Neuroplasticity in post-stroke aphasia: A systematic review and meta-analysis of functional imaging studies of reorganization of language processing

Supplementary Tables

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Note

Interactive tables with hyperlinks and tooltips can be accessed at:
https://langneurosci.org/aphasia-neuroplasticity-review
| Study                | Language | Inclusion criteria                                                                                                                                                                                                                                                                                                                                 | N  | N  | N | Notes                                                                 |
|---------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|---|---------------------------------------------------------------------|
| Weiller et al. (1995) | German   | Lesion including L pSTG; moderate-to-severe Wernicke’s aphasia in the subacute period; now recovered and not aphasic per formal testing; able to perform verb generation task                                                                                                                                       | 6  | 6  | N | 6 patients were selected from a database of 600 carefully documented cases |
| Belin et al. (1996)   | French   | MCA; persistent severe non-fluent aphasia followed by marked improvement with MIT                                                                                                                                                                                                                                                                  | 7  | 0  | N |                                                                     |
| Ohyama et al. (1996)  | Japanese | Able to repeat single words                                                                                                                                                                                                                                                                                                                      | 16 | 6  | N |                                                                     |
| Heiss et al. (1997)   | German   | —                                                                                                                                                                                                                                                                                                                                               | 6  | 6  | N |                                                                     |
| Karbe et al. (1998)   | German   | MCA; able to repeat single words                                                                                                                                                                                                                                                                                                                  | 12 | 10 | N | Only 7 of the 12 patients took part at T2                           |
| Cao et al. (1999)     | US English | Aphasia with significant recovery over months to years (ADPASS > 70th percentile)                                                                                                                                                                                                       | 6  | 37 | N | 2 additional patients excluded: 1 unable to reliably describe performance post-scan; 1 due to head motion |
| Heiss et al. (1999)   | German   | AAT repetition ≥ 50                                                                                                                                                                                                                                                                                                                               | 23 | 11 | N |                                                                     |
| Kessler et al. (2000) | German   | Mild to moderate aphasia on TT; at least 50 out of 150 on AAT repetition                                                                                                                                                                                                                                                                         | 24 | 0  | N |                                                                     |
| Rosen et al. (2000)   | US English | L IFG, possibly extending to neighboring regions                                                                                                                                                                                                                                                                                                    | 6  | 14 | Y | 1 participant was reported in a previous case study; of the 14 controls, 6 were studied with PET and 8 with fMRI |
| Blasi et al. (2002)   | US English | L IFG, possibly extending to neighboring regions                                                                                                                                                                                                                                                                                                     | 8  | 14 | N |                                                                     |
| Leff et al. (2002)    | UK English | —                                                                                                                                                                                                                                                                                                                                               | 15 | 8  | N |                                                                     |
| Blank et al. (2003)   | UK English | Initial non-fluent aphasia due to anterior perisylvian lesion; subsequently recovered the ability to speak in sentences; patients were divided into those with and without damage to the IFG pars opercularis (POp+: n = 7; POp-: n = 7)                                                                 | 14 | 12 | N | 8 of 12 controls included in Blank et al. (2002)                     |
| Cardebat et al. (2003)| French   | No severe aphasia; no leukoaraiosis                                                                                                                                                                                                                                                                                                              | 8  | 6  | N |                                                                     |
| Sharp et al. (2004)   | UK English | Lesion in vicinity of L STG; no extensive frontal damage; no inferior temporal damage; able to perform tasks                                                                                                                                                                                                                                       | 9  | 18 | N |                                                                     |
| Zahn et al. (2004)    | German   | Global aphasia in the first three months; some improvement of comprehension within 6-12 months                                                                                                                                                                                                                                                    | 7  | 14 | N |                                                                     |
| Crinion & Price (2005)| UK English | —                                                                                                                                                                                                                                                                                                                                               | 17 | 18 | N |                                                                     |
| de Boissezon et al. (2005) | French | Subcortical stroke; no severe aphasia                                                                                                                                                                                                                                                                                                      | 7  | 0  | N |                                                                     |
| Connor et al. (2006)  | US English | L IFG, possibly extending to neighboring regions                                                                                                                                                                                                                                                                                                   | 8  | 14 | Y | Re-analysis of data from Blasi et al. (2002)                        |
| Crinion et al. (2006) | UK English | —                                                                                                                                                                                                                                                                                                                                               | 24 | 11 | N | Results of control participants previously reported in Crinion et al. (2003) |
| Saur et al. (2006)    | German   | MCA; age < 70 years; able to distinguish forward vs backward speech outside the scanner; no pronounced small vessel disease                                                                                                                                                                                                                        | 14 | 14 | N | 4 additional patients excluded: 1 health problems; 1 scanner noise; 2 did not tolerate fMRI; 198 patients with aphasia were screened |
| Meinzer et al. (2008)| German   | —                                                                                                                                                                                                                                                                                                                                               | 11 | 0  | N |                                                                     |
| Study                        | Language | Country | Diagnosis                                  | N  | Type | Notes                                                                                                                                 |
|------------------------------|----------|---------|--------------------------------------------|----|------|---------------------------------------------------------------------------------------------------------------------------------------|
| Raboyeau et al. (2008)       | French   |         | Naming deficit; good comprehension         | 10 | 20   | 8 additional patients excluded: 5 completed only one of the two sessions; 3 unable to perform the tasks                             |
| Richter et al. (2008)        | German   |         | Main deficits in production rather than comprehension | 16 | 8    | 7 out of 13 patients appear to represent the same data reported in de Boissezon et al. (2005)                                       |
| de Boissezon et al. (2009)   | French   |         | Only part of L MCA; able to perform word generation; no severe aphasia | 13 | 0    | 8 additional patients excluded: 5 completed only one of the two sessions; 3 unable to perform the tasks                             |
| Fridriksson et al. (2009)    | US English |         | —                                           | 11 | 10   | 15 controls were scanned but 3 were randomly excluded to match group sizes for jICA.                                               |
| Menke et al. (2009)          | German   |         | Moderate to severe anoma                    | 8  | 9    |                                                                                                                                        |
| Specht et al. (2009)         | German   |         | —                                           | 12 | 12   | 8 additional patients excluded: lesions involved L anterolateral superior temporal cortex; reanalysis of subset of dataset from Crinion et al. (2006) |
| Warren et al. (2009)         | UK English |         | Comprehension deficit per CAT and TROG (1 patient did not meet this criterion); anterolateral superior temporal cortex spared | 16 | 11   | 8 additional patients excluded: lesions involved L anterolateral superior temporal cortex; reanalysis of subset of dataset from Crinion et al. (2006) |
| Chau et al. (2010)           | Cantonese |         | —                                           | 7  | 0    | 7 additional patients excluded: 6 for making fewer than 5 correct responses in one or more sessions; 1 for excessive head motion; “several” patients overlapped with those reported by Fridriksson et al. (2009, 2010); demographic data includes excluded patients |
| Fridriksson (2010)           | US English |         | —                                           | 19 | 0    |                                                                                                                                        |
| Fridriksson et al. (2010)    | US English |         | —                                           | 15 | 9    |                                                                                                                                        |
| Sharp et al. (2010)          | UK English |         | Lesion in vicinity of L STG; no extensive frontal damage; no inferior temporal damage; able to perform tasks | 9  | 18   | Additional analysis of same dataset as Sharp et al. (2004)                                                                             |
| Thompson et al. (2010)       | US English |         | Agrammatic                                  | 6  | 12   |                                                                                                                                        |
| Tyler et al. (2010)          | UK English |         | —                                           | 14 | 10   | 2 of the 14 patients were not stroke, but were post resective surgery                                                                |
| van Oers et al. (2010)       | Dutch    |         | MCA; mRS < 3; able to perform at least 2 out of the 3 tasks | 13 | 13   |                                                                                                                                        |
| Papoutsi et al. (2011)       | UK English |         | —                                           | 14 | 15   | Reanalysis of same dataset from Tyler et al. (2011); 1 patient had post-surgical haematoma rather than stroke (per Tyler et al., 2011) |
| Sebastian & Kiran (2011)     | US English |         | —                                           | 8  | 8    |                                                                                                                                        |
| Szaflarski et al. (2011)     | US English |         | Moderate aphasia, L MCA                     | 8  | 0    | 3 additional patients excluded: 2 metallic artifact; 1 seizure at time of stroke                                                   |
| Tyler et al. (2011)          | UK English |         | —                                           | 14 | 15   | Not stated, but it seems like most of the patients also participated in Tyler et al. (2010); 1 patient had post-surgical haematoma rather than stroke |
| Weiduschat et al. (2011)     | German   |         | Age 55-85                                   | 10 | 0    | 4 additional patients excluded: 3 malfunction of TMS device or claustrophobia; 1 recovered nearly completely prior to intervention |
| Allendorfer et al. (2012)    | US English |         | MCA; moderate-severe aphasia; mRS ≤ 3        | 16 | 32   | "Part of a larger ongoing study", may overlap with other studies from this group                                                   |
| Fridriksson, Hubbard, et al. (2012) | US English |         | Broca's aphasia                             | 10 | 20   | 3 additional patients excluded: 1 due to a metal implant; 2 for severely non-fluent                                                   |
| Study                        | Language | Region | Description                          | N | Y | Exclusion Reason                                                                 |
|-----------------------------|----------|--------|--------------------------------------|---|---|---------------------------------------------------------------------------------|
| Fridriksson, Richardson, et al. (2012) | US English | —      | speech; demographic data includes excluded patients | 29 | 14 | Y 1 additional patient excluded: contraindications to MRI; 26 of 30 patients were included in Fridriksson (2010); demographic data includes excluded patient |
| Marcotte et al. (2012)      | Canadian French | Moderate-severe aphasia; anomia | 9 | 0 | N |
| Schofield et al. (2012)     | UK English | Comprehension deficit | 20 | 26 | Y 1 additional patient excluded: excessive head motion; patients recruited from database so may have participated in prior studies from this group, but not stated explicitly; demographic data includes excluded patient |
| Wright et al. (2012)        | UK English | —      | Y Unclear how many, if any, patients were included in previous studies from this group; design is identical to Tyler et al. (2010); 3 of the 21 patients were not stroke, but were post resective surgery |
| Szafarski et al. (2013)     | US English | —      | Y 6 additional patients excluded: 4 did not tolerate MRI or PET scans; 2 TMS device was defective |
| Thiel et al. (2013)         | German   | Anomia; no severe AoS or dysarthria | 14 | 0 | N 9 additional patients excluded: 4 for ceiling performance; 5 for technical problems |
| Benjamin et al. (2014)      | US English | "at least minimal evidence of non-fluent output"; lesion including precentral gyrus or underlying white matter | 14 | 0 | N |
| Brownsett et al. (2014)     | UK English | No involvement of ACA territory | 16 | 17 | N 3 additional patients excluded: 2 withdrew after attempting first scan; 1 had severe dysarthria |
| Mattioli et al. (2014)      | Italian  | L MCA; comprehension mildly impaired | 12 | 10 | N Treated and untreated groups differed in severity at baseline, albeit not significantly |
| Mohr et al. (2014)          | UK English | MCA; mild-moderate non-fluent aphasia; no severe comprehension deficit | 6 | 0 | N 6 additional patients excluded: 4 for health risks; 2 for technical problems and data loss; patient numbers in tables 1 and 2 appear not to correspond with patient numbers later in the paper |
| Robson et al. (2014)        | UK English | Wernicke's aphasia (impaired spoken single word comprehension, impaired single word repetition, fluent, sentence-like speech with phonological/neologistic errors) | 12 | 12 | N |
| Szafarski et al. (2014)     | US English | —      | Y Some participants included in Allendorfer et al. (2012); one participant was < 18 years old at time of stroke; there was also a perinatal stroke group, not relevant for this review; 3 participants were excluded but it is not stated whether they were adult or perinatal patients. |
| van Hees et al. (2014)      | Australian English | —      | Y |
| Abel et al. (2015)          | German   | Anomia; no severe AoS or dysarthria | 14 | 14 | Y 9 additional patients excluded: 4 for ceiling performance; 5 for technical problems; same dataset as Abel et al. (2014) |
| Kiran et al. (2015)         | US English | Impaired naming | 8 | 8 | N |
| Sandberg et al. (2015)      | US English | —      | Y |
| Study | Country | Condition | n | M | Gender | Notes |
|-------|---------|-----------|---|---|--------|-------|
| Geranmayeh et al. (2016) | UK English | No severe receptive aphasia | 53 | 24 | N | Prior strokes were allowed only if no aphasia resulted |
| Griffis et al. (2016) | US English | Moderate aphasia, L MCA | 8 | 0 | Y | 3 additional patients excluded: 2 metallic artifact; 1 seizure at time of stroke; same patients as Szaflarski et al. (2011); different fMRI paradigm acquired in the same sessions |
| Sims et al. (2016) | US English | Some spared tissue in L IFG | 14 | 8 | Y | 2 additional patients excluded: 1 had no spared tissue in the L IFG; 1 had a R hemisphere stroke; although not stated, it is apparent that many of the patients were included in Sandberg et al. (2015) |
| Darkow et al. (2017) | German | L hand motor area spared; mild aphasia | 16 | 16 | N | |
| Geranmayeh et al. (2017) | UK English | — | 27 | 0 | Y | Patients are a subset of those in Geranmayeh et al. (2016); 24 control participants are described, but no imaging data from the controls are analyzed in this paper |
| Griffis, Nenert, Allendorfer, & Szaflarski (2017) | US English | — | 43 | 43 | Y | Same dataset as Griffis et al. (2017) Hum Brain Mapp |
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017) | US English | — | 43 | 43 | Y | Data were collected as part of “several separate studies” |
| Harvey et al. (2017) | US English | Mild-moderate non-fluent aphasia; relatively intact comprehension; able to produce meaningful words and phrases | 6 | 0 | N | |
| Nardo et al. (2017) | UK English | Anomia; good single word comprehension; relatively spared word and nonword repetition; no AoS; spared or partially spared L IFG | 18 | 0 | N | |
| Nenert et al. (2017) | US English | At least mild aphasia per TT | 19 | 38 | Y | Patients are a subset of the 24 participants in Szaflarski et al. (2015), a clinical trial on CIAT |
| Qiu et al. (2017) | Mandarin | Broca's aphasia | 10 | 10 | N | 14 additional patients excluded: < 20% accuracy in scanner; 29 of the participants overlap with the other Skipper-Kallal et al. (2017) paper |
| Skipper-Kallal et al. (2017a) | US English | Able to name 20% of pictures correctly in the scanner | 32 | 25 | Y | 10 additional patients excluded: < 10% accuracy in scanner; 29 of the participants overlap with the other Skipper-Kallal et al. (2017) paper |
| Skipper-Kallal et al. (2017b) | US English | 10% accuracy on scanner task | 39 | 37 | Y | |
| Dietz et al. (2018) | US English | — | 12 | 0 | Y | 2 additional patients excluded: 1 for illness; 1 for MRI contraindication or personal conflict (inconsistent information provided); same data as Dietz et al. (2016), which is a methodological paper |
| Hallam et al. (2018) | UK English | Semantic aphasia; left frontal damage (+ other regions, typically) | 14 | 16 | N | |
| Nenert et al. (2018) | US English | Aphasia at acute screening (not necessarily at first study time point) | 17 | 85 | N | 1 additional patient excluded: significant signal artifacts; presence and severity of aphasia assessed on hospital admission, not at first study time point, so it is not clear that all participants actually had aphasia at first study time point |
| Pillay et al. (2018) | US English | Residual phonologic retrieval deficit; intact semantic processing | 21 | 0 | N | |
| Study & Authors            | Language | Description                                                                 | N | Control | Data reuse | Limitations                                                                 |
|---------------------------|----------|------------------------------------------------------------------------------|---|---------|------------|----------------------------------------------------------------------------|
| Szafranski et al. (2018)  | US English | —                                                                            | 12| 0       | N          | 1 additional patient excluded: scanned at only 2 out of 3 time points      |
| van de Sandt-Koenderman et al. (2018) | Dutch | Severe non-fluent aphasia (< 50 words/minute); articulation deficits; repetition severely affected; moderate-good auditory comprehension | 9 | 0   | N          |                                                                           |
| van Oers et al. (2018)    | Dutch | MRS ≤ 3; ability to perform tasks                                             | 12| 8       | N          | 1 additional patient excluded: developed a hematoma between baseline and post-testing; one patient had two strokes within one day, but we would consider that essentially a single stroke |
| Barbieri et al. (2019)    | US English | —                                                                            | 18| 23      | N          |                                                                           |
| Johnson et al. (2019)     | US English | Anomia                                                                       | 30| 17      | N          | 5 additional patients excluded: 2 withdrew from non-treatment arm; 3 fMRI acquisition errors; 1 did not complete treatment and post-treatment scanning (but of these latter 4, one must have at least completed the non-treatment arm); there were 26 patients in the treated group and 10 in the untreated group, but 6 patients overlapped between the two groups (they joined the treated group after completing the untreated phase) |
| Kristinsson et al. (2019) | US English | < 80% on PNT; able to name at least 5 out of 40 items during fMRI; WAB-R spontaneous speech ≥ 2; WAB-R auditory comprehension ≥ 2 | 87| 0       | Y          | 65 were previously included in Fridriksson et al. (2018), a tDCS study     |
| Purcell et al. (2019)     | US English | Chronic dysgraphia (acquired impairment in spelling)                         | 21| 0       | N          | 4 additional patients excluded: 3 health reasons; 1 data acquisition error |
| Sreedharan, Chandran, et al. (2019) | Malayalam | Broca's aphasia or anomic aphasia; comprehension relatively preserved; "motivated for speech therapy" | 8 | 4 | N          | 3 additional patients excluded: 2 for claustrophobia; 1 for transportation issues |
| Hartwigsen et al. (2020)  | German | Lesion involving left temporo-parietal cortex and sparing left frontal cortex; relatively well-recovered | 12| 0   | N          | 2 additional patients excluded: 1 lost to follow-up; 1 did not show any sound-related neural activation in auditory cortex after sham cTBS |
| Stockert et al. (2020)    | German | Lesion localized to frontal or temporal cortex                               | 34| 17     | Y          | 50 additional patients excluded: 19 lesions spanned frontal and temporal, or were subcortical, or had persisting large vessel occlusions; 31 not all three timepoints were acquired; 8 patients were included in Saur et al. (2006); there may also be overlap with Saur et al. (2010), a study that did not meet our inclusion criteria; 1630 patients screened for inclusion; frontal patients scanned later than temporal patients at T1 and T2 |

N aphasia = Number of individuals with aphasia; N control = Number of control participants; Data reuse = Were any of the participants included in any previous studies?; AAT = Aachen Aphasia Test; ACA = anterior cerebral artery; ADPASS = Aphasia Diagnostic Profiles Aphasia Severity Score; AoS = apraxia of speech; CAT = Comprehensive Aphasia Test; CIAT = constraint-induced aphasia therapy; fMRI = functional magnetic resonance imaging; IFG = inferior frontal gyrus; jICA = joint independent components analysis; L = left; MCA = middle cerebral artery; MIT = melodic intonation therapy; mRS = modified Rankin Scale; N = No; PET = positron emission tomography; Pop+ = pars opercularis damaged; Pop- = pars opercularis spared; pSTG = posterior superior temporal gyrus; R = right; STG = superior temporal gyrus; T1, T2, etc. = first time point, second time point, etc.; TMS = transcranial magnetic stimulation; TROG = Test for Reception of Grammar; TT = Token Test; Y = Yes; Yellow underline = minor limitation; Orange underline = moderate limitation.
## Supplementary Table S2. Participants: Demographic data

| Study                | Age                                      | Sex                  | Handedness          | Time post onset                                      |
|----------------------|------------------------------------------|----------------------|---------------------|-----------------------------------------------------|
| Weiller et al. (1995) | N (mean 58 years, range 50-66 years; controls were younger: mean 35 years; range 27-50 years) | Y (6 M/0 F)         | Y (6 R/0 L)        | Y (range 5-117 months)                              |
| Belin et al. (1996)  | Y (mean 49.7 years, range 40-58 years)   | N                    | Y (7 R/0 L)        | Y (range 15-149 months; including MIT for the most recent 1-108 months) |
| Ohyama et al. (1996) | Y (mean 56.6 ± 11.8 years, range 38-75 years) | Y (12 M/4 F)       | Y (16 R/0 L)       | N* (mean 15.1 ± 16.7 months, range 1.1-50.3 months; a mix of subacute and chronic participants; 8 of each) |
| Heiss et al. (1997)  | Y (range 33-66 years)                     | Y (4 M/2 F)         | Y (6 R/0 L)        | Y (T1: ~4 weeks; T2: ~12-18 months)                |
| Karbe et al. (1998)  | N (mean 57 years, range 34-78 years; controls not matched for age) | Y (7 M/5 F); stated to be not matched, but difference not significant | Y (12 R/0 L) | Y (T1: mean 24 ± 11 days, ~3-4 weeks; T2: mean 19 ± 2 months, > 1 year) |
| Cao et al. (1999)    | Y (range 20-56 years)                     | Y (1 M/5 F)         | Y (6 R/0 L)        | Y (range 5-32 months)                              |
| Heiss et al. (1999)  | Y (mean 56 ± 12 years, range 31-77 years; assume patient's age of 5.6 years is a typo for 56 years) | Y (15 M/8 F)       | Y (23 R/0 L)       | Y (T1: ~2 weeks; T2: ~8 weeks)                      |
| Kessler et al. (2000)| Y (piracetam group: mean 57.4 ± 13.5 years; placebo group: mean 56.3 ± 10.0 years) | Y (13 M/11 F)      | Y (24 R/0 L)       | Y (T1: ~2 weeks; T2: ~8 weeks)                      |
| Rosen et al. (2000)  | N (mean 47 years, range 32-72 years; control participants not age-matched) | Y (3 M/3 F)         | Y (6 R/0 L)        | Y (range 0.5-7.6 years)                            |
| Blasi et al. (2002)  | N (mean 48.6 years; patients and controls not closely matched for age, unclear if difference significant) | Y (2 M/6 F)         | Y (8 R/0 L)        | N (> 6 months; actual TPO not stated)               |
| Leff et al. (2002)   | Y (range 43-76 years)                     | Y (11 M/4 F)        | Y (11 R/0 L)       | Y (range 5-76 months)                              |
| Blank et al. (2003)  | Y (POp+: median 50 years, range 36-72 years; POp-: median 61 years, range 39-70 years) | Y (8 M/6 F)         | Y (14 R/0 L)       | Y (POp+: median 39 months, range 19-134 months; POp-: median 17 months, range 6-240 months) |
| Cardebat et al. (2003)| Y (mean 58.4 ± 11.9 years, range 37-73 years) | Y (7 M/1 F)         | Y (8 R/0 L)        | N* (T1: 58 ± 35 days, range 11-113 days; T2: 11.7 ± 1.6 months, range 320-460 days; T1 varies considerably from early to late subacute) |
| Sharp et al. (2004)  | Y (median 58 years, range 39-72 years)    | Y (8 M/1 F)         | Y (9 R/0 L)        | Y (mean 45 months, range 14-145 months)            |
| Zahn et al. (2004)   | Y (range 29-67 years)                     | Y (6 M/1 F)         | Y (7 R/0 L)        | Y (range 6 months-4 years)                         |
| Crinion & Price (2005)| Y (mean 62 ± 2.7 SEM years, range 34-75 years) | Y (12 M/5 F)       | Y (17 R/0 L)       | Y (range 4-125 months; aphasia with temporal damage (n=8) mean 41 months; aphasia without temporal damage (n=9) mean 48 months) |
| de Boissezon et al. (2005)| Y (mean 52.4 ± 13 years, range 31-69 years) | Y (7 M/0 F)         | Y (7 R/0 L)        | N* (T1: mean 53 ± 35 days, range 11-108 days; T2: mean 12.2 ± 1.4 months; T1 varies considerably from early to late subacute) |
| Connor et al. (2006) | N (mean 48.6 years; patients and controls not closely matched for age, unclear if difference significant) | Y (2 M/6 F)         | Y (8 R/0 L)        | N (> 6 months; actual TPO not stated)               |
| Crinion et al. (2006) | Y (range 32-85 years)                     | Y (18 M/6 F)        | Y (24 R/0 L)       | N (mean 32 months, range 2-204 months; combines subacute and chronic patients) |
| Saur et al. (2006)   | Y (mean 51.9 ± 14.2 years, range 16-68 years) | Y (11 M/3 F)       | Y (12 R/1 L)       | Y (T1 acute: mean 1.8 days, range 0-4 days; T2 subacute: mean 12.1 days, |
| Study                        | Age Range                  | Gender | Study Stage | Notes                                                                 |
|------------------------------|----------------------------|--------|-------------|----------------------------------------------------------------------|
| Meinzer et al. (2008)        | Y (median 51.0 years, range 19-66 years) | Y (7 M/4 F) | Y (11 R/0 L) | Y (median 32 months; range 6-480 months)                              |
| Raboyeau et al. (2008)       | N (mean 53.8 ± 14.7 years; controls were younger) | Y (6 M/4 F) | Y (10 R/0 L) | Y (range 7-102 months)                                                |
| Richter et al. (2008)        | Y (mean 58.3 years; range 42-73 years) | Y (12 M/4 F) | Y (16 R/0 L) | N (> 12 months; actual TPO not stated)                                |
| de Boissezon et al. (2009)   | Y (range 31.2-74.2 years)    | Y (12 M/1 F) | Y (13 R/0 L) | N* (T1: mean 64 ± 32 days; T2: mean 11.8 ± 1.4 months; T1 varies considerably from early to late subacute) |
| Raboyeau et al. (2008)       | Y (mean 53.8 ± 14.7 years; controls were younger) | Y (6 M/5 F) | N           | Y (range 10-101 months)                                               |
| Menke et al. (2009)          | Y (mean 58.3 years; range 33-78 years) | Y (11 R/0 L) | Y (range 1.8-6.9 years) | N* (T1: mean 64 ± 32 days; T2: mean 11.8 ± 1.4 months; T1 varies considerably from early to late subacute) |
| Specht et al. (2009)         | N (mean 49 ± 14 years, range 30-71 years; controls were younger) | Y (9 M/3 F) | N           | Y (mean 1.9 ± 1.4 years, range 0.2-3.7 years; one non-chronic patient is included) |
| Warren et al. (2009)         | N (mean 65.8 ± 2.0 SEM years; controls were younger) | Y (11 M/5 F) | Y (16 R/0 L) | N (mean 28.8 ± 9.2 months SEM; minimum time post onset not reported, but some patients in Crinion et al. (2006) were subacute) |
| Chau et al. (2010)           | Y (mean 63 ± 10 years, range 56-79 years) | Y (5 M/2 F) | Y (7 R/0 L) | Y (mean 17 ± 8 months, range 8-28 months)                             |
| Fridriksson (2010)           | Y (mean 59.7 ± 12.3 years)   | Y (12 M/14 F) | N           | Y (> 8 months; actual TPO not stated)                                 |
| Fridriksson et al. (2010)    | Y (mean 61.9 years, range 41-81 years) | N (7 M/8 F); not stated for controls | N           | Y (mean 29.7 years, > 6 months)                                       |
| Sharp et al. (2010)          | Y (median 58 years, range 39-72 years) | Y (8 M/1 F) | Y (9 R/0 L) | Y (mean 45 months, range 14-145 months)                               |
| Thompson et al. (2010)       | Y (mean 54 years, range 38-66 years) | Y (5 M/1 F) | Y (6 R/0 L) | Y (range 6-146 months)                                                |
| Tyler et al. (2010)          | Y (mean 54 years, range 33-76 years) | Y (11 M/3 F) | Y (14 R/0 L) | Y (mean 7 years, range 1.4-3.7 years)                                |
| van Oers et al. (2010)       | Y (mean 53 ± 14 years, range 29-74 years) | Y (4 M/9 F) | N (13 R/0 L); not stated for controls | Y (range 1.3-4.7 years)                                                |
| Papoutsi et al. (2011)       | Y (mean 56 ± 12 years, range 35-77 years) | Y (11 M/3 F) | Y (14 R/0 L) | Y (mean 8 ± 9 years, range 2-40 years)                                |
| Sebastian & Kiran (2011)     | Y (range 40-79 years)        | N (5 M/3 F); control sex not stated, but reported to be matched | Y (8 R/0 L) | Y (mean 48.3 months, range 30-78 months)                              |
| Szaflarski et al. (2011)     | Y (mean 54.4 ± 12.7 years)   | Y (4 M/4 F) | Y (8 R/0 L) | Y (mean 5.3 ± 3.6 years, > 12 months)                                |
| Tyler et al. (2011)          | Y (mean 56 years, range 34-77 years) | Y (11 M/3 F) | Y (14 R/0 L) | Y (mean 7 years, > 1.5 years)                                         |
| Weiduschat et al. (2011)     | Y (range 59-83 years)        | Y (5 M/5 F) | Y (10 R/0 L) | Y (range 18-97 days; patients at different subacute stages of recovery) |
| Allendorfer et al. (2012)    | Y (mean 54.4 ± 9.5 years, range 38-78 years) | Y (9 M/7 F) | Y (16 R/0 L) | Y (mean 3.7 ± 3.5 years, range 0.5-11.4 years)                       |
| Fridriksson, Hubbard, et al. (2012) | Y (mean 56.9 ± 9.2 years, range 45-75 years) | N (9 M/4 F); control sex not matched | Y (12 R/1 L) | Y (mean 63.8 ± 64.3 months, range 10-261 months)                      |
| Fridriksson, Richardson, et al. (2012) | Y (mean 59.2 years, range 33-81 years) | N (14 M/16 F); not stated for controls | N           | Y (mean 51.1 months, range 6-350 months)                              |
| Marcotte et al. (2012)       | Y (mean 62 ± 6.0 years, range 50-67 years) | Y (5 M/4 F) | Y (9 R/0 L) | Y (mean 110.2 ± 92.5 months, range 50-300 months)                    |
| Study                        | Duration (Range)                  | Sex (M/F) | Control Matched | Year Excluded | Duration (Range)                  |
|------------------------------|-----------------------------------|-----------|-----------------|--------------|-----------------------------------|
| Schofield et al. (2012)      | Y (range 35.8-90.3 years)         | N         | 16 M/4 F        | Y (16 M/4 F) | Y (range 35.8-90.3 years)         |
| Wright et al. (2012)         | Y (mean 57.4 ± 12.5 years)        | Y (15 M/6 F) | Y (21 R/0 L)    | Y (mean 6.5 ± 7.5 years, > 1.4 years) |
| Szaflarski et al. (2013)     | Y (recovered: mean 50 ± 13 years; non-recovered: mean 51 ± 13 years) | Y (15 M/12 F) | Y (27 R/0 L)    | Y (recovered: mean 2.1 ± 2.1 years; non-recovered: mean 4.9 ± 3.1 years) |
| Thiel et al. (2013)          | Y (rTMS group: mean 69.8 ± 8.0 years; sham group: mean 71.2 ± 7.8 years) | N         | Y (24 R/0 L)    | Y (rTMS group: mean 37.5 ± 18.5 days; sham group: mean 50.6 ± 22.6 days) |
| Abel et al. (2014)           | Y (median 48 years, range 35-74 years) | Y (10 M/4 F) | Y (14 R/0 L)    | Y (median 41 months, range 11-72 months) |
| Benjamin et al. (2014)       | Y (intention group: mean 72.1 ± 10.5 years; control group: mean 63.0 ± 9.2 years) | Y (8 M/6 F) | Y (14 R/0 L)    | Y (intention group: mean 37.4 ± 33.5 months, range 12-87 months; control group: 38.1 ± 37.4 months, range 10-112 months) |
| Brownsett et al. (2014)      | Y (mean 60 years, range 37-84 years) | Y (11 M/5 F) | Y (16 R/0 L)    | Y (mean 4 years, range 6 months-11 years) |
| Mattioli et al. (2014)       | N (range 37-79 years; control ages not reported, though reported to be matched) | N (7 M/5 F); control sex not stated, but reported to be matched | Y (12 R/0 L) | Y (T1: mean 2.2 ± 1.3 days; T2: mean 16.2 ± 1.3 days; T3: mean 190 ± 25.5 days) |
| Mohr et al. (2014)           | Y (range 41-76 years)             | Y (5 M/1 F) | Y (6 R/0 L)     | Y (range 17-234 months (including excluded patients)) |
| Robson et al. (2014)         | Y (mean 70.1 ± 8.7 years, range 59-87 years) | Y (10 M/2 F) | Y (12 R/0 L)    | Y (range 7-84 months)              |
| Szaflarski et al. (2014)     | Y (mean 51.8 ± 15.1 years)        | Y (18 M/14 F) | N               | Y (mean 3.2 ± 3.1 years, > 6 months) |
| van Hees et al. (2014)       | Y (mean 56.4 ± 9.2 years; range 41-69 years) | Y (3 M/5 F) | Y (8 R/0 L)     | Y (mean 52.3 ± 49.8 months; range 17-170 months) |
| Abel et al. (2015)           | Y (median 48 years, range 35-74 years) | Y (10 M/4 F) | Y (14 R/0 L)    | Y (median 41 months, range 11-72 months) |
| Kiran et al. (2015)          | Y (mean 58 years)                 | Y (7 M/1 F) | N               | Y (range 15-157 months)             |
| Sandberg et al. (2015)       | Y (mean 59 years, range 47-75 years) | Y (7 M/3 F) | Y (10 R/0 L)    | Y (range 7-134 months)             |
| Geranmayeh et al. (2016)     | Y (mean 62 ± 14 years, range 26-83 years) | N (32 M/21 F); controls were mostly female, unlike patients | Y (50 R/3 L) | Y (mean 111 ± 27 days, range 84-200 days) |
| Griffis et al. (2016)        | Y (mean 54.4 ± 12.7 years)        | Y (4 M/4 F) | Y (8 R/0 L)     | Y (mean 5.3 ± 3.6 years)            |
| Sims et al. (2016)           | Y (mean 59.7 years, range 48-75 years) | Y (10 M/4 F) | Y (14 R/0 L)    | Y (mean 6 years, range 6 months-13 years) |
| Darkow et al. (2017)         | Y (mean 56.7 ± 10.1 years)        | Y (10 M/6 F) | Y (16 R/0 L)    | Y (mean 54.3 ± 45.3 months, range 12-169 months) |
| Geranmayeh et al. (2017)     | Y (mean 59.1 ± 10.8 years, range 39-77 years) | Y (18 M/9 F) | Y (26 R/1 L)    | Y (T1: 15 ± 7.6 days (range 5-35 days); T2: 108 ± 26 days (range 87-200 days)) |
| Griffis, Nenert, Allendorfer, & Szaflarski (2017) | Y (mean 53 ± 15 years, range 23-90 years) | Y (25 M/18 F) | Y (41 R/2 L)    | Y (range 1-14 years)               |
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017) | Y (mean 53 ± 15 years, range 23-90 years) | Y (25 M/18 F) | Y (41 R/2 L)    | Y (range 1-14 years)               |
| Harvey et al. (2017)         | Y (range 47-75 years)             | Y (5 M/1 F) | Y (6 R/0 L)     | Y (range 6-102 months)             |
| Nardo et al. (2017)          | Y (mean 50 ± 12 years, range 21-67 years) | Y (12 M/6 F) | Y (18 R/0 L)    | Y (mean 61 ± 58 months, range 5-264 months) |
| Nenert et al.                | Y (CIAT group: mean 58.0 ± 10.6 years) | Y (11 M/8 F) | N (17 R/0 L); 2 | Y (CIAT group: mean 60.2 ± 48.9 | days) |
| Year          | Study                                      | Patients | Treatment Group | Patients “atypical”: (unclear whether L or mixed) | Months: untreated group: mean 41.9 ± 30.0 months; all > 1 year) |
|--------------|--------------------------------------------|----------|----------------|-----------------------------------------------|---------------------------------------------------------------|
| 2017         | Qiu et al. (2017)                          | Y (mean 55.9 ± 13.4 years, range 40-70 years) | Y (7 M/3 F) | Y (10 R/0 L) | Y (range 1-3 months) |
|              | Skipper-Kallal et al. (2017a)              | Y (mean 58.8 ± 8.6 years, range 45.7-78.2 years) | Y (19 M/12 F); stated to be not matched, but difference not significant | Y (26 R/3 L) | Y (mean 40.9 ± 36.1 months, 4.9-151.0 months) |
|              | Skipper-Kallal et al. (2017b)              | Y (mean 59.8 ± 10.0 years) | Y (26 M/13 F) | Y (33 R/4 L); missing for 2 participants | Y (mean 52.9 ± 51.4 months, range 6.3-255.7 months) |
|              | Dietz et al. (2018)                        | Y (mean 58.8 ± 8.6 years, range 45.7-78.2 years) | Y (19 M/12 F); stated to be not matched, but difference not significant | Y (26 R/3 L) | Y (mean 40.9 ± 36.1 months, 4.9-151.0 months) |
|              | Hallam et al. (2018)                       | Y (mean 61 ± 11 years, range 38-80 years) | Y (5 M/7 F) | Y (11 R/1 L) | Y (AAC group: range 16-170 months; usual care group: range 38-105 months) |
|              | Nenert et al. (2018)                       | Y (mean 46 ± 16 years) | Y (9 M/8 F) | N (17 R/0 L); all patients stated to be right handed, but “ambidextrous patients” mentioned on p. 364 | N* (T1: ~2 weeks; T2: ~6 weeks; T3: ~12 weeks; T4: ~26 weeks; T5: ~52 weeks) |
|              | Pillay et al. (2018)                       | Y (mean 56.4 ± 12.5 years, range 30-80 years) | Y (11 M/10 F) | Y (21 R/0 L) | Y (mean 1134 ± 1491 days, range 180-6732 days) |
|              | Szaflarski et al. (2018)                   | Y (range 26-66 years) | Y (9 M/3 F) | Y (11 R/1 L) | Y (range 1-12 years) |
|              | van de Sandt-Koenderman et al. (2018)      | Y (subacute: mean 51.2 years, range 25-61 years; chronic: mean 54.0 years, range 21-66 years) | Y (5 M/4 F) | Y (8 R/0 L) | Y (subacute: range 0.5-3 months; chronic: range 17-40 months) |
|              | van Oers et al. (2018)                     | Y (mean 67.9 ± 11.4 years, range 46-86 years) | Y (10 M/2 F) | Y (12 R/0 L) | N* (T1: within 2 weeks; T2: ~3 months; T3: ~6 months; T4: ~12 months; specific timing of first time point not stated) |
|              | Barbieri et al. (2019)                     | N (range 22-73 years; controls were younger) | Y (11 M/7 F) | N (15 R/3 L); not stated for controls | Y (range 13-107 months) |
|              | Johnson et al. (2019)                      | Y (treated group: mean 62.8 ± 10.2 years, range 42-80 years; untreated group: mean 59.0 ± 11.8 years, range 39-79 years) | Y (21 M/9 F) | Y (27 R/3 L) | Y (treated group: mean 58.3 ± 51.8 months, range 12-170 months; untreated group: mean 85.2 ± 141.9 months, range 10-467 months) |
|              | Kristinsson et al. (2019)                  | Y (typical BDNF genotype group mean 59.6 ± 11.2 years, range 29-77 years; atypical BDNF genotype group mean 57.7 ± 10.9 years, range 30-76 years) | Y (58 M/29 F) | Y (87 R/0 L) | Y (typical BDNF genotype group: mean 44.0 ± 38.7 months; atypical BDNF genotype group: mean 34.5 ± 36.9 months; all participants > 6 months) |
|              | Purcell et al. (2019)                      | Y (range 40-80 years) | Y (13 M/8 F) | Y (16 R/3 L) | Y (range 14-209 months) |
|              | Sreedharan, Chandran, et al. (2019)        | N (range 18-68 years; controls were younger) | Y (7 M/1 F) | Y (8 R/0 L) | N (6-22 weeks; patients at different subacute stages of recovery) |
|              | Hartwigsen et al. (2020)                   | Y (mean 58.8 years, range 43-72 years) | Y (8 M/4 F) | Y (12 R/0 L) | Y (mean 37.9 ± 34.8 months, range 6-122 months) |
|              | Stockert et al. (2020)                     | Y (frontal group: mean 52.3 ± 18.9 years, range 15-78 years; temporoparietal group: mean 54.4 ± 12.7 years, range 31-76 years) | Y (25 M/9 F) | N (31 R/2 L); not stated for controls | Y (frontal group: T1 acute: mean 3.2 ± 2.0 days, range 1-7 days; T2 subacute: mean 11.9 ± 2.2 days, range 8-17 days; T3 chronic: mean 272.6 ± 88.5 days, range 181-435 days; temporoparietal group: T1 acute: mean 1.6 ± 0.8 days, range 1-4 days; T2 subacute: mean 10.1 ± 1.7 days, range 8-13 days; T3 chronic: |
Age = Is age reported for patients and controls, and matched?; Sex = Is sex reported for patients and controls, and matched?; Handedness = Is handedness reported for patients and controls, and matched?; Time post onset = Is time post stroke onset reported and appropriate to the study design?; AAC = Augmentative and Alternative Communication; CIAT = constraint-induced aphasia therapy; F = female; L = left; M = male; MIT = melodic intonation therapy; N = No; POP+ = pars opercularis damaged; POP- = pars opercularis spared; R = right; rTMS = repetitive transcranial magnetic stimulation; SEM = standard error of the mean; T1, T2, etc. = first time point, second time point, etc.; TPO = time post onset; Y = Yes; Yellow underline = minor limitation; Orange underline/* = moderate limitation.
| Study               | Aphasia                        | Language evaluation                  | Aphasia severity                                                                 | Aphasia type                                                                 |
|---------------------|--------------------------------|--------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Weiller et al. (1995) | Comprehensive battery         | AAT                                  | Recovered; not aphasic per formal testing                                        | Recovered, but all had moderate-severe Wernicke's aphasia in the subacute period |
| Belin et al. (1996)  | Severity and type              | BDAE                                 | Persistent severe non-fluent aphasia followed by marked improvement with MIT     | 5 global, 2 Broca's                                                           |
| Ohyama et al. (1996) | Comprehensive battery         | WAB                                  | AQ mean 74.3 ± 12.2, range 53.8-92.4                                             | 6 anomic, 4 atypical, 4 mild Broca's, 1 mild Wernicke's, 1 transcortical sensory; alternately: 10 fluent, 6 non-fluent |
| Heiss et al. (1997)  | Severity only                  | Verbal repetition, confrontation naming, oral and written comprehension, reading abilities, TT, phonemic fluency, clinical impression, family interview | T1: TT range 37-48; T2: TT range 3-39 (1 missing)                              | T1: 5 global, 1 Wernicke's; T2: not stated                                      |
| Karbe et al. (1998)  | Severity and type              | TT                                   | T1: 9 severe; 2 mild; 1 not stated; TT range 3-47 errors; T2: not stated          | T1: 8 global, 3 anomic, 1 Wernicke's; T2: not stated                           |
| Cao et al. (1999)    | Severity and type              | ADP                                  | ADPASS percentile range 73-99                                                     | 3 anomic, 1 conduction, 1 recovered, 1 transcortical sensory                   |
| Heiss et al. (1999)  | Severity and type              | AAT, phonemic fluency                | T1: subcortical: TT median 8 errors, range 0-17 errors; frontal: TT median 21 errors, range 4-40 errors; temporal: TT median 39 errors, range 1-47 errors; T2: subcortical: TT median 1 error, range 0-14 errors; frontal: TT median 8 errors, range 0-34; temporal: TT median 34 errors, range 0-44 errors | T1: 6 Wernicke's, 5 Broca's, 5 residual aphasia, 4 anomic, 2 transcortical sensory, 1 conduction; T2: not stated |
| Kessler et al. (2000) | Severity only                  | AAT                                  | T1: piracetam group: TT 17.16 ± 14.31 errors; placebo group: TT 17.91 ± 15.47 errors; T2: piracetam group: TT 9.66 ± 12.62 errors; placebo group: TT 12.50 ± 16.88 errors | Not stated                                                                      |
| Rosen et al. (2000)  | Severity and type              | WAB (except BDAE in 1 patient), reading pseudowords, word stem completion, verb generation, reading single words | AQ range 74-97 (missing in 1 patient)                                             | 3 anomic, 1 Broca's, 1 not stated, 1 recovered                                |
| Blasi et al. (2002)  | Comprehensive battery         | WAB or BDAE                          | AQ range 66.5-89.0 in 6 participants; BDAE aphasia severity of 4 in 1 participant, no formal evaluation in 1 participant | 3 anomic, 3 transcortical motor, 1 Broca's, 1 not stated; most were Broca's or global acutely |
| Leff et al. (2002)   | Not at all                     | PPT (Dutch), British picture vocabulary scale, Action for Dysphasic Adults lexical decision battery, auditory maximal pairs (an offline phoneme discrimination test) | Not stated                                                                      | Not stated, but all 6 patients with pSTS damage had single word comprehension deficits acutely |
| Blank et al. (2003)  | Type only                      | CAT, QPA                             | Not stated                                                                      | POP+: 4 non-fluent but not agrammatic, 2 agrammatic, 1 recovered; POp-: 4 non-fluent |
| Study                          | Battery Type          | Subtests/Tests Used                                                                 | Severity/Classified | Notes                                                                 |
|-------------------------------|-----------------------|-------------------------------------------------------------------------------------|---------------------|----------------------------------------------------------------------|
| Cardebat et al. (2003)        | Not at all            | Not stated                                                                           | Not stated          | T1: some prominent symptoms are listed for each patient; T2: not stated |
| Sharp et al. (2004)           | Severity only         | Subtests from CAT, subtests from PALPA, Action for dysphasic adults, TROG, PPT      | Mild                | Not stated                                                           |
| Zahn et al. (2004)            | Comprehensive battery| AABT, AAT                                                                            | TT percentile range 28-63 | 3 global, 2 Broca's, 2 unclassifiable; all had been global initially |
| Crinion & Price (2005)        | Comprehensive battery| CAT                                                                                  | Not stated          | Not stated                                                           |
| de Boissezon et al. (2005)    | Type only             | Montreal-Toulouse Aphasia Battery                                                    | Not stated          | T1: 2 Broca's, 2 transcortical sensory, 1 anomic, 1 transcortical motor, 1 Wernicke's; T2: 4 recovered, 1 anomic, 1 transcortical motor; 1 transcortical sensory |
| Connor et al. (2006)          | Comprehensive battery| WAB or BDAE                                                                          | AQ range 66.5-89.0 in 6 participants, BDAE aphasia severity of 4 in 1 participant, no formal evaluation in 1 participant | 3 anomic, 3 transcortical motor, 1 Broca's, 1 not stated; most were Broca's or global acutely |
| Crinion et al. (2006)          | Comprehensive battery| CAT (missing in two participants)                                                    | Not stated          | Not stated                                                           |
| Saur et al. (2006)            | Comprehensive battery| AABT, AAT including TT, analysis of spontaneous speech, CETI, Language Recovery Score (LRS) derived from all these measures plus in-scanner task performance | T1: LRS mean 0.44, range 0.11-0.81; 1 mild, 1 mild-moderate, 7 moderate, 3 moderate-severe, 2 severe per AAT; T2: LRS mean 0.71, range 0.33-0.92; 2 recovered, 2 recovered-mild, 2 mild, 3 mild-moderate, 3 moderate, 2 severe per AAT; T3: LRS mean 0.91, range 0.66-1.00; 8 recovered, 2 recovered-mild, 3 mild, 1 moderate per AAT | T1: 9 non-fluent, 5 fluent; T2: not stated; T3: 6 recovered, 4 minimal language impairment, 3 anomic, 1 global |
| Meinzer et al. (2008)         | Comprehensive battery| AAT, study-specific picture naming test with 150 items                              | 6 moderate, 4 mild, 1 severe | 7 Broca's, 2 Wernicke's, 1 global, 1 unclassified                    |
| Raboyeau et al. (2008)        | Severity and type     | Montreal-Toulouse Aphasia Battery                                                    | Mild (but had initially been severe) | 4 anomic, 3 conduction, 2 Broca's, 1 AoS                             |
| Richter et al. (2008)         | Comprehensive battery| AAT, two subtests of ANELT                                                            | TT range 5-50       | 7 anomic, 7 Broca's, 2 global; it was an inclusion criterion that the main deficits were in production |
| de Boissezon et al. (2009)    | Comprehensive battery| Montreal-Toulouse Aphasia Battery                                                    | Not stated          | T1: 3 transcortical motor, 2 anomic, 2 Broca's, 2 transcortical sensory, 2 Wernicke's, 1 conduction, 1 agrammatic; T2: not stated |
| Fridriksson et al. (2009)     | Comprehensive battery| WAB; BNT                                                                              | AQ range 31.8-91.5  | 6 anomic, 4 Broca's, 1 transcortical motor; alternatively: 6 fluent, 5 non-fluent |
| Menke et al. (2009)           | Comprehensive battery| AAT                                                                                   | 6 moderate-severe, 2 severe | 7 Broca's, 1 global                                                  |
| Specht et al. (2009)          | Comprehensive battery| AAT                                                                                   | Not stated          | 3 global, 3 Wernicke's, 2 amnestic, 2 Broca's, 2 unclassified        |
| Warren et al. (2009)          | Not at all            | CAT, TROG                                                                             | Not stated          | Not stated                                                           |
| Study                        | Severity and Type | Battery/Materials                                                                 | Description                                                                                                               |
|-----------------------------|-------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Chau et al. (2010)          | Severity only     | Cantonese Aphasia Battery (modified WAB)                                         | 5 patients had AQ > 75, 2 had AQ < 30                                                                                  |
| Fridriksson (2010)          | Severity and type | WAB                                                                              | AQ mean 60.4 ± 25.6 (including excluded patients)                                                                        |
| Fridriksson et al. (2010)   | Severity and type | WAB                                                                              | AQ mean 77.1, range 47.1-93.7                                                                                           |
| Sharp et al. (2010)         | Severity only     | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Thompson et al. (2010)      |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Tyler et al. (2010)         |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| van Oers et al. (2010)      |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Papoutsi et al. (2011)      |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Sebastian & Kiran (2011)    |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Szaflarski et al. (2011)    |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Tyler et al. (2011)         |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Weiduschat et al. (2011)    |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Allendorfer et al. (2012)   |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Fridriksson, Hubbard, et al. (2012) |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Fridriksson, Richardson, et al. (2012) |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Marquette et al. (2012)     |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Schofield et al. (2012)     |                   | WAB, AQ mean 60.4 ± 25.6 (including excluded patients)                            | 11 anomic, 10 Broca's, 3 conduction, 1 transcortical motor, 1 Wernicke's (including excluded patients)               |
| Authors            | Severity/Type | Test battery | Description                                                                 | T1: Severity and type | T2: Severity and type | Summary |
|--------------------|---------------|--------------|-----------------------------------------------------------------------------|-----------------------|-----------------------|---------|
| Wright et al. (2012) | Not at all    | Sentence-picture matching | Not stated                                                                 | Comprehension impairments; this distribution was bimodal | Not stated | 
| Szaflarski et al. (2013) | Severity only | TT, BNT, semantic fluency, phonemic fluency, PPVT, complex ideation subtest of BDAE | Recovered: TT mean 43 ± 1, ≥ 41; non-recovered: TT mean 23 ± 12, < 41 | Not stated | 
| Thiel et al. (2013) | Severity and type | AAT | T1: rTMS group: AAT sum of scores mean 251.5 ± 32.4; sham group: mean 251.1 ± 39.5; T2 not stated | T1: rTMS group: 7 Wernicke's, 3 amnestic, 2 global, 1 Broca's; sham group: 5 Wernicke's, 3 Broca's, 2 global, 1 amnestic; T2: not stated | 
| Abel et al. (2014) | Type only     | AAT | Not stated                                                                 | 8 Broca's, 3 Wernicke's, 1 fluent non-classifiable, 1 global, 1 transcortical sensory | 
| Benjamin et al. (2014) | Severity and type | WAB, BNT, PPVT | Intention group: AQ mean 65.5 ± 8.3; control group: AQ mean 71.9 ± 11.9 | Intention group: 4 conduction, 2 Broca's, 1 anomic; control group: 4 anomic, 1 Broca's, 1 conduction, 1 transcortical motor | 
| Brownset et al. (2014) | Not at all | Not stated | Not stated                                                                 | Not stated, but all had auditory comprehension and repetition deficits, and all could at least attempt to repeat | 
| Mattioli et al. (2014) | Comprehensive battery | AAT, TT | T1: TT range 2-45; T2: TT range 6-48; T3: TT range 21-48 | T1: 8 Broca's, 3 anomic, 1 Wernicke's; T2: not stated | 
| Mohr et al. (2014) | Severity only | BDAE, TT | Mild-moderate; T1: TT range 15-49 errors (including 2 excluded patients) | Not stated | 
| Robson et al. (2014) | Comprehensive battery | BDAE, PPT, word-to-picture matching test from Cambridge Semantic Battery, single word reading aloud from PALPA | BDAE comprehension range 6-26 (out of 32); BDAE comprehension scores and percentiles do not seem entirely commensurate | All Wernicke's | 
| Szaflarski et al. (2014) | Not at all | Not stated | "complete or almost complete" recovery in a "substantial proportion" of the patients | Not stated | 
| van Hees et al. (2014) | Comprehensive battery | WAB, BNT, PPT, CAT, picture naming from International Picture Naming Project Database | AQ range 57.3-91.6; 5 mild, 2 moderate, 1 mild-moderate | 6 anomic, 2 conduction | 
| Abel et al. (2015) | Type only | AAT | Not stated                                                                 | 8 Broca's, 3 Wernicke's, 1 fluent non-classifiable, 1 global, 1 transcortical sensory | 
| Kiran et al. (2015) | Severity only | WAB, BNT, PPT, CLQT | AQ range 48.0-97.2 | Not stated | 
| Sandberg et al. (2015) | Comprehensive battery | WAB, BNT, subtests from PALPA, PPT, CLQT | AQ range 41.7-99.2 | 6 anomic, 2 conduction, 1 Broca's, 1 transcortical motor | 
| Geramayeh et al. (2016) | Comprehensive battery | CAT, QPA | "relatively mild stroke"; 17 patients were so mild that they were not aphasic per the CAT | Not stated | 
| Griffiths et al. (2016) | Severity and type | BNT; phonemic fluency, semantic fluency, complex ideation from BDAE, PPVT, communicative activities log | Moderate | 4 Broca's, 3 anomic, 1 anomic/conduction | 
| Sims et al. (2016) | Severity and type | WAB, BNT, PPT, CLQT | AQ range 48.0-99.2 | 4 anomic, 2 Broca's, 2 conduction, 2 transcortical motor, 1 anomic or transcortical motor, 1 Broca's or conduction, 1 "N/A", 1 Wernicke's or conduction | 
| Darkow et al. (2017) | Comprehensive battery | AAT | Mild | Not stated | 

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| Study                          | Aphasia* | Assessment Instrument(s) | Aphasia Severity | Type | Note                                                                 |
|-------------------------------|----------|--------------------------|------------------|------|----------------------------------------------------------------------|
| Geranmayeh et al. (2017)      | Not at all | CAT, QPA                 | Not stated        |      |                                                                      |
| Griffis, Nenert, Allendorfer, & Szaflarski (2017) | Not at all | BNT, semantic fluency, phonemic fluency | Not stated |      |                                                                      |
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017) | Not at all | BNT, semantic fluency, phonemic fluency | Not stated |      |                                                                      |
| Harvey et al. (2017)          | Comprehensive battery | BDAE, BNT               | Mild-moderate    |      | All non-fluent                                                        |
| Nardo et al. (2017)           | Not at all | BNT, one CAT subtest, two PALPA subtests | Not stated |      |                                                                      |
| Nenert et al. (2017)          | Severity only | TT, PPVT, BNT, semantic fluency, phonemic fluency, communicative activities log | 6 mild (2 control, 4 CIAT); 5 moderate (3 control, 2 CIAT); 8 severe (3 control, 5 CIAT) |      |                                                                      |
| Qiu et al. (2017)             | Severity and type | WAB                     | Moderate-severe  |      | All Broca's                                                          |
| Skipper-Kallal et al. (2017a) | Comprehensive battery | WAB, PNT                | AQ mean 77.7 ± 21.0, range 22.8-99.2 |      | 21 anomic, 7 Broca's, 3 conduction, 1 transcortical sensory   |
| Skipper-Kallal et al. (2017b) | Comprehensive battery | WAB, PNT                | Not stated       |      | 23 anomic, 11 Broca's, 3 conduction, 1 transcortical sensory, 1 Wernicke's |
| Dietz et al. (2018)           | Severity and type | WAB, Reading Comprehension Battery for Aphasia | AAC group: AQ range 37.6-82.4; usual care group: AQ range 36.7-89.2 |      | AAC group: 2 Broca's, 1 anomic, 1 conduction, 1 global, 1 Wernicke's; usual care group: 2 anomic, 2 Broca's, 1 conduction, 1 Wernicke's |
| Hallam et al. (2018)          | Comprehensive battery | Cambridge semantic battery, three additional semantic tasks, connected speech words per minute, repetition from PALPA | Not stated |      | 6 anomic, 2 Broca's, 2 global, 2 transcortical sensory, 1 mixed transcortical, 1 not stated |
| Nenert et al. (2018)          | Not at all | PPVT, BNT, phonemic fluency, semantic fluency, complex ideation subtest of BDAE | Not stated for study timepoints, but on admission, aphasia severity was assessed with the TT: 2 no aphasia per cutoff but clinical impression of aphasia, 5 mild, 6 moderate, 4 severe |      |                                                                      |
| Pillay et al. (2018)          | Not at all | Pseudoword rhyme matching, semantic picture matching (similar to PPT-P), picture naming | Not stated |      |                                                                      |
| Szafarski et al. (2018)       | Comprehensive battery | WAB, BNT, semantic fluency, phonemic fluency | AQ range 10.4-94.6 |      | 8 anomic, 2 Broca's, 1 conduction, 1 global                          |
| van de Sandt-Koenderman et al. (2018) | Comprehensive battery | AAT, ANELT               | T1: subacute: ASRS median 1, range 0-2; ANELT range 10-29; chronic: ASRS median 1.5, range 1-2; ANELT range 20-29; T2: subacute: ASRS range 1-3; ANELT range 10-43; chronic: ASRS range 1-2; ANELT range 22-31 |      | T1: all severe non-fluent; T2: not stated |
| van Oers et al. (2018)        | Comprehensive battery | AAT, BNT                 | T1: 8 moderate, 2 severe, 2 not stated; T2: 4 moderate, 3 recovered, 2 not stated, 1 mild, 1 severe |      | T1: 6 Broca's, 3 anomic, 2 Wernicke's, 1 global; T2: 4 anomic, 3 recovered, 2 Broca's, 1 unclassified, 1 Wernicke's |
| Barbieri et al. (2019)        | Comprehensive battery | WAB, Northwestern Assessment of Verbs and Sentences (NAVS), Northwestern Naming Battery (NNB), analysis of spontaneous speech (Cinderella story) using | AQ range 52.8-91.7 |      | Not stated, except that "language deficits were consistent with nonfluent aphasia and agrammatism" |
| Study                        | Severity | Battery/Tests                                                                                   | Treated/Untreated Group                                      | Not stated                              |
|------------------------------|----------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------|
| Johnson et al. (2019)        | Severity only | WAB, BNT, PPT                                                                                  | Treated group: AQ mean 60.1 ± 24.0, range 11.7-95.2; untreated group: AQ mean 65.8 ± 24.6, range 26.9-91.5 | Not stated                              |
| Kristinsson et al. (2019)    | Severity and type | WAB, PNT, PPT                                                                                  | Typical BDNF genotype group: AQ mean 64.2 ± 20.3; atypical BDNF genotype group: AQ mean 54.3 ± 21.0 | Typical BDNF genotype group: 25 Broca's, 12 anomic, 11 conduction, 2 transcortical motor aphasia, 2 Wernicke's, 1 global; atypical BDNF genotype group: 16 Broca's, 6 anomic, 6 conduction, 3 global, 3 Wernicke's |
| Purcell et al. (2019)         | Comprehensive battery | Spelling (PALPA 40 and 54, and other word lists), oral reading (PALPA 35), reading comprehension (PALPA 51), spoken word-picture matching and picture naming tests from Northwestern Naming Battery, PPT-P; note no generic aphasia battery, but fairly complete coverage of language domains | Spelling of untrained items range 51%-94% | 4 orthographic working memory deficit, 8 orthographic long-term memory deficit, 9 both types of deficit |
| Sreedharan, Chandran, et al. | Severity only | WAB translated into Malayalam                                                                 | AQ range approximately 50-80 | Broca's or anomic |
| Hartwigsen et al. (2020)     | Not at all | AAT                                                                                           | 7 mild residual aphasia, 5 recovered                        | Not stated                              |
| Stockert et al. (2020)       | Severity only | AAT including TT, comprehension composite (LRScomp) and production composite (LRSprod) were derived | Frontal group: T1 acute: LRScomp mean 0.48 ± 0.26; T2 subacute: LRScomp mean 0.64 ± 0.21; T3 chronic: LRScomp mean 0.91 ± 0.07; temporo-parietal group: T1 acute: LRScomp mean 0.63 ± 0.32; T2 subacute: LRScomp mean 0.79 ± 0.20; T3 chronic: LRScomp mean 0.91 ± 0.13 | Not stated                              |

**Aphasia [column] = To what extent is the nature of aphasia characterized?; AABT = Aachen Aphasia Bedside Test; AAT = Aachen Aphasia Test; ABA = Apraxia Battery for Adults; ADP = Aphasia Diagnostic Profiles; ADPASS = Aphasia Diagnostic Profiles Aphasia Severity Score; ANELT = Amsterdam-Nijmegen Everyday Language Test; AoS = apraxia of speech; AQ = aphasia quotient; ASRS = Aphasia Severity Rating Scale; BDAE = Boston Diagnostic Aphasia Examination; BNT = Boston Naming Test; CAT = Comprehensive Aphasia Test; CETI = Communicative Effectiveness Index; CIAT = constraint-induced aphasia therapy; CLQT = Cognitive Linguistic Quick Test; LRS = Language Recovery Score; MIT = melodic intonation therapy; NAVS = Northwestern Assessment of Verbs and Sentences; PALPA = Psycholinguistic Assessments of Language Processing in Aphasia; PNT = Philadelphia Naming Test; POp+ = pars opercularis damaged; POp- = pars opercularis spared; PPT = Pyramids and Palm Trees; PPVT = Peabody Picture Vocabulary Test; pSTS = posterior superior temporal sulcus; QPA = Quantitative Production Analysis; rTMS = repetitive transcranial magnetic stimulation; T1, T2, etc. = first time point, second time point, etc.; TROG = Test for Reception of Grammar; TT = Token Test; WAB = Western Aphasia Battery; Yellow underline = minor limitation; Orange underline = moderate limitation.**
**Supplementary Table S4. Participants: Characterization of neurological status**

| Study                  | First stroke | Stroke type    | Lesion | Lesion extent | Lesion location                                                                 |
|------------------------|--------------|----------------|--------|---------------|--------------------------------------------------------------------------------|
| Weiller et al. (1995)  | Yes          | Ischemic only  | Individual lesions | Not stated   | Posterior L MCA infarct, lesion to the L posterior STG usually extending to MTG and AG |
| Belin et al. (1996)    | Not stated   | Not stated     | Individual lesions | Not stated, but note that hypoperfusion greatly exceeded the infarct in all but 1 patient | L MCA; 2 also had ACA |
| Ohyama et al. (1996)   | Yes          | Ischemic only  | Extent and location | Mean 33.9 ± 26.3 cc, range 8.1-113.2 cc | L perisylvian |
| Heiss et al. (1997)    | Yes          | Ischemic only  | Individual lesions | Range 27.2-133.2 cc | L MCA; 5 patients had superior temporal damage and 1 had subcortical damage underlying posterior superior temporal cortex |
| Karbe et al. (1998)    | Yes          | Ischemic only  | Extent and location | Range 2-133 cc | L MCA |
| Cao et al. (1999)      | Yes          | Ischemic only  | Individual lesions | Extents are reported in three dimensions | 4 L MCA, 2 L ICA |
| Heiss et al. (1999)    | Yes          | Ischemic only  | Extent and location | Range 4.3-154.3 cc (probably; units not stated) | L MCA; 9 subcortical, 7 frontal, 7 temporal |
| Kessler et al. (2000)  | Yes          | Ischemic only  | Location only     | Not stated   | 10 L frontal, 6 L subcortical, 8 L temporal |
| Rosen et al. (2000)    | Yes          | Not stated     | Individual lesions | Range 10.7-117.5 cc | L IFG, extending to neighboring areas in most cases |
| Blasi et al. (2002)    | Yes          | Ischemic only  | Individual lesions | Not stated   | L IFG and operculum, extending to adjacent cortex and white matter in several cases |
| Leff et al. (2002)     | Yes          | Not stated     | Individual lesions | Extent and location | Range 0.5-14% of total brain volume |
| Blank et al. (2003)    | No           | Not stated     | Individual lesions | Not stated   | L frontal, occasionally extending into temporal |
| Cardebat et al. (2003) | Yes          | Mixed etiologies| Individual lesions | Not stated   | 4 L subcortical, 2 L prerolandic, 2 L postrolandic |
| Sharp et al. (2004)    | Yes          | Not stated     | Lesion overlay    | Not stated   | Lesion in vicinity of L STG; no extensive frontal damage; no inferior temporal damage |
| Zahn et al. (2004)     | Yes          | Not stated     | Lesion overlay    | Not stated   | L MCA |
| Crinion & Price (2005) | Yes          | Not stated     | Lesion overlay    | Not stated   | L MCA |
| de Boissezon et al. (2005) | Yes          | Mixed etiologies| Individual lesions | Not stated   | 5 L non-thalamic subcortical, 2 L thalamic |
| Connor et al. (2006)   | Yes          | Ischemic only  | Individual lesions | Not stated   | L IFG and operculum, extending to adjacent cortex and white matter in several cases |
| Crinion et al. (2006)  | Yes          | Not stated     | Lesion overlay    | Not stated   | 6 L but no temporal damage, 9 L temporal damage excluding anterior temporal cortex, 9 L temporal damage including anterior temporal cortex |
| Saur et al. (2006)     | Yes          | Ischemic only  | Individual lesions | Not stated   | L MCA; 4 frontal (2 extending to temporoparietal); 5 temporoparietal (2 extending to subcortical); 4 striatocapsular (2 extending to cortical); 1 frontoparietal |
| Meinzer et al. (2008)  | Not stated   | Mixed etiologies| Lesion overlay    | Range 31.0-236.0 cc | L |
| Authors                  | Ischemic Only | Mixed Etiologies | Individual Lesions | Lesion Location | MCA Region |
|-------------------------|---------------|------------------|--------------------|-----------------|------------|
| Raboyeau et al. (2008)  | Yes           | Not stated        | Individual lesions | Range 29.9-195.2 cc | L MCA      |
| Richter et al. (2008)   | Not stated    | Not stated        | Individual lesions | Not stated       | L          |
| de Boissezon et al. (2009) | Yes           | Mixed etiologies | Lesion overlay     | Range 0.9-43.4 cc | L MCA (7 subcortical, 6 cortical) |
| Fridrikksson et al. (2009) | Not stated    | Not stated        | Lesion overlay     | Range 3.0-342.2 cc | L MCA      |
| Menke et al. (2009)     | Yes           | Mixed etiologies | Individual lesions | Not stated       | L          |
| Specht et al. (2009)    | Not stated    | Not stated        | Lesion overlay     | Not stated       | L MCA, with greatest overlap in the posterior STG |
| Warren et al. (2009)    | Yes           | Ischemic only    | Lesion overlay     | Patients with positive anterior temporal interconnectivity: mean 93.3 ± 24.0 cc; patients with negative anterior temporal interconnectivity: mean 96.1 ± 27.6 cc | L not including anterolateral superior temporal cortex; maximal overlap in posterior superior temporal cortex |
| Chau et al. (2010)      | Yes           | Ischemic only    | Location only      | Not stated       | 3 L MCA, 2 L frontal, 2 L basal ganglia |
| Fridrikkson (2010)      | Yes           | Ischemic only    | Lesion overlay     | Not stated       | L MCA      |
| Fridrikksson et al. (2010) | Yes           | Ischemic only    | Lesion overlay     | Not stated       | L MCA      |
| Sharp et al. (2010)     | Yes           | Not stated        | Lesion overlay     | Not stated       | Lesion in vicinity of L STG; no extensive frontal damage; no inferior temporal damage |
| Thompson et al. (2010)  | Yes           | Not stated        | Individual lesions | Not stated       | 5 L MCA, 1 R MCA with aphasia |
| Tyler et al. (2010)     | Not stated    | Mixed etiologies | Lesion overlay     | Not stated       | L          |
| van Oers et al. (2010)  | Yes           | Ischemic only    | Individual lesions | Range 6.0-167.3 cc | L MCA      |
| Papoutsi et al. (2011)  | Not stated    | Not stated        | Lesion overlay     | Not stated       | L MCA      |
| Sebastian & Kiran (2011) | Not stated    | Mixed etiologies | Individual lesions | Range 23-45 cc  | L MCA      |
| Szaflarski et al. (2011) | Not stated    | Not stated        | Individual lesions | Not stated       | L MCA      |
| Tyler et al. (2011)     | Not stated    | Not stated        | Lesion overlay     | Not stated       | L MCA      |
| Weiduschat et al. (2011) | Yes           | Not stated        | Extent and location | Range 0.7-88.9 cc | L MCA      |
| Allendorfer et al. (2012) | Not stated    | Ischemic only    | Individual lesions | Range 2.8-248.9 cc | L MCA      |
| Fridrikkson, Hubbard, et al. (2012) | Yes           | Not stated        | Lesion overlay     | Not stated       | L MCA      |
| Fridrikkson, Richardson, et al. (2012) | Yes           | Mixed etiologies | Lesion overlay     | Range 7.7-420.5 cc | L MCA      |
| Marcotte et al. (2012)  | Yes           | Not stated        | Lesion overlay     | Range 14.6-295.8 cc | L MCA      |
| Schofield et al. (2012) | Yes           | Ischemic only    | Lesion overlay     | Range 24.2-403.6 cc | L MCA      |
| Wright et al. (2012)    | Yes           | Not stated        | Lesion overlay     | Not stated       | L MCA      |
| Szaflarski et al. (2011) | Not stated    | Not stated        | Lesion             | Recovered: median 9.2 cc, range | L MCA      |

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| Year                  | Etiology                  | Lesion Type       | Lesion Extent Description                                                                 | Hemisphere |
|----------------------|---------------------------|-------------------|------------------------------------------------------------------------------------------|------------|
| Thiel et al. (2013)  | Yes                       | Ischemic only     | Lesion overlay, RTMS group: 233 ± 197 cc; sham group: 244 ± 243 cc; lesion extent in images appears much smaller than the stated volumes | L MCA     |
| Abel et al. (2014)   | Yes                       | Mixed etiologies  | Lesion overlay, Not stated                                                               | L MCA; 2 also had ACA |
| Benjamin et al. (2014)| No                        | Mixed etiologies  | Lesion overlay, Not stated                                                               | L MCA, extending frontally at least into the precentral gyrus or underlying white matter |
| Brownsett et al. (2014)| Not stated               | Not stated        | Lesion overlay, Not stated                                                               | L temporal and parietal cortex; 4 extended into the frontal lobe; no lesions involved ACA territory |
| Mattioli et al. (2014)| Yes                      | Not stated        | Individual lesions, Range 4.4-158.3 cc (possibly; units stated do not seem correct)        | L MCA; lesions seem very small in Supplementary Figure 1, but are described as more extensive in Supplementary Table 1 |
| Mohr et al. (2014)   | Yes                       | Mixed etiologies  | Lesion overlay, Not stated                                                               | L MCA     |
| Robson et al. (2014) | Yes                       | Mixed etiologies  | Lesion overlay, Not stated                                                               | L MCA; all involved STG extending into IPL and temporoparietal junction; 8 extending into MTL; 4 extending into inferior frontal |
| Szaflarski et al. (2014)| Not stated               | Not stated        | Lesion overlay, 60.1 ± 57.5 cc                                                          | L MCA     |
| van Hees et al. (2014) | Yes                      | Not stated        | Lesion overlay, Not stated                                                               | L hemisphere |
| Abel et al. (2015)   | Yes                       | Mixed etiologies  | Lesion overlay, Not stated                                                               | L MCA; 2 also had ACA |
| Kiran et al. (2015)  | Yes                       | Not stated        | Lesion overlay, 24.2-431.6 cc                                                           | L MCA except for one patient with R MCA and aphasia |
| Sandberg et al. (2015)| Not stated               | Not stated        | Lesion overlay, Range 0.3-256.0 cc                                                      | L MCA     |
| Geranmayeh et al. (2016)| No                      | Not stated        | Lesion overlay, Mean 25.4 ± 13.5 cc, range 0.3-168.0 cc                                 | L; modest R involvement in 7 cases |
| Griffiths et al. (2016)| Not stated              | Not stated        | Individual lesions, Range 1.4-52.5 cc                                                   | L MCA     |
| Sims et al. (2016)   | Not stated                | Not stated        | Lesion overlay, Not stated                                                               | L MCA     |
| Darkow et al. (2017) | Not stated                | Not stated        | Lesion overlay, Range 9.7-165.1 cc                                                       | L MCA not including hand motor area |
| Geranmayeh et al. (2017)| No                      | Not stated        | Lesion overlay, Mean 41.4 ± 44.4 cc, range 3.8-173.9 cc                                 | L; modest R involvement in 3 cases |
| Griffiths, Nenert, Allendorfer, & Szaflarski (2017)| Yes                  | Not stated        | Lesion overlay, Mean 105.2 ± 76.3 cc                                                    | L         |
| Griffiths, Nenert, Allendorfer, Vannest, et al. (2017)| Yes                  | Not stated        | Individual lesions, Mean 105.2 ± 76.3 cc                                               | L         |
| Harvey et al. (2017) | Yes                       | Ischemic only     | Lesion overlay, Individual lesions, Range 36.6-252.1 cc                                 | L MCA     |
| Nardo et al. (2017)  | Yes                       | Not stated        | Lesion overlay, Not stated                                                               | L MCA     |
| Nenert et al. (2017) | Yes                       | Ischemic only     | Lesion overlay, Not stated                                                               | L MCA     |
| Qiu et al. (2017)    | Yes                       | Mixed etiologies  | Not at all                                                                                | L         |
| Skipper-Kallal et al (2017) | Not stated       | Not stated        | Lesion, Mean 27.5 ± 22.9 cc                                                            | L MCA     |
| Study                      | First stroke only? | Lesion [column] | Lesion | Extent and location | Lesion size (cc) |
|----------------------------|---------------------|-----------------|--------|---------------------|-----------------|
| Dietz et al. (2018)        | Yes                 | Individual      | overlay| AAC group: range 7849-30570 voxels; usual care group: 1583-30110 voxels (voxel size not stated) | L MCA           |
| Nenert et al. (2018)       | No                  | Lesion          | overlay| Not stated           | L MCA; mostly posterior per Supplementary Figure 2       |
| Pillay et al. (2018)       | Not stated          | Lesion          | overlay| Mean 73.4 ± 58.6 cc, range 6.7-227.0 cc | 17 L MCA, 2 combined L MCA/ACA, combined 2 L MCA/PCA    |
| van de Sandt-Koenderman et al. (2018) | Not stated | Extent and location | Subacute: range 32.4-141.2 cc (no lesion extent was reported for one subacute participant because there was no tissue loss yet); chronic: range 27.4-87.9 cc | 8 L MCA, 1 L SMA and R insular-temporoparietal |
| van Oers et al. (2018)     | Yes                 | Lesion          | overlay| Range 9-208 cc       | L MCA           |
| Barbieri et al. (2019)     | Yes                 | Lesion          | overlay| Not stated           | Mostly L MCA but some lesions include PCA or ACA territory |
| Johnson et al. (2019)      | Not stated          | Lesion          | overlay| Treated group: 136.6 ± 81.1 cc, range 11.7-317.1 cc; untreated group: 112.7 ± 94.6 cc, range 1.6-317.1 cc | Mostly MCA with a few extending into PCA |
| Kristinsson et al. (2019)  | No                  | Lesion          | overlay| Typical BDNF genotype group: 121.4 ± 73.2 cc; atypical BDNF genotype group: 142.2 ± 88.4 cc | L MCA           |
| Purcell et al. (2019)      | Yes                 | Lesion          | overlay| Range 7.7-215.0 cc   | L MCA with L ventral occipitotemporal cortex mostly intact |
| Sreedharan, Chandran, et al. (2019) | Not stated | Individual lesions | Not stated | 7 L MCA, 1 bilateral MCA |
| Hartwigsen et al. (2020)   | Yes                 | Lesion          | overlay| Range 11.9-176.3 cc  | Left temporo-parietal cortex; maximal overlap in SMG |
| Stockert et al. (2020)     | Yes                 | Lesion          | overlay| Frontal group: mean 69.3 ± 34.0 cc, range 12.3-76.6 cc; temporo-parietal group: mean 54.8 ± 41.1 cc, range 6.2-108.5 cc | L MCA, frontal (n = 17) or temporo-parietal (n = 17) |

First stroke = First stroke only?; Lesion [column] = To what extent is the lesion distribution characterized?; AAC = Augmentative and Alternative Communication; ACA = anterior cerebral artery; AG = angular gyrus; cc = cubic centimeters; ICA = internal carotid artery; IFG = inferior frontal gyrus; IPL = inferior parietal lobule; L = left; MCA = middle cerebral artery; MTG = middle temporal gyrus; MTL = medial temporal lobe; PCA = posterior cerebral artery; pMTG = posterior middle temporal gyrus; pSTS = posterior superior temporal sulcus; R = right; rTMS = repetitive transcranial magnetic stimulation; SMA = supplementary motor area; STG = superior temporal gyrus; vATL = ventral anterior temporal lobe; Yellow underline = minor limitation; Orange underline = moderate limitation.
### Supplementary Table S5. Imaging: Design

| Study                        | Modality     | Study timing          | Time points                                      | Intervention                                                                 |
|------------------------------|--------------|-----------------------|--------------------------------------------------|-----------------------------------------------------------------------------|
| Weiller et al. (1995)        | PET (rCBF)   | Cross-sectional       | —                                                | —                                                                           |
| Belin et al. (1996)          | PET (rCBF)   | Cross-sectional       | —                                                | —                                                                           |
| Ohyama et al. (1996)         | PET (rCBF)   | Cross-sectional       | —                                                | —                                                                           |
| Heiss et al. (1997)          | PET (rCMRgl) | Longitudinal—recovery | T1: ~4 weeks; T2: ~12-18 months                  | Not stated                                                                 |
| Karbe et al. (1998)          | PET (rCMRgl) | Longitudinal—recovery | T1: mean 24 ± 11 days, ~3-4 weeks; T2: mean 19 ± 2 months, > 1 year | Not stated                                                                 |
| Cao et al. (1999)            | fMRI         | Cross-sectional       | —                                                | —                                                                           |
| Heiss et al. (1999)          | PET (rCBF)   | Longitudinal—recovery | T1: ~2 weeks; T2: ~8 weeks                        | Not stated                                                                 |
| Kessler et al. (2000)        | PET (rCBF)   | Longitudinal—mixed    | T1: pre-treatment, ~2 weeks post onset; T2: post-treatment, ~8 weeks post onset | SLT, 1 hour/day, 5 days/week, 6 weeks; 12 patients received piracetam and 12 received placebo; note that the two groups are not directly compared in any imaging or behavioral analyses |
| Rosen et al. (2000)          | PET and fMRI | Cross-sectional       | —                                                | —                                                                           |
| Blasi et al. (2002)          | fMRI         | Cross-sectional       | —                                                | —                                                                           |
| Leff et al. (2002)           | PET (rCBF)   | Cross-sectional       | —                                                | —                                                                           |
| Blank et al. (2003)          | PET (rCBF)   | Cross-sectional       | —                                                | —                                                                           |
| Cardebat et al. (2003)       | PET (rCBF)   | Longitudinal—recovery | T1: 58 ± 35 days, range 11-113 days; T2: 11.7 ± 1.6 months, range 320-460 days; T1 varies considerably from early to late subacute | Not stated                                                                 |
| Sharp et al. (2004)          | PET (rCBF)   | Cross-sectional       | —                                                | —                                                                           |
| Zahn et al. (2004)           | fMRI         | Cross-sectional       | —                                                | —                                                                           |
| Crinion & Price (2005)       | fMRI         | Cross-sectional       | —                                                | —                                                                           |
| de Boissezon et al. (2005)   | PET (rCBF)   | Longitudinal—recovery | T1: mean 53 ± 35 days, range 11-108 days; T2: mean 12.2 ± 1.4 months; T1 varies considerably from early to late subacute | Not stated                                                                 |
| Connor et al. (2006)         | fMRI         | Cross-sectional       | —                                                | —                                                                           |
| Crinion et al. (2006)        | PET (rCBF)   | Cross-sectional       | —                                                | —                                                                           |
| Saur et al. (2006)           | fMRI         | Longitudinal—recovery | T1 acute: mean 1.8 days, range 0-4 days; T2 subacute: mean 12.1 days, range 3-16 days; T3 chronic: mean 321 days, range 102-513 days | Standard SLT throughout the observation period including at least 3 weeks inpatient |
| Meinzer et al. (2008)        | fMRI         | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~2 weeks later | CIAT, 3 hours/day, 5 days/week, 2 weeks                                      |
| Raboyeau et al. (2008)       | PET (rCBF)   | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~4 weeks later | Lexical training, 15 minutes/day, 5 days/week, 4 weeks; the control group were trained to relearn foreign words that they had learned in school but since mostly forgotten |
| Richter et al. (2008)        | fMRI         | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~2 weeks later | CIAT, 3 hours/day, 10 days                                                  |
| de Boissezon et al. (2009)   | PET (rCBF)   | Longitudinal—recovery | T1: mean 64 ± 32 days; T2: mean 11.8 ± 1.4 months; T1 varies considerably from early to late subacute | Community SLT; 45 minutes/day, 1-3 days/week                                |
| Fridriksson et al. (2009)    | fMRI         | Cross-sectional       | —                                                | —                                                                           |
| Menke et al. (2009)          | fMRI         | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~2 weeks later; T3: 8 months after the end of treatment | Intensive anomia training; 3 hours/day; 2 weeks                             |
| Specht et al. (2009)         | PET (rCBF)   | Cross-sectional       | —                                                | —                                                                           |
| Study                                | Imaging Modality | Study Type          | Time Points                                                                 | Findings                                                                 |
|--------------------------------------|------------------|---------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Warren et al. (2009)                 | PET (rCBF)       | Cross-sectional     | —                                                                            | —                                                                         |
| Chau et al. (2010)                   | fMRI             | Longitudinal—chronic | T1: pre-treatment/chronic; T2: post-treatment, ~10 weeks later               | Acupuncture, 3 sessions/week, 8 weeks                                     |
| Fridriksson (2010)                   | fMRI             | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment/~4 weeks later; note that there were two separate sessions per time point, as well as another two sessions midway through treatment that are not analyzed in this paper | Anomia treatment using a cueing hierarchy, 3 hours/day, 5 days/week, 2 weeks, with a 1-week gap between the two weeks |
| Fridriksson et al. (2010)            | fMRI             | Cross-sectional     | —                                                                            | —                                                                         |
| Sharp et al. (2010)                  | PET (rCBF)       | Cross-sectional     | —                                                                            | —                                                                         |
| Thompson et al. (2010)               | fMRI             | Longitudinal—chronic | T1: pre-treatment/chronic; T2: post-treatment, 9-15 weeks later              | Treatment of underlying forms                                             |
| Tyler et al. (2010)                  | fMRI             | Cross-sectional     | —                                                                            | —                                                                         |
| van Oers et al. (2010)               | fMRI             | Cross-sectional     | Behavioral data (TT and a naming measure) were also acquired subacutely (mean 26 ± 18 days, range 5-56 days) | —                                                                         |
| Papoutsi et al. (2011)               | fMRI             | Cross-sectional     | —                                                                            | —                                                                         |
| Sebastian & Kiran (2011)             | fMRI             | Cross-sectional     | —                                                                            | —                                                                         |
| Szaflarski et al. (2011)             | fMRI             | Longitudinal—chronic | T1: pre-treatment/chronic; T2: post-treatment, ~2 weeks later               | RTMS to residual activation near Broca's area, 5 sessions/week, 2 weeks |
| Tyler et al. (2011)                  | fMRI             | Cross-sectional     | —                                                                            | —                                                                         |
| Weiduschat et al. (2011)             | PET (rCBF)       | Longitudinal—mixed  | T1: pre-treatment/subacute (range 18-97 days post onset); T2: post-treatment, ~2 weeks later | Individualized SLT, 45 minutes/day, 5 days/week, 2 weeks; 6 patients underwent rTMS to the R IFG pars triangularis; 4 received vertex (sham) rTMS |
| Allendorfer et al. (2012)            | fMRI             | Cross-sectional     | —                                                                            | —                                                                         |
| Fridriksson, Hubbard, et al. (2012)  | fMRI             | Cross-sectional     | —                                                                            | —                                                                         |
| Fridriksson, Richardson, et al. (2012) | fMRI         | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment/~4 weeks later; note that there were two separate sessions per time point, as well as another two sessions midway through treatment that are not analyzed in this paper | Anomia treatment using a cueing hierarchy, 3 hours/day, 5 days/week, 2 weeks, with a 1-week gap between the two weeks |
| Marcotte et al. (2012)               | fMRI             | Longitudinal—chronic | T1: pre-treatment/chronic; T2: post-treatment, 3-6 weeks later (after 80% performance on trained items, or 6 weeks) | Semantic feature analysis, 1 hour/day, 3 days/week, 3-6 weeks |
| Schofield et al. (2012)              | fMRI             | Cross-sectional     | —                                                                            | —                                                                         |
| Wright et al. (2012)                 | fMRI             | Cross-sectional     | —                                                                            | —                                                                         |
| Szaflarski et al. (2013)             | fMRI             | Cross-sectional     | —                                                                            | —                                                                         |
| Thiel et al. (2013)                  | PET (rCBF)       | Longitudinal—mixed  | T1: pre-treatment/subacute (rTMS group: mean 37.5 ± 18.5 days post onset; sham group: mean 50.6 ± 22.6 days post onset); T2 post-treatment, ~2.5 weeks later | RTMS group: inhibitory rTMS over the R IFG pars triangularis + SLT for 45 minutes/day, 5 days/week, 2 weeks; control group: sham TMS + SLT |
| Abel et al. (2014)                   | fMRI             | Longitudinal—chronic | T1: pre-treatment/chronic; T2: post-treatment, ~6 weeks later (labeled T2 and T3 in paper) | Lexical therapy, alternating between weeks with phonological and semantic treatment, 4 weeks; 60 out of the 132 items were trained |
| Benjamin et al. (2014)               | fMRI             | Longitudinal—chronic | T1: pre-treatment/chronic; T2: post-treatment; T3: 3 months after the end of treatment | Word finding therapy for both groups, but the intention group had to produce complex left hand movements, while the control group did not; note that groups were not directly compared in any imaging analyses |
| Authors                  | Imaging Technique | Design Type          | T1 Description                                                                 | T2 Description                                                                 | T3 Description                                                                 | Patients                                                                                           |
|-------------------------|-------------------|----------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Brownsett et al. (2014) | fMRI              | Longitudinal—chronic treatment | Patients: T1: acclimatization/chronic (but used in some analyses); T2: pre-treatment/chronic (not stated how long after T1); T3: post-treatment/~4 weeks later; controls: T1: pre-training; T2: post-training/~2 weeks later | Patients: home-based therapy consisting of auditory discrimination and repetition tasks for 3 or 4 weeks between T2 and T3; control: 2 weeks of similar training using noise vocoded speech |
| Mattioli et al. (2014)  | fMRI              | Longitudinal—mixed   | T1: pre-treatment, mean 2.2 ± 1.3 days post onset; T2: post-treatment, mean 16.2 ± 1.3 days post onset; T3: mean 190 ± 25.5 days post onset | 6 patients were randomized to receive treatment focusing on verbal comprehension and lexical retrieval for 1 hour/day, 5 days/week between T1 and T2; no patient received treatment after T2 |
| Mohr et al. (2014)      | fMRI              | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~2 weeks later | CIAT, 3-4 hours/day, 5 days/week, 2 weeks |
| Robson et al. (2014)    | fMRI              | Cross-sectional      | — | — |
| Szaflarski et al. (2014)| fMRI              | Cross-sectional      | — | — |
| van Hees et al. (2014)  | fMRI              | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, 5-6 weeks later; note that "immediate improvement" was measured at the end of SLT, a week or two prior to T2 scan | SLT with alternating semantic and phonological sessions, 3 days/week, 4 weeks |
| Abel et al. (2015)      | fMRI              | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~6 weeks later (labeled T2 and T3 in paper) | Lexical therapy, alternating between weeks with phonological and semantic treatment, 4 weeks; 60 out of the 132 items were trained |
| Kiran et al. (2015)     | fMRI              | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~10 weeks later | Semantic feature-based treatment, 10 weeks |
| Sandberg et al. (2015)  | fMRI              | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, up to 10 weeks later | Semantic feature-based treatment, 2 hours/day, 2 days/week, up to 10 weeks (depending on when criterion reached) |
| Geranmayeh et al. (2016)| fMRI              | Cross-sectional      | — | — |
| Grifis et al. (2016)    | fMRI              | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~2 weeks later | RTMS to residual activation near Broca's area, 5 sessions/week, 2 weeks |
| Sims et al. (2016)      | fMRI              | Cross-sectional      | — | — |
| Darkow et al. (2017)    | fMRI              | Longitudinal—chronic treatment | T1/T2: chronic; tDCS and sham sessions in randomized order | — |
| Geranmayeh et al. (2017)| fMRI              | Longitudinal—recovery | T1: 15 ± 7.6 days (range 5-35 days); T2: 108 ± 26 days (range 87-200 days) | Variable modest amounts of SLT (range 0-18 hours) reported in Supplementary Table 1 |
| Grifis, Nenert, Allendorfer, & Szaflarski (2017) | fMRI | Cross-sectional | — | — |
| Grifis, Nenert, Allendorfer, Vannest, et al. (2017) | fMRI | Cross-sectional | — | — |
| Harvey et al. (2017)    | fMRI              | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, 2 months after treatment; T3: 6 months after treatment (the 2-month time point was not included in analysis because there was no significant behavioral effect at that time) | Inhibitory rTMS to R IFG, 10 days |
| Nardo et al. (2017)     | fMRI              | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~6 weeks later | Anomia treatment (computer-based practice), 2+ hours/day, 6 weeks |
| Nenert et al. (2017)    | fMRI              | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~3 weeks later; T3: 3 months after the end of treatment | CIAT, 4 hours/day, 5 days/week, 2 weeks |
| Qiu et al. (2017)       | fMRI              | Cross-sectional      | — | — |
| Skipper-Kallal et al.   | fMRI              | Cross-sectional      | — | — |
| Study (year) | Study Design | Study Timing | Time Points | Intervention Details |
|-------------|--------------|--------------|-------------|----------------------|
| Skipper-Kallal et al. (2017b) | Cross-sectional | — | — | AAC group: treatment aimed at teaching participants how to utilize AAC to facilitate discourse; usual care group: traditional SLT, not focused on discourse or AAC specifically |
| Dietz et al. (2018) | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~4 weeks later | — | Not stated |
| Hallam et al. (2018) | Cross-sectional | — | — | Not stated |
| Nenert et al. (2018) | Longitudinal—recovery | T1: ~2 weeks; T2: ~6 weeks; T3: ~12 weeks; T4: ~26 weeks; T5: ~52 weeks | — | Not stated |
| Pillay et al. (2018) | Cross-sectional | — | — | Modified CIAT + intermittent theta burst stimulation to residual left hemispheric language activation, 45 minutes/session, 5 days/week, 2 weeks |
| Szaflarski et al. (2018) | Longitudinal—chronic treatment | T1: pre-treatment/chronic (1-2 weeks prior to treatment); T2: post-treatment (within 1 week after end of 2-week treatment); T3: 13-20 weeks after end of treatment | — | Not stated |
| van de Sandt-Koenderman et al. (2018) | Longitudinal—mixed | T1: pre treatment/subacute or chronic; T2: post-treatment, ~6 weeks later | MIT, 5+ hours/week | Not stated |
| van Oers et al. (2018) | Longitudinal—recovery | T1: within 2 weeks; T2: ~3 months; T3: ~6 months; T4: ~12 months; specific timing of first time point not stated | — | Not stated |
| Barbieri et al. (2019) | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~12 weeks later | 13 patients were treated and 5 were not; treatment of underlying forms; 90 minutes/session, 2 sessions/week until 80% accuracy met on weekly probe task, then 1 session/week, 12 weeks except for one patient who demonstrated rapid improvement and completed treatment in 6 weeks | Not stated |
| Johnson et al. (2019) | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, ~12 weeks later | Semantic naming treatment, 2 sessions/week | Not stated |
| Kristinsson et al. (2019) | Cross-sectional | — | — | Not stated |
| Purcell et al. (2019) | Longitudinal—chronic treatment | T1: pre-treatment/chronic; T2: post-treatment, 6-24 weeks later | Spelling treatment, 60-80 minutes/day, 2 days/week, range 6-24 weeks | Not stated |
| Sreedharan, Chandran, et al. (2019) | Longitudinal—mixed | Neurofeedback group: T1: pre-treatment/subacute; T2: 1-5 weeks later; T3: 2-6 weeks after T1; T4: 3-11 weeks after T1; T5: 4-12 weeks after T1; T6: 5-12 weeks after T1; no training group: T1: subacute; T2: 2-12 weeks later; controls: T1: start of study; T2: 1-4 weeks later; T3: 3-5 weeks after T1; T4: 4-8 weeks after T1; T5: 7-37 weeks after T1; T6: 12-43 weeks after T1 | 4 patients received 4 additional sessions involving neurofeedback training, while 4 patients received treatment as usual | Not stated |
| Hartwigs et al. (2020) | Longitudinal—chronic treatment | T1/T2/T3: chronic; sessions consisted of cTBS over left anterior IFG, cTBS over left posterior IFG, or sham; sessions at least 7 days apart in randomized order | CTBS | Not stated |
| Stockert et al. (2020) | Longitudinal—recovery | T1 acute: 1-7 days; T2 subacute: 8-21 days; T3 chronic: > 6 months | — | Not stated |

Study timing = Is the study cross-sectional or longitudinal?; Time points = If longitudinal, at what time point(s) were imaging data acquired?; Intervention = If longitudinal, was there any intervention between the time points?; AAC = Augmentative and Alternative Communication; CIAT = constraint-induced aphasia therapy; fMRI = functional magnetic resonance imaging; IFG = inferior frontal gyrus; MIT = melodic intonation therapy; PET = positron emission tomography; R = right; rCBF = regional cerebral blood flow; rCMRgl = regional cerebral metabolic rate for glucose; rTMS = repetitive transcranial magnetic stimulation; SLT = speech-language therapy; T1, T2, etc. = first time point, second time point, etc.; tDCS = transcranial direct current stimulation; TT = Token Test; Yellow underline = minor limitation.
**Supplementary Table S6. Imaging: Methodology part 1**

| Study                  | Scanner                                      | Timing | Design type | Total images |
|------------------------|----------------------------------------------|--------|-------------|--------------|
| Weiller et al. (1995)  | Y (CTI ECAT 953/15)                          | Y      | PET         | 6            |
| Belin et al. (1996)    | Y (CEA LETI-TTV03)                          | Y      | PET         | 4            |
| Ohyama et al. (1996)   | Y (Head tome IV tomograph)                   | Y      | PET         | 6            |
| Heiss et al. (1997)    | Y (Siemens ECAT EXACT HR)                   | Y      | PET         | 2            |
| Karbe et al. (1998)    | Y (CTI-Siemens ECAT EXACT HR)               | N*     | PET         | 8            |
| Cao et al. (1999)      | Y (Magnex Scientific 3 Tesla)               | Y      | Block       | 40           |
| Heiss et al. (1999)    | Y (CTI-Siemens ECAT EXACT HR)               | Y      | PET         | 8            |
| Kessler et al. (2000)  | Y (CTI-Siemens ECAT EXACT HR)               | Y      | PET         | 8            |
| Rosen et al. (2000)    | Y (Siemens 961 EXACT HR; Siemens Vision 1.5 Tesla) | N       | PET: 10; fMRI: 384-768 | 8            |
| Blasi et al. (2002)    | Y (Siemens Vision 1.5 Tesla)                | Y      | Event-related | 1024       |
| Leff et al. (2002)     | Y (CTI-Siemens ECAT EXACT HR++/966)         | Y      | PET         | 16           |
| Blank et al. (2003)    | Y (CTI-Siemens ECAT EXACT HR++/966)         | Y      | PET         | 15 (patients); 12 (controls) |
| Cardebat et al. (2003) | Y (Siemens ECAT HR+)                        | Y      | PET         | 6            |
| Sharp et al. (2004)    | Y (Siemens HR++ 966)                        | Y      | PET         | 16           |
| Zahn et al. (2004)     | Y (Philips ACS NT Gyroscan 1.5 Tesla)       | N*     | Block       | 198          |
| Crinion & Price (2005) | N (Siemens 1.5 Tesla; model not stated)      | N      | Block       | 460          |
| de Boissezon et al. (2005) | Y (CTI-Siemens ECAT EXACT HR+)        | Y      | PET         | 6            |
| Connor et al. (2006)   | Y (Siemens Vision 1.5 Tesla)                | Y      | Event-related | 1024       |
| Crinion et al. (2006)  | Y (CTI-Siemens ECAT EXACT HR++/966 (16 patients and all controls) or GE Advance (8 patients)) | Y      | PET         | 12-16       |
| Saur et al. (2006)     | Y (Siemens Trio 3 Tesla)                    | Y      | Event-related | 660          |
| Meinzer et al. (2008)  | Y (Philips Intera 1.5 Tesla)                | Y      | Block       | 160          |
| Raboyeau et al. (2008) | Y (Siemens ECAT HR+)                        | Y      | PET         | 6            |
| Richter et al. (2008)  | Y (Siemens Vision plus 1.5 Tesla)           | N      | Block       | 134          |
| de Boissezon et al. (2009) | Y (CTI-Siemens ECAT EXACT HR+)       | Y      | PET         | 6            |
| Fridriksson et al. (2009) | N (not stated)                              | N      | Event-related | 120          |
| Menke et al. (2009)    | Y (Philips Intera 3 Tesla)                  | N      | Event-related | Probably ~360, but not stated |
| Specht et al. (2009)   | Y (CTI-Siemens HR+)                         | Y      | PET         | 9            |
| Warren et al. (2009)   | Y (CTI-Siemens ECAT EXACT HR++/966 (10 patients and all controls) or GE Advance (6 patients)) | Y      | PET         | 12-16       |
| Chau et al. (2010)     | N (not stated)                              | N      | Block       | 90?          |
| Fridriksson (2010)     | Y (Siemens Trio 3 Tesla)                   | N      | Event-related | 120          |
| Study                                      | Images | Paradigm | Device                  | Notes                                                                 | Time (s) |
|-------------------------------------------|--------|----------|-------------------------|----------------------------------------------------------------------|----------|
| Fridriksson et al. (2010)                 | N      | Event-related | Siemens Trio 3 Tesla | N (exact timing of picture presentation not specified)                | 120      |
| Sharp et al. (2010)                       | Y      | PET      | Siemens HR++ 966        |                                                                       | 16       |
| Thompson et al. (2010)                    | N      | Event-related | Siemens Trio 3 Tesla | N (total images acquired not stated)                                  | Not stated|
| Tyler et al. (2010)                       | N*     | Block    | Siemens Trio 3 Tesla    | N* (there was only one block per condition per run, so condition could be confounded with low frequency drift; also, the length of the sentences is not stated so it is unclear how well the HRF peak aligns with the sparse acquisitions) | 69       |
| van Oers et al. (2010)                    | Y      | Block    | Philips Achieva 3 Tesla | Y                                                                       | 3036     |
| Papoutsi et al. (2011)                    | N      | Event-related | Siemens Trio 3 Tesla | N (length of stimuli not described)                                   | 1059     |
| Sebastian & Kiran (2011)                  | N      | Event-related | GE 3 Tesla; model not stated | N* (control events took place in the inter-trial interval between language events, and may have been systematically confounded in timing; the total number of functional images acquired is not stated) | Not stated|
| Szaflarski et al. (2011)                  | N      | Block    | Varian Unity INOVA 4 T  | N (timing not clear, because previous studies cited are not all identical in terms of timing) | Not stated|
| Tyler et al. (2011)                       | N      | Event-related | Siemens Trio 3 Tesla | N (run length not stated; length of stimuli not described)            | Not stated but 1059 per Papoutsi et al. (2011) |
| Weiduschat et al. (2011)                  | Y      | PET      | CTI-Siemens ECAT EXACT HR |                                                                       | 8        |
| Allendorfer et al. (2012)                 | N      | Mixed    | Philips 3 Tesla; model not stated |                                                                       | 435      |
| Fridriksson, Hubbard, et al. (2012)       | N      | Event-related | Siemens 3 Tesla; model not stated | N* (it appears that each of the three conditions was presented in a separate run) | 180?     |
| Fridriksson, Richardson, et al. (2012)    | N      | Event-related | Siemens Trio 3 Tesla | N (timing of stimuli within the silent periods is unclear)           | 120      |
| Marcotte et al. (2012)                    | N      | Event-related | Siemens Trio 3 Tesla | N (total images acquired not stated)                                  | Not stated|
| Schofield et al. (2012)                   | Y      | Block    | Siemens Sonata 1.5 Tesla |                                                                       | 488      |
| Wright et al. (2012)                      | N*     | Block    | Siemens Trio 3 Tesla    | N* (there was only one block per condition per run, so condition could be confounded with low frequency drift; also, the length of the sentences is not stated so it is unclear how well the HRF peak aligns with the sparse acquisitions) | 69       |
| Szaflarski et al. (2013)                  | Y      | Block    | Philips 3 Tesla; model not stated |                                                                       | 330      |
| Thiel et al. (2013)                       | Y      | PET      | CTI-Siemens ECAT EXACT HR |                                                                       | 8        |
| Abel et al. (2014)                        | Y      | Event-related | Philips Achieva 3 Tesla | N* (trials too close together (~8 s) and insufficient jitter (1-3 s) for event-related design) | 560      |
| Benjamin et al. (2014)                    | N      | Event-related | Philips Achieva 3 Tesla | N (total images acquired not stated)                                  | Not stated|
| Brownsett et al. (2014)                   | N      | Event-related | Philips Intera 3 Tesla | N* (timing of sentence presentation not described; sparse event-related design, but ITI of only 8 s and consistent linear order of listening and repetition trials could make it difficult to disentangle hemodynamic responses to listening and repeating trials) | 168 (patients); 280 (controls) |
| Mattioli et al. (2014)                    | N      | Event-related | Siemens Avanto 1.5 Tesla | N (timing of stimuli not clearly described)                           | 504      |
| Mohr et al. (2014)                        | Y      | Event-related | Siemens Trio 3 Tesla    |                                                                       | 76       |
| Robson et al. (2014)                      | N*     | Block    | Philips Achieva 3 Tesla  | N* (each condition was acquired in a separate run, which is suboptimal) | 417      |
| Study                                      | MR System | Type       | Notes                                                                 | Trials | ITI/RTMS  |
|-------------------------------------------|-----------|------------|----------------------------------------------------------------------|--------|-----------|
| Szaflarski et al. (2014)                  | Y(Philips Achieva 3 Tesla, except for 1 patient and 1 control on a Bruker 3 Tesla) | Y          | Block                                                                | 165    |           |
| van Hees et al. (2014)                    | Y(Bruker MedSpec 4 Tesla)  | Y          | Event-related                                                        | 610    |           |
| Abel et al. (2015)                        | Y(Philips Achieva 3 Tesla) | N*         | (trials too close together (~8 s) and insufficient jitter (1-3 s) for event-related design) | 560    |           |
| Kiran et al. (2015)                       | Y(Philips Achieva 3 Tesla) | N*         | (picture and scrambled conditions have different durations; ITI 2-4 s seems too short; total images acquired not stated) | Not stated |           |
| Sandberg et al. (2015)                    | Y(Philips Achieva 3 Tesla) | N*         | (total images acquired not stated; ITI of 1-3 s seems short)         | Not stated |           |
| Geranmayeh et al. (2016)                  | Y(Siemens Trio 3 Tesla)  | Y          | Event-related                                                        | 213    |           |
| Griffis et al. (2016)                     | Y(Varian Unity INOVA 4 Tesla) | Y          | Block                                                                | 140    |           |
| Sims et al. (2016)                        | Y(Philips Achieva 3 Tesla) | N*         | (total images acquired not stated)                                   | Not stated |           |
| Darkow et al. (2017)                      | Y(Siemens Trio 3 Tesla)  | Y          | Event-related                                                        | 100    |           |
| Geranmayeh et al. (2017)                  | Y(Siemens Trio 3 Tesla)  | Y          | Event-related                                                        | 213    |           |
| Griffis, Nenert, Allendorfer, & Szaflarski (2017) | N(Siemens Allegra 3 Tesla or Philips 3 Tesla; model not stated) | Y          | Block                                                                | 165    |           |
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017) | N(Siemens Allegra 3 Tesla or Philips 3 Tesla; model not stated) | Y          | Block                                                                | 165    |           |
| Harvey et al. (2017)                      | Y(Siemens Trio 3 Tesla)  | Y          | Block                                                                | 200    |           |
| Nardo et al. (2017)                       | Y(Siemens Trio 3 Tesla)  | Y          | Event-related                                                        | 696    |           |
| Nenert et al. (2017)                      | N(Philips 3 Tesla or Siemens 3 Tesla; models not stated) | Y          | Block                                                                | 600    |           |
| Qiu et al. (2017)                         | Y(GE Signa 1.5 Tesla)    | N*         | (only three pictures were named per 30-second block)                | 186    |           |
| Skipper-Kallal et al. (2017a)             | Y(Siemens Trio 3 Tesla)  | N*         | (total images acquired not stated; separation of adjacent events (covert and overt naming) will be limited because of the small amount of jitter in their timing (only 1500 ms)) | Event-related | ~450 but not stated |
| Skipper-Kallal et al. (2017b)             | Y(Siemens Trio 3 Tesla)  | N*         | (total images acquired not stated; separation of adjacent events (covert and overt naming) will be limited because of the small amount of jitter in their timing (only 1500 ms)) | Event-related | ~450 but not stated |
| Dietz et al. (2018)                       | Y(Philips Achieva 3 Tesla) | Y          | Event-related                                                        | 135    |           |
| Hallam et al. (2018)                      | Y(GE Signa HDx 3 Tesla)  | Y          | Event-related                                                        | 348    |           |
| Nenert et al. (2018)                      | N(Philips 3 Tesla or Siemens 3 Tesla; models not stated) | Y          | Block                                                                | 600    |           |
| Pillay et al. (2018)                      | Y(GE Excite 3 Tesla)     | N*         | (precise timing of stimuli not stated; total images acquired not stated) | Event-related | Not stated |
| Szaflarski et al. (2018)                  | Y(Siemens Allegra 3 Tesla) | Y          | Block                                                                | 330    |           |
| van de Sandt-Koenderman et al. (2018)     | N(GE 3 Tesla; model not stated) | Y          | Block                                                                | 132    |           |
| van Oers et al. (2018)                    | Y(Philips Achieva 3 Tesla) | N*         | (stimulus presentation was self-paced, but the ITI is not reported, nor are the number of trials presented per condition; it is likely that the language and control blocks contained different numbers of trials) | Block | 1656     |
| Barbieri et al. (2019)                    | Y(Siemens Trio 3 Tesla or Siemens Prisma 3 Tesla) | N*         | (stimulus timing described does not match stated duration of data acquisition;) | Block | ~482     |
| Reference                        | Scanner Description                                                                 | Timing Comments                                                                 | fMRI Type          | Total Images |
|---------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------|--------------|
| Johnson et al. (2019)           | Y (Siemens Trio 3 Tesla, except for 2 patients on a Siemens Prisma 3 Tesla)         | N* (total images not stated; short ITI and minimal jitter)                        | Event-related     | Not stated   |
| Kristinsson et al. (2019)       | Y (Siemens Trio 3 Tesla or Siemens Prisma 3 Tesla)                                   | Y                                                                                | Event-related     | 60           |
| Purcell et al. (2019)           | N (not stated)                                                                       | Y                                                                                | Event-related     | 1232         |
| Sreedharan, Chandran, et al. (2019) | Y (Siemens Avanto 1.5 Tesla)                                                         | N* (picture naming events consistently located between blocks)                   | Mixed             | Probably 964 |
| Hartwigsen et al. (2020)        | Y (Siemens Verio 3 Tesla)                                                            | N* (stimulus timing not described in detail; stated duration of data acquisition substantially outside possible range of duration of stimuli) | Block             | 740          |
| Stockert et al. (2020)          | Y (Siemens Trio 3 Tesla or Siemens Verio 3 Tesla)                                    | Y                                                                                | Event-related     | 660          |

Scanner = Is the scanner described?; Timing = Is the timing of stimulus presentation and image acquisition clearly described and appropriate?; Total images = Total images acquired; fMRI = functional magnetic resonance imaging; HRF = hemodynamic response function; ITI = inter-trial interval; N = No; PET = positron emission tomography; Y = Yes; Yellow underline = minor limitation; Orange underline/* = moderate limitation.
### Supplementary Table S7. Imaging: Methodology part 2

| Study                | Acquisition | Preprocessing | Model fitting | Registration | Notes                                                                 |
|----------------------|-------------|---------------|---------------|--------------|----------------------------------------------------------------------|
| Weiller et al. (1995)| Y (axial; field of view = 5.4 cm; perisylvian only) | Y             | Y             | Y            |                                                                      |
| Belin et al. (1996)  | Y (7 transaxial slices 12 mm apart)                  | Y             | Y             | Y            |                                                                      |
| Ohyama et al. (1996) | N (91 mm field of view; coverage limitations not stated) | Y             | Y             | N (lesion impact not addressed)                                      |
| Heiss et al. (1997)  | Y (whole brain)                                     | Y             | Y             | N/A          |                                                                      |
| Karbe et al. (1998)  | Y (whole brain)                                     | Y             | Y             | N/A          |                                                                      |
| Cao et al. (1999)    | Y (axial, perisylvian only)                          | Y             | N (first level cross-correlation analysis unclear) | N/A          |                                                                      |
| Heiss et al. (1999)  | Y (whole brain)                                     | Y             | Y             | N/A          |                                                                      |
| Kessler et al. (2000)| Y (whole brain)                                     | Y             | Y             | N/A          |                                                                      |
| Rosen et al. (2000)  | Y (whole brain)                                     | Y             | Y             | Y            | 1 patient scanned on different PET scanner, and not scanned with fMRI; controls had different fMRI sequence to patients |
| Blasi et al. (2002)  | Y (whole brain)                                     | Y             | Y             | N (not described)                                                  |
| Leff et al. (2002)   | Y (whole brain)                                     | Y             | Y             | Y            |                                                                      |
| Blank et al. (2003)  | Y (whole brain)                                     | Y             | Y             | Y            |                                                                      |
| Cardebat et al. (2003)| Y (whole brain)                                   | Y             | Y             | N (lesion impact not addressed)                                      |
| Sharp et al. (2004)  | Y (whole brain)                                     | Y             | Y             | Y            |                                                                      |
| Zahn et al. (2004)   | Y (whole brain)                                     | Y             | Y             | N/A          |                                                                      |
| Crinion & Price (2005)| Y (whole brain)                                   | Y             | Y             | Y            |                                                                      |
| de Boissezon et al. (2005)| Y (whole brain)    | Y             | Y             | N (lesion impact not addressed; minimal due to lesions being small and subcortical) |
| Connor et al. (2006) | Y (whole brain)                                     | Y             | Y             | N/A          |                                                                      |
| Crinion et al. (2006)| Y (whole brain)                                     | Y             | Y             | Y            | Two different scanners used for patients, but not for controls       |
| Saur et al. (2006)   | Y (whole brain)                                     | Y             | Y             | Y            |                                                                      |
| Meinzer et al. (2008)| Y (whole brain)                                     | Y             | Y             | Y            |                                                                      |
| Raboyeau et al. (2008)| Y (whole brain)                                    | Y             | Y             | N (lesion impact not addressed)                                      |
| Richter et al. (2008)| Y (whole brain)                                     | Y             | Y             | N (lesion impact not addressed)                                      |
| de Boissezon et al. (2009)| Y (whole brain)                                      | Y             | Y             | N (lesion impact not addressed)                                      |
| Fridrikssson et al. (2009)| Y (whole brain)                                     | Y             | Y             | Y            | Sparse sampling                                                      |
| Menke et al. (2009)  | Y (whole brain)                                     | Y             | Y             | Y            |                                                                      |
| Specht et al. (2009) | Y (whole brain)                                     | Y             | Y             | Y            |                                                                      |
| Warren et al. (2009) | Y (whole brain)                                     | Y             | Y             | Y            | Two different scanners used for patients, but not for controls       |
| Chau et al. (2010)   | Y (whole brain)                                     | Y             | Y             | N (lesion impact not addressed)                                      |
| Study                        | Y (whole brain) | Y | Y | N (lacks explanation of event durations) | Y | Sparse sampling |
|------------------------------|-----------------|---|---|------------------------------------------|---|-----------------|
| Fridriksson (2010)          |                 |   |   |                                          |   |                 |
| Fridriksson et al. (2010)   |                 |   |   |                                          |   |                 |
| Sharp et al. (2010)         |                 |   |   |                                          |   |                 |
| Thompson et al. (2010)      |                 |   |   |                                          |   |                 |
| Tyler et al. (2010)         |                 |   |   |                                          |   |                 |
| van Oers et al. (2010)      |                 |   |   | Breath holding scan also done to measure hemodynamic responsiveness |   |                 |
| Papoutsi et al. (2011)      |                 |   |   |                                          |   |                 |
| Sebastian & Kiran (2011)    |                 |   |   |                                          |   |                 |
| Szaflarski et al. (2011)    |                 |   |   |                                          |   |                 |
| Tyler et al. (2011)         |                 |   |   |                                          |   |                 |
| Weiduschat et al. (2011)    |                 |   |   |                                          |   |                 |
| Allendorfer et al. (2012)   |                 |   |   |                                          |   |                 |
| Fridriksson, Hubbard, et al. (2012) |           |   |   |                                          |   |                 |
| Fridriksson, Richardson, et al. (2012) |           |   |   |                                          |   |                 |
| Marcotte et al. (2012)      |                 |   |   |                                          |   |                 |
| Schofield et al. (2012)     |                 |   |   |                                          |   |                 |
| Wright et al. (2012)        |                 |   |   |                                          |   |                 |
| Szaflarski et al. (2013)    |                 |   |   |                                          |   |                 |
| Thiel et al. (2013)         |                 |   |   |                                          |   |                 |
| Abel et al. (2014)          |                 |   |   |                                          |   |                 |
| Benjamin et al. (2014)      |                 |   |   |                                          |   |                 |
| Brownset et al. (2014)      |                 |   |   |                                          |   |                 |
| Mattioli et al. (2014)      |                 |   |   |                                          |   |                 |

*Sparse sampling; different task structure in controls (two repetition trials per listening trial) raises concerns about comparisons between groups*
| Study                          | slices | noise "bip" | lesion impact | Methodology                                                                 |
|-------------------------------|--------|-------------|---------------|----------------------------------------------------------------------------|
| Mohr et al. (2014)            | Y      | Y           | N             | Sparse sampling                                                            |
| Robson et al. (2014)          | Y      | Y           | Y             | Spin echo fMRI to minimize ATL dropout                                      |
| Szaflarski et al. (2014)      | Y      | Y           | Y             | Slow event-related design; sparse sampling                                  |
| van Hees et al. (2014)        | Y      | Y           | N             |                                                                         |
| Abel et al. (2015)            | Y      | Y           | N             |                                                                         |
| Kiran et al. (2015)           | Y      | Y           | Y             | Controls were run on two different sets of parameters, neither of which was the same as the patients |
| Sandberg et al. (2015)        | Y      | Y           | Y             |                                                                         |
| Geranmayeh et al. (2016)      | Y      | Y           | Y             | Sparse sampling; mini-blocks of 2-4 trials                                  |
| Griffis et al. (2016)         | Y      | Y           | N             |                                                                         |
| Sims et al. (2016)            | Y      | Y           | Y             | No smoothing                                                               |
| Darkow et al. (2017)          | Y      | Y           | Y             | Sparse sampling                                                            |
| Geranmayeh et al. (2017)      | Y      | Y           | Y             | Sparse sampling; mini-blocks of 2-4 trials                                  |
| Griffis, Nenert, Allendorfer, Szaflarski (2017) | Y      | Y | Y |                                                                         |
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017) | Y      | Y | N |                                                                         |
| Harvey et al. (2017)          | Y      | Y           | N             |                                                                         |
| Nardo et al. (2017)           | Y      | Y           | Y             |                                                                         |
| Nenert et al. (2017)          | Y      | Y           | N             |                                                                         |
| Qiu et al. (2017)             | Y      | N (not described) | N (no description of model fitting) |                                                                         |
| Skipper-Kallal et al. (2017a) | Y      | N* (entire phases where picture was displayed modeled as covert and overt naming; difficult to separate phases due to timing) | Y |                                                                         |
| Skipper-Kallal et al. (2017b) | Y      | N* (not stated but see Skipper-Kallal et al. (2017b)) | Y | At each voxel, individuals with lesions to that voxel were excluded from analysis |
| Dietz et al. (2018)           | Y      | N (no description of HRF model, which is important given sparse sampling design) | N (lesion impact not addressed) | Additional methodological details in Dietz et al. (2016) |
| Hallam et al. (2018)          | Y      | Y           | Y             | Interleaved silent steady state imaging                                   |
| Nenert et al. (2018)          | Y      | Y           | N             | Scanner identity appropriately included as covariate                      |
| Pillay et al. (2018)          | Y      | Y           | Y             |                                                                         |
| Study                          | Acquisition | Preprocessing | Model fitting | Registration | ATL | fMRI | HRF | PET | N/A | Comment                                                                 |
|-------------------------------|-------------|---------------|---------------|--------------|-----|------|-----|-----|-----|-------------------------------------------------------------------------|
| Szafarski et al. (2018)       | Y           | Y             | Y             | Y            |     |      |     |     |     |                                                                         |
| van de Sandt-Koenderman et al. (2018) | Y           | Y             | Y             | N (lesion impact not addressed) |     |      |     |     |     |                                                                         |
| van Oers et al. (2018)        | Y           | Y             | Y             | Y            |     |      |     |     |     | Not all participants scanned at each time point; the number scanned at each time point is not stated |
| Barbieri et al. (2019)        | Y           | Y             | Y             | Y            |     |      |     |     |     | 2 runs before treatment and 2 runs after treatment; each pair of runs took place on two separate days (1-7 days apart) |
| Johnson et al. (2019)         | Y           | Y             | N* (unclear whether there was sufficient resting data to allow the key contrast to be computed) | Y |     |      |     |     |     |                                                                         |
| Kristinsson et al. (2019)     | Y           | Y             | Y             | Y            |     |      |     |     |     | Sparse sampling                                                        |
| Purcell et al. (2019)         | Y (cerebellum excluded) | Y             | N* (not feasible to separate closely spaced instruction, word, and letter/response, especially when responses will be compared to rest) | Y |     |      |     |     |     |                                                                         |
| Sreedharan, Chandran, et al. (2019) | Y           | Y             | N* (event timing will make conditions difficult to disentangle) | N (lesion impact not addressed) |     |      |     |     |     |                                                                         |
| Hartwigsen et al. (2020)      | Y           | Y             | Y             | N (lesion impact not addressed) |     |      |     |     |     |                                                                         |
| Stockert et al. (2020)        | N           | Y             | Y             | Y            |     |      |     |     |     |                                                                         |

Acquisition = Are the imaging acquisition parameters, including coverage, adequately described and appropriate?; Preprocessing = Is preprocessing and intrasubject coregistration adequately described and appropriate?; Model fitting = Is first level model fitting adequately described and appropriate?; Registration = Is intersubject normalization adequately described and appropriate?; ATL = anterior temporal lobe; fMRI = functional magnetic resonance imaging; HRF = hemodynamic response function; N = No; N/A = N/A—no intersubject normalization.; PET = positron emission tomography; Y = Yes; Yellow underline = minor limitation; Orange underline/* = moderate limitation.
Supplementary Table S8. Conditions

| Study               | Condition                                      | Response type               | Repetitions | All groups could do | All indivs could do | Notes                                                                 |
|---------------------|------------------------------------------------|-----------------------------|-------------|---------------------|---------------------|----------------------------------------------------------------------|
| Weiller et al. (1995) | Verb generation                                | Multiple words (covert)     | 2           | Y                   | Y                   | Auditory presentation; pre-scan behavioral data reported             |
|                     | Pseudoword repetition                           | Multiple words (covert)     | 2           | Y                   | Y                   |                                                                      |
|                     | Rest                                            | None                        | 2           | N/A                 | N/A                 |                                                                      |
| Belin et al. (1996)  | Word repetition with MIT-like intonation        | Word (overt)                | 1           | Y                   | U                   |                                                                      |
|                     | Word repetition                                 | Word (overt)                | 1           | Y                   | U                   |                                                                      |
|                     | Listening to words                             | None                        | 1           | N/A                 | N/A                 |                                                                      |
|                     | Rest                                            | None                        | 1           | N/A                 | N/A                 |                                                                      |
| Ohyama et al. (1996) | Word repetition                                 | Word (overt)                | 2           | Y                   | Y                   | Patients were able to repeat words well, with phonemic errors on no more than 4 out of 48 words; counting condition not analyzed in this paper |
|                     | Counting                                        | Multiple words (overt)      | 2           | Y                   | Y                   |                                                                      |
|                     | Rest                                            | None                        | 2           | N/A                 | N/A                 |                                                                      |
| Heiss et al. (1997)  | Word repetition                                 | Word (overt)                | 1           | U                   | U                   | No information about repetition rate, or whether repetition was overt or covert |
|                     | Rest                                            | None                        | 1           | N/A                 | N/A                 |                                                                      |
| Karbe et al. (1998)  | Word repetition                                 | Word (overt)                | 4 (?)       | U                   | U                   | Inability to repeat single words was an exclusion criterion, but many patients had severe aphasia so it is unclear how they would have performed |
|                     | Rest                                            | None                        | 4 (?)       | N/A                 | N/A                 |                                                                      |
| Cao et al. (1999)    | Picture naming                                  | Word (covert)               | 4           | Y                   | Y                   |                                                                      |
|                     | Viewing nonsense drawings                       | None                        | 4           | N/A                 | N/A                 |                                                                      |
| Heiss et al. (1999)  | Noun repetition                                 | Word (overt)                | 4           | U                   | U                   | Inclusion criterion would suggest all patients could do the task, but this is not stated |
|                     | Rest                                            | None                        | 4           | N/A                 | N/A                 |                                                                      |
| Kessler et al. (2000)| Word repetition                                 | Word (overt)                | 4           | Y                   | Y                   | Inclusion criterion was applied to ensure that the task could be performed |
|                     | Rest                                            | None                        | 4           | N/A                 | N/A                 |                                                                      |
| Rosen et al. (2000)  | Word stem completion (PET)                      | Word (overt)                | 4           | Y                   | Y                   | Pseudoword reading condition not analyzed in this paper              |
|                     | Reading pseudowords aloud (PET)                 | Word (overt)                | 4           | Y                   | N                   |                                                                      |
|                     | Rest (PET)                                      | None                        | 2           | N/A                 | N/A                 |                                                                      |
|                     | Word stem completion (fMRI)                     | Word (covert)               | 15-30 (?)   | Y                   | Y                   |                                                                      |
|                     | Rest (fMRI)                                     | None                        | 15-30 (?)   | N/A                 | N/A                 |                                                                      |
| Blasi et al. (2002)  | Word stem completion (novel items)              | Word (covert)               | 196         | Y                   | U                   | Novel items were presented in runs 1, 6, 7, and 8; repeated items were presented in runs 2, 3, 4, and 5; of the four repeated runs, only run 5 was analyzed. |
|                     | Word stem completion (repeated items)           | Word (covert)               | 196         | Y                   | U                   |                                                                      |
|                     | Rest                                            | None                        | Implicit baseline | N/A                 | N/A                 |                                                                      |
| Leff et al. (2002)   | Listening to words at 10 wpm                    | None                        | 2           | N/A                 | N/A                 |                                                                      |
|                     | Listening to words at 35 wpm                    | None                        | 2           | N/A                 | N/A                 |                                                                      |
|                     | Listening to words at 55 wpm                    | None                        | 2           | N/A                 | N/A                 |                                                                      |
|                     | Listening to words at 70 wpm                    | None                        | 2           | N/A                 | N/A                 |                                                                      |
|                     | Listening to words at 85 wpm                    | None                        | 2           | N/A                 | N/A                 |                                                                      |
|                     | Listening to words at 95 wpm                    | None                        | 2           | N/A                 | N/A                 |                                                                      |
|                     | Listening to words at 115 wpm                   | None                        | 2           | N/A                 | N/A                 |                                                                      |
| Study                         | Task Type                  | Trial Type | T | Control T | Y | Note |
|-------------------------------|----------------------------|------------|---|-----------|---|------|
| Blank et al. (2003)           | Propositional speech       | Sentence (overt) | 5; control: 4 | Y | Alertness maintained in rest by Asking participants to listen to environmental sounds that were presented before and after data acquisition; speech was recorded and rate was measured, also QPA was done of a separate speech sample outside the scanner |
| Cardebat et al. (2003)        | Word generation            | Word (overt) | 4 | Y | U |
| Sharp et al. (2004)           | Semantic decision          | Word (overt) | 8; control: 4 | Y | Seems the response was a spoken word, but this is not stated explicitly; assuming all individuals could do the tasks because this was an inclusion criterion and behavioral data supports |
| Zahn et al. (2004)            | Phonetic decision          | Button press | 3 | Y | N |
| Crinion & Price (2005)        | Listening to narrative speech | None | 32 | N/A | N/A | A post-scan surprise recognition test asked whether or not 38 phrases had occurred in any story; patients answered 12-33 of these questions correctly; controls answered 24-37 correctly; also note that all patients performed above chance on CAT auditory sentence comprehension (73%+ accuracy) |
| de Boissezon et al. (2005)    | Word generation            | Word (overt) | 4 | Y | Y |
| Connor et al. (2006)          | Word stem completion (novel items) | Word (covert) | 196 | Y | U |
| Crinion et al. (2006)         | Listening to narrative speech | None | 6-8 | N/A | N/A |
| Saur et al. (2006)            | Listening to sentences and making a plausibility | Button press | 92 | U | N | In the auditory sentence comprehension condition,
participants had to press a button to semantically anomalous sentences; in the reversed speech condition, they had to always press the button; the behavioral scores provided are not explained in the paper, but per a personal communication cited by Geranmayeh et al. (2014), 10% of the score reflects discrimination between intelligible and reversed speech, while 90% reflects semantic anomaly judgment; our coding of behavior is based on this limited information.

| Study                          | Task Description                        | Event Type | Number | Y/N | U/N | Notes                                                                 |
|-------------------------------|-----------------------------------------|------------|--------|-----|-----|----------------------------------------------------------------------|
| Meinzer et al. (2008)         | Picture naming (trained items)          | Word (overt) | 8      | Y   | N   | One participant was < 10% on trained and untrained items at T1       |
|                               | Picture naming (untrained items)        | Word (overt) | 8      | Y   | N   |                                                                      |
|                               | Rest                                     | None        | 16     | N/A | N/A |                                                                      |
| Raboyeau et al. (2008)        | Picture naming (native language)        | Word (overt) | Aphasia: 4; control: 2 | Y   | U   | Picture naming in native language in controls not analyzed in this paper |
|                               | Picture naming (relearned foreign language) (controls only) | Word (overt) | 2      | Y   | U   |                                                                      |
| Rest                          | None                                     | 2           | N/A    | N/A |     |                                                                      |
| Richter et al. (2008)         | Reading words silently                   | Word (covert) | 4      | Y   | U   | Preliminary data on the tasks suggests that patients would have been able to perform them, and patients were interviewed regarding the tasks after each fMRI session, however the outcomes of these interviews are not reported |
|                               | Word stem completion                     | Word (covert) | 4      | Y   | U   |                                                                      |
|                               | Rest                                     | None        | 10 (?) | N/A | N/A |                                                                      |
| de Boissezon et al. (2009)    | Word generation                          | Word (overt) | 4      | Y   | Y   |                                                                      |
|                               | Rest                                     | None        | 2      | N/A | N/A |                                                                      |
| Fridriksson et al. (2009)     | Picture naming                           | Word (overt) | 80     | Y   | N   | Patients could not name trained and untrained items at baseline      |
|                               | Viewing scrambled images                 | None        | 40     | N/A | N/A |                                                                      |
| Menke et al. (2009)           | Picture naming (trained items)          | Word (overt) | 30     | N   | N   |                                                                      |
|                               | Picture naming (untrained items)        | Word (overt) | 30     | N   | N   |                                                                      |
|                               | Picture naming (already known items)    | Word (overt) | 30     | Y   | U   |                                                                      |
|                               | Rest                                     | None        | Implicit baseline | N/A | N/A |                                                                      |
| Specht et al. (2009)          | Lexical decision (words vs pseudowords)  | Button press | 3      | Y   | Y   | Behavioral data was lost, but it is clearly stated that all participants could perform all tasks above chance; the tone decision task is not described in sufficient detail, but since it is not used in any contrast of interest, the conditions are |
|                               | Lexical decision (words vs reversed foreign words) | Button press | 3      | Y   | Y   |                                                                      |
| Study                        | Task Description                                                                 | Response Type  | Memory | Error | Comments                                                                                                                                 |
|-----------------------------|----------------------------------------------------------------------------------|----------------|--------|-------|------------------------------------------------------------------------------------------------------------------------------------------|
| Warren et al. (2009)        | Listening to narrative speech                                                     | Button press   | 3      | Y     | Tones were described clearly; tone reflecting as being clearly described                                                             |
|                             | Listening to reversed speech                                                      | None           | 6-8    | N/A   | N/A                                                                                                                                 |
| Chau et al. (2010)          | Answering questions from Cantonese Aphasia Battery                               | Button press   | 3      | U     | Nature of questions not described in detail; responses involved raising left or right hand (not button press per se)                 |
|                             | Visual decision                                                                  | Button press   | 3      | U     | U                                                                                                                                 |
| Fridriksson (2010)          | Picture naming                                                                  | Word (overt)   | 80     | Y     | U                                                                                                                                 |
|                             | Viewing abstract pictures                                                        | None           | 40     | N/A   | N/A                                                                                                                                 |
| Fridriksson et al. (2010)   | Picture naming                                                                  | Word (overt)   | 80     | Y     | Y                                                                                                                                 |
|                             | Viewing abstract pictures                                                        | None           | 40     | N/A   | N/A                                                                                                                                 |
| Sharp et al. (2010)         | Semantic decision                                                                | Word (overt)   | 8       | Y     | Y                                                                                                                                 |
|                             | Syllable count decision                                                          | Word (overt)   | 4       | Y     | U                                                                                                                                 |
|                             | Semantic decision (noise vocoded) (control only)                                 | Word (overt)   | 4 (control) | Y     | Y                                                                                                                                 |
|                             | Syllable count decision (noise vocoded) (control only)                           | Word (overt)   | 4 (control) | Y     | Y                                                                                                                                 |
| Thompson et al. (2010)      | Auditory sentence-picture matching (auditory; object cleft)                     | Button press   | 60     | N     | N                                                                                                                                 |
|                             | Auditory sentence-picture matching (subject cleft)                               | Button press   | 60     | Y     | Y                                                                                                                                 |
|                             | Auditory sentence-picture matching (simple past tense active)                    | Button press   | 60     | Y     | N                                                                                                                                 |
|                             | Rest                                                                              | None           | Implicit baseline | N/A | N/A                                                                                                                                 |
| Tyler et al. (2010)         | Listening to normal sentences and detecting a target word                         | Button press   | 2      | Y     | U                                                                                                                                 |
|                             | Listening to grammatical but meaningless sentences and detecting a target word    | Button press   | 2      | Y     | U                                                                                                                                 |
|                             | Listening to scrambled sentences and detecting a target word                      | Button press   | 2      | Y     | U                                                                                                                                 |
|                             | Listening to "musical rain" and detecting a period of white noise                 | Button press   | 2      | Y     | U                                                                                                                                 |
|                             | Rest                                                                              | None           | 2      | N/A   | N/A                                                                                                                                 |
| van Oers et al. (2010)      | Written word-picture matching                                                    | Button press   | 6      | Y     | Y                                                                                                                                 |
|                             | Semantic decision                                                                | Button press   | 6      | Y     | Y                                                                                                                                 |
|                             | Verb generation                                                                  | Word (covert)  | 8      | Y     | Y                                                                                                                                 |
|                             | Patients who could not do tasks were excluded from analyses of those tasks (1    |                |        |       | Patient from semantic decision; 3 patients from verb generation; wording is somewhat unclear regarding exclusion of patients who  |
|                             | patient from semantic decision; 3 patients from verb generation; wording is      |                |        |       | somewhat unclear regarding exclusion of patients who                                                                                 |
|                             | apparently not reported                                                          |                |        |       |                                                                                                                                 |

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| Study                        | Task Description                                                                 | Type of Task | Duration | Accuracy | Baseline | Notes                                                                                                                                                                                                 |
|------------------------------|----------------------------------------------------------------------------------|--------------|----------|----------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Papoutsi et al. (2011)       | Listening to unambiguous sentences ("unambiguous")                               | None         | 42       | N/A      | N/A      | Could not perform verb generation, but we assume they were excluded                                                                                                                                 |
|                              | Listening to ambiguous sentences with dominant resolution ("dominant")           | None         | 42       | N/A      | N/A      |                                                                                                                                                                                                       |
|                              | Listening to ambiguous sentences with subordinate resolution ("subordinate")     | None         | 42       | N/A      | N/A      |                                                                                                                                                                                                       |
|                              | Listening to filler sentences                                                    | None         | 126      | N/A      | N/A      |                                                                                                                                                                                                       |
|                              | Listening to "musical rain"                                                       | None         | 42       | N/A      | N/A      |                                                                                                                                                                                                       |
| Sebastian & Kiran (2011)     | Picture naming                                                                   | Word (overt) | 60       | Y        | Y        | Based on Binder et al. (1997), but details not reported; group only just above chance, unclear whether significantly better; clearly some individuals were at chance                                                                   |
|                              | Viewing scrambled images and saying "pass"                                      | Word (overt) | 60       | U        | U        |                                                                                                                                                                                                       |
|                              | Semantic decision                                                                | Button press | 48       | Y        | Y        |                                                                                                                                                                                                       |
|                              | Visual decision                                                                 | Button press | 48       | U        | U        |                                                                                                                                                                                                       |
| Szafierski et al. (2011)     | Semantic decision                                                                | Button press | Not stated | U        | N        |                                                                                                                                                                                                       |
|                              | Tone decision                                                                    | Button press | Not stated | U        | U        |                                                                                                                                                                                                       |
| Tyler et al. (2011)          | Listening to unambiguous sentences ("unambiguous")                               | None         | 42       | N/A      | N/A      |                                                                                                                                                                                                       |
|                              | Listening to ambiguous sentences with dominant resolution ("dominant")           | None         | 42       | N/A      | N/A      |                                                                                                                                                                                                       |
|                              | Listening to ambiguous sentences with subordinate resolution ("subordinate")     | None         | 42       | N/A      | N/A      |                                                                                                                                                                                                       |
|                              | Listening to filler sentences                                                    | None         | 126      | N/A      | N/A      |                                                                                                                                                                                                       |
|                              | Listening to "musical rain"                                                       | None         | 42       | N/A      | N/A      |                                                                                                                                                                                                       |
|                              | Rest                                                                             | None         | 42       | N/A      | N/A      |                                                                                                                                                                                                       |
| Weiduschat et al. (2011)     | Verb generation                                                                  | Word (covert) | 4        | Y        | U        | Given the means and standard deviations presented, it is likely that some patients could not perform some tasks; post-scan recognition tests not considered to quantify performance                                     |
|                              | Rest                                                                             | None         | 4        | N/A      | N/A      |                                                                                                                                                                                                       |
| Allendorfer et al. (2012)    | Verb generation (overt, event-related)                                            | Multiple words (overt) | 15  | Y        | U        |                                                                                                                                                                                                       |
|                              | Verb generation (covert, event-related)                                          | Multiple words (covert) | 15  | U        | U        |                                                                                                                                                                                                       |
|                              | Noun repetition (event-related)                                                  | Multiple words (overt) | 15  | Y        | U        |                                                                                                                                                                                                       |
|                              | Verb generation (covert, block)                                                  | Multiple words (covert) | 10  | U        | U        |                                                                                                                                                                                                       |
|                              | Finger tapping (block)                                                           | Other        | 10       | U        | U        |                                                                                                                                                                                                       |
| Fridrikssson, Hubbard, et al. (2012) | Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) | Sentence (overt) | 30 (7) | Y        | U        | Rest condition implied but not described                                                                                                                                                           |
|                              | Listening to reversed sentences and viewing a mouth speaking, while              | Sentence (overt) | 30 (7) | Y        | U        |                                                                                                                                                                                                       |
| Task Description                                                                 | Response | Y/N | Presentation | Target Detection | Notes |
|---------------------------------------------------------------------------------|----------|-----|--------------|------------------|-------|
| producing unrelated sentences                                                  | None     | 30  | N/A          | N/A              |       |
| Listening to/watching audiovisual sentences and viewing a mouth                | None     | Implicit baseline | N/A    | N/A              |       |
| Rest                                                                            | None     | Implicit baseline | N/A    | N/A              |       |
| Fridrikkson, Richardson, et al. (2012)                                          | Picture naming | 80  | Y            | U                |       |
| Viewing abstract pictures                                                      | None     | 40  | N/A          | N/A              |       |
| Marcotte et al. (2012)                                                         | Picture naming (already known items) | 20  | Y            | Y                |       |
| Picture naming (trained items)                                                 | Word (overt) | 20  | N            | N                |       |
| Picture naming (untrained items)                                               | Word (overt) | 40  | N            | N                |       |
| Viewing scrambled images and saying “baba”                                      | Word (overt) | 20  | Y            | Y                |       |
| Rest                                                                            | None     | Implicit baseline | N/A    | N/A              |       |
| Schofield et al. (2012)                                                        | Listening to word pairs, speaker gender judgment | 18  | Y            | U                |       |
| Listening to reversed word pairs, speaker gender judgment                      | Button press | 18  | Y            | U                |       |
| Rest                                                                            | None     | 40 (?) | N/A          | N/A              |       |
| Wright et al. (2012)                                                           | Listening to normal sentences and detecting a target word | 2   | Y            | Y                | Auditory presentation; target detection task with early and late targets; 12-15 trials per block with single sparse acquisition each, but only one block of each condition per run, in fixed order |
| Listening to grammatical but meaningless sentences and detecting a target word  | Button press | 2   | Y            | Y                |       |
| Listening to scrambled sentences and detecting a target word                   | Button press | 2   | Y            | Y                |       |
| Listening to “musical rain” and detecting a period of white noise              | Button press | 2   | Y            | Y                |       |
| Rest                                                                            | None     | 2   | N/A          | N/A              |       |
| Szafarski et al. (2013)                                                        | Semantic decision | 10  | N            | N                |       |
| Tone decision                                                                   | Button press | 12  | N            | N                |       |
| Thiel et al. (2013)                                                            | Verb generation | 4   | U            | U                |       |
| Rest                                                                            | None     | 4   | N/A          | N/A              |       |
| Abel et al. (2014)                                                             | Picture naming (semantic trained items) | 30  | Y            | U                |       |
| Picture naming (phonological trained items)                                    | Word (overt) | 30  | Y            | U                |       |
| Picture naming (untrained items)                                               | Word (overt) | 30  | Y            | U                |       |
| Picture naming (already known items)                                          | Word (overt) | 42  | Y            | U                |       |
| Rest                                                                            | None     | Implicit baseline | N/A    | N/A              |       |
| Benjamin et al. (2014)                                                         | Word generation | 60  | U            | U                |       |
| Rest                                                                            | None     | Implicit baseline | N/A    | N/A              |       |
| Brownsett et al. (2014)                                                        | Listening to sentences | None | Aphasia: not | N/A              | N/A   | Paradigm was different in patients and controls, and is |
| Study (year)           | Task Description                                                                 | Task Type       | Patients | See also note                                                                 |
|-----------------------|---------------------------------------------------------------------------------|-----------------|----------|-------------------------------------------------------------------------------|
| Mattioli et al. (2014)| Repeating sentences (sentence from previous trial)                            | Sentence (overt)| Y        | N/A                                                                          |
|                       | Listening to noise vocoded sentences (control only)                             | None            | N/A      | N/A                                                                          |
|                       | Repeating noise vocoded sentences (control only)                                | Sentence (overt)| Y        | U/A                                                                          |
|                       | Listening to segmented white noise                                              | None            | N/A      | N/A                                                                          |
| Mohr et al. (2014)    | Listening to sentences and making a plausibility judgment                       | Button press    | Y        | U/A                                                                          |
|                       | Listening to reversed speech                                                    | None            | N/A      | N/A                                                                          |
| Robson et al. (2014)  | Semantic decision (written word)                                                | Button press    | Y        | N/A                                                                          |
|                       | Semantic decision (picture)                                                     | Button press    | Y        | N/A                                                                          |
|                       | Visual decision                                                                  | Button press    | Y        | N/A                                                                          |
|                       | Rest                                                                            | None            | N/A      | N/A                                                                          |
| Szafrarski et al. (2014)| Verb generation (multiple words)                                          | Multiple words | Y        | U/A                                                                          |
|                       | Finger tapping                                                                  | Other           | Y        | Y/A                                                                          |
| van Hees et al. (2014)| Picture naming (phonological trained items)                                    | Word (overt)    | Y        | N/A                                                                          |
|                       | Picture naming (semantic trained items)                                         | Word (overt)    | Y        | N/A                                                                          |
|                       | Picture naming (known items)                                                   | Word (overt)    | Y        | Y/A                                                                          |
|                       | Viewing scrambled images                                                        | None            | N/A      | N/A                                                                          |
| Abel et al. (2015)    | Picture naming                                                                  | Word (overt)    | Y        | Y/A                                                                          |
|                       | Rest                                                                            | Implicit        | N/A      | N/A                                                                          |
| Kiran et al. (2015)   | Picture naming (trained)                                                        | Word (overt)    | U        | U/A                                                                          |
|                       | Picture naming (untrained)                                                      | Word (overt)    | U        | U/A                                                                          |
|                       | Viewing scrambled images and saying “skip”                                      | Word (overt)    | U        | U/A                                                                          |
|                       | Semantic feature decision                                                       | Button press    | U        | U/A                                                                          |
|                       | Visual decision                                                                 | Button press    | U        | U/A                                                                          |
| Sandberg et al. (2015)| Concreteness judgment (abstract words)                                          | Button press    | Y        | N/A                                                                          |
|                       | Concreteness judgment (concrete words)                                          | Button press    | Y        | Y/A                                                                          |
|                       | Letter string judgment                                                          | Button press    | U        | U/A                                                                          |
|                       | Rest                                                                            | Implicit        | N/A      | N/A                                                                          |

Some patients named < 10% correct at T1

2 patients below chance on abstract words per supplementary table 2
| Study                  | Task Type                          | Stimulus Type      | Number of Trials | User Feedback | Group Performance |
|-----------------------|-----------------------------------|--------------------|------------------|---------------|-------------------|
| Geranmayeh et al. (2016) | Propositional speech production | Sentence (overt)   | 60               | Y             | N                 |
|                       | Counting                          | Multiple words (overt) | 48               | Y             | U                 |
|                       | Target decision                   | Button press       | 48               | Y             | U                 |
|                       | Rest                              | None               | 45               | N/A           | N/A               |
| Griffis et al. (2016) | Verb generation                   | Multiple words (covert) | 7               | Y             | Y                 |
|                       | Finger tapping                    | Other              | 7                | U             | U                 |
| Sims et al. (2016)    | Semantic feature decision         | Button press       | 64               | Y             | U                 |
|                       | Visual decision                   | Button press       | Not stated       | Y             | U                 |
|                       | Semantic relatedness decision     | Button press       | 50               | Y             | U                 |
|                       | Pseudoword identity decision      | Button press       | 50               | Y             | U                 |
|                       | Rest                              | None               | Implicit baseline | N/A           | N/A               |
| Darkow et al. (2017)  | Picture naming                    | Word (overt)       | 80               | Y             | Y                 |
|                       | Rest                              | None               | 20               | N/A           | N/A               |
| Geranmayeh et al. (2017) | Propositional speech production | Sentence (overt)   | 60               | Y             | Y                 |
|                       | Counting                          | Multiple words (overt) | 48               | Y             | U                 |
|                       | Target decision                   | Button press       | 48               | Y             | N                 |
|                       | Rest                              | None               | 45               | N/A           | N/A               |
| Griffis, Nenert, Allendorfer, & Szafranski (2017) | Semantic decision | Button press | 5 | N | N |
|                       | Tone decision                     | Button press       | 6                | U             | U                 |
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017) | Semantic decision | Button press | 5 | N | N |
|                       | Tone decision                     | Button press       | 6                | U             | U                 |
| Harvey et al. (2017)  | Picture naming                    | Word (overt)       | 20               | Y             | Y                 |
|                       | Viewing patterns                  | None               | 20               | N/A           | N/A               |
| Nardo et al. (2017)   | Picture naming (untrained items, word cue) | Word (overt) | 54 | Y | U |
|                       | Picture naming (untrained items, initial phonemes cue) | Word (overt) | 54 | Y | U |
|                       | Picture naming (untrained items, final phonemes cue) | Word (overt) | 54 | Y | U |
|                       | Picture naming (untrained items, no cue) | Word (overt) | 54 | Y | U |
|                       | Picture naming (trained items, word cue) | Word (overt) | 53 | Y | U |
|                       | Picture naming (trained items, initial phonemes cue) | Word (overt) | 53 | Y | U |
|                       | Picture naming (trained items, final phonemes cue) | Word (overt) | 53 | Y | U |
|                       | Picture naming (trained items, no cue) | Word (overt) | 53 | Y | U |
|                       | Rest                              | None               | Implicit baseline | N/A           | N/A               |
| Nenert et al. (2017)  | Semantic decision                 | Button press       | 10               | U             | U                 |
|                       | Tone decision                     | Button press       | 10               | U             | U                 |
| Task Description | Task Type | Items | Y/N | U/U | Notes |
|------------------|-----------|-------|-----|-----|-------|
| Verb generation (covert) | Multiple words | 10 | U | U | Evidence for task performance from Dietz et al. (2016) |
| Finger tapping | Other | 10 | U | U | | 
| Qiu et al. (2017) | Picture naming | Word (overt) | 9 | U | U | 
| | Rest | None | 9 | N/A | N/A | Covert and overt naming were modeled as two phases of each trial (there was a cue to produce the name after 7500-9000 ms); 5 participants who were more impaired were given easier pictures to name; patients who named less than 20% of items correctly were excluded |
| Skipper-Kallal et al. (2017a) | Picture naming (silently name) | Word (covert) | 32 | Y | Y | 
| | Picture naming (produce the name) | Word (overt) | 32 | Y | Y | 
| | Rest | None | Implicit baseline | N/A | N/A | 
| Skipper-Kallal et al. (2017b) | Picture naming (prepare to name) | Word (covert) | 32 | Y | Y | Covert and overt naming were modeled as two phases of each trial (there was a cue to produce the name after 7500-9000 ms); 14 participants who were more impaired were given easier pictures to name; patients who named less than 10% of items correctly were excluded |
| | Picture naming (produce the name) | Word (overt) | 32 | Y | Y | 
| | Rest | None | Implicit baseline | N/A | N/A | 
| Dietz et al. (2018) | Verb generation (covert) | Multiple words (covert) | 15 | U | U | 
| | Verb generation (overt) | Multiple words (overt) | 15 | Y | U | 
| | Noun repetition | Multiple words (overt) | 15 | Y | U | 
| Hallam et al. (2018) | Listening to high ambiguity sentences | None | 24 | N/A | N/A | All but one patient had good single word comprehension, which was argued to support sentence comprehension |
| | Listening to low ambiguity sentences | None | 24 | N/A | N/A | 
| | Listening to spectrally rotated speech | None | 24 | N/A | N/A | 
| | Pressing a button to a visual cue | Button press | 9 | U | U | 
| | Rest | None | 12 | N/A | N/A | 
| Nenert et al. (2018) | Semantic decision | Button press | 5 | N | N | Assume semantic decision is out of 25, so chance is 12.5 and 95% CI below chance at T2; post-scan recognition test for verb generation not considered to quantify task performance |
| | Tone decision | Button press | 5 | Y | U | 
| | Verb generation | Multiple words (covert) | 5 | U | U | 
| | Finger tapping | Other | 5 | U | U | 
| Pillay et al. (2018) | Reading nouns aloud | Word (overt) | 72 | Implicit baseline | N/A | N/A | Some participants had < 10% accuracy, but this is appropriately addressed in the analysis |
| | Rest | None | Implicit baseline | N/A | N/A | 
| Szaflarski et al. (2018) | Semantic decision | Button press | 5 | U | U | 
| | Tone decision | Button press | 6 | U | U | 
| van de Sandt-Koenderman et al. (2018) | Listening to narrative speech | None | 6 | N/A | N/A | 
| | Listening to reversed speech | None | 6 | N/A | N/A | 
| van Oers et al. (2018) | Written word-picture matching | Button press | 6 | U | U | 

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| Study               | Task Description                                                                 | Response Type | Conditions | Baseline | Notes                                                                                                                                 |
|---------------------|----------------------------------------------------------------------------------|---------------|------------|----------|-------------------------------------------------------------------------------------------------------------------------------------|
| Barbieri et al. (2019) | Auditory sentence-picture verification, Listening to reversed speech and viewing scrambled pictures | Button press  | 32         | U        | Based on the behavioral data obtained outside the scanner, it is likely that many patients were at chance on the language task.          |
| Johnson et al. (2019) | Picture naming (trained items), Picture naming (untrained items, from control category), Picture naming (untrained items, from experimental categories), Viewing scrambled images and saying “skip”, Rest | Word (overt)  | 36         | U        | The untrained group were not actually trained on "trained items"; no accuracy data for untrained group (except for lack of change between T1 and T2). |
| Kristinsson et al. (2019) | Picture naming, Viewing abstract pictures | Word (overt)  | 40         | Y        |                                                                                                                                     |
| Purcell et al. (2019) | Spelling probe (training items), Spelling probe (known items), Case verification, Rest | Button press  | 60         | Y        | Condition 3 not used in any contrasts                                                                                                                                                  |
| Sreedharan, Chandran, et al. (2019) | Neurofeedback (try to activate language areas), Rest, Picture naming | Other         | 24         | U        | Suggested strategies to activate language areas included “making a speech, having a conversation, reciting a poem or any other form of language activity performed covertly”; picture naming task involved covert word response and button press; picture naming task not used in any contrast; word generation task used only to generate ROIs. |
| Hartwigsen et al. (2020) | Syllable count decision, Semantic decision, Rest | Button press  | 10         | Y        | Extent of recovery supports the assertion that all individuals could do the tasks                                                                                                 |
| Stockert et al. (2020) | Listening to normal sentences and making a plausibility judgment (paradigm 1), Listening to semantically anomalous sentences and making a plausibility judgment (paradigm 1), Listening to reversed speech, Listening to normal sentences (paradigm 2), Listening to semantically anomalous sentences | Button press  | 46         | U        | Description implies that paradigm 2 did not include a semantically anomalous condition, but previous papers indicate that it did; conditions 2, 5, and 6 were not used, and condition 7 was effectively contrasted out; reported behavioral data collapses across conditions and paradigms and so does not establish performance on any specific condition, but the data suggest that at least the conditions where no language-related decisions were
| (paradigm 2) Listening to pseudoword speech (paradigm 2) | Button press | 30 | Y | U |
|--------------------------------------------------------|--------------|----|---|---|
| Rest                                                   | None         | Implicit baseline | N/A | N/A |

Repetitions = Number of times the condition was repeated per scanning session (PET measurements, blocks, or events); All groups could do? = Were all groups at all time points able to perform the task (if any)?; All indivs could do = Were all individuals at all time points able to perform the task (if any)?; 2AFC = two-alternative forced choice; BNT = Boston Naming Test; CAT = Comprehensive Aphasia Test; fMRI = functional magnetic resonance imaging; MIT = melodic intonation therapy; N = No; N/A = not applicable (no task); PET = positron emission tomography; PPT = Pyramids and Palm Trees; QPA = Quantitative Production Analysis; T1, T2, etc. = first time point, second time point, etc.; U = Unknown; wpm = words per minute; Y = Yes; Yellow underline = minor limitation; Orange underline = moderate limitation.
**Supplementary Table S9. Contrasts**

| Contrast | Language condition | Control condition | Matched for | Ctrl activation | Notes |
|----------|--------------------|-------------------|-------------|----------------|-------|
| Weiller et al. (1995): Contrast 1 | Verb generation | Rest | Vis Aud Mot Cog Acc RT Rep Lang Lat | Y N Y N NANC NANC S Y Y | L posterior temporal, IFG and ventral precentral gyrus, much smaller activations in the R hemisphere |
| Weiller et al. (1995): Contrast 2 | Pseudoword repetition | Rest | Vis Aud Mot Cog Acc RT Rep Lang Lat | Y N Y N NANC NANC S S S | 
| Belin et al. (1996): Contrast 1 | Word repetition with MIT-like intonation | Word repetition | Vis Aud Mot Cog Acc RT Rep Lang Lat | Y Y Y Y NBD UNR N/A N/A N/A | L posterior temporal only; similar but less extensive activation in the R hemisphere |
| Ohyama et al. (1996): Contrast 1 | Word repetition | Rest | Vis Aud Mot Cog Acc RT Rep Lang Lat | Y Y N N NANC NANC S S N | Bilateral auditory and motor activations are prominent, only slightly L-lateralized |
| Heiss et al. (1997): Contrast 1 | Word repetition | Rest | Vis Aud Mot Cog Acc RT Rep Lang Lat | Y Y Y Y NBD UNR N/A N/A N/A | The only control data is extent of activation and mean signal increase in L and R superior temporal cortex; both of these measures were slightly L-lateralized |
| Karbe et al. (1998): Contrast 1 | Word repetition | Rest | Vis Aud Mot Cog Acc RT Rep Lang Lat | Y Y N N NANC NANC S N N | ROIs only; negligible evidence of lateralization |
| Cao et al. (1999): Contrast 1 | Picture naming | Viewing nonsense drawings | Vis Aud Mot Cog Acc RT Rep Lang Lat | Y Y Y N NANC NANC S U S | Insufficient data to assess the control activation pattern |
| Heiss et al. (1999): Contrast 1 | Noun repetition | Rest | Vis Aud Mot Cog Acc RT Rep Lang Lat | Y Y N N NANC NANC S S S | L frontal and bilateral temporal |
| Kessler et al. (2000): Contrast 1 | Word repetition | Rest | Vis Aud Mot Cog Acc RT Rep Lang Lat | Y Y N N NANC NANC N U U | No control data are reported or cited, however the same task was used in several previous studies by this group |
| Rosen et al. (2000): Contrast 1 | Word stem completion (PET) | Rest (PET) | Vis Aud Mot Cog Acc RT Rep Lang Lat | N N N N NANC NANC S S Y | L IFG, L ITG, L anterior fusiform |
| Rosen et al. (2000): Contrast 2 | Word stem completion (fMRI) | Rest (fMRI) | Vis Aud Mot Cog Acc RT Rep Lang Lat | N Y Y N NANC NANC S S Y | L IFG, L intraparietal sulcus |
| Blasi et al. (2002): Contrast 1 | Word stem completion (novel items) | Rest | Vis Aud Mot Cog Acc RT Rep Lang Lat | N Y Y N NANC NANC Y S S | Activation of language areas but also other areas; frontal activation is somewhat lateralized |
| Blasi et al. (2002): Contrast 2 | Word stem completion (repeated items) | Word stem completion (novel items) | Vis Aud Mot Cog Acc RT Rep Lang Lat | Y Y Y Y Y N NANC NANC S U S | No whole brain analysis of this contrast, but somewhat lateralized in the sense that L but not R frontal areas showed a learning effect |
| Leff et al. (2002): Contrast 1 | Higher word rates | Lower word rates | Vis Aud Mot Cog Acc RT Rep Lang Lat | Y N Y Y NANC NANC NANC S S S | Control activation is bilateral in primary auditory cortex and the lateral STG (Fig. 1, labels 1 and 2), but there is a left-lateralized activation in the pSTS (label 3); the scatter plots in Fig. 1 show activity-word rate curves for peak pSTS voxels in individual subjects; slopes were steeper in the left hemisphere (p < 0.05), however, |
| Study                        | Task/Contrast | Task Description                                                                 | Conditions | p-Value | p-Value | p-Value | p-Value | p-Value | p-Value | p-Value | p-Value | Analysis Notes                                                                 |
|------------------------------|---------------|----------------------------------------------------------------------------------|------------|---------|---------|---------|---------|---------|---------|---------|---------|-------------------------------------------------------------------------------------------------------------------------------------|
| Blank et al. (2003): Contrast 1 | Propositional speech production | Rest                                              | Y  | N  | N  | NANC | NANC | Y  | S  | S  | Much bilateral activation due to overt speech but pars opercularis and supratemporal plane L-lateralized |
| Blank et al. (2003): Contrast 2 | Propositional speech production | Counting                                          | Y  | Y  | Y  | NANC | NANC | Y  | S  | S  | Extrasylvian; somewhat L-lateralized |
| Cardebat et al. (2003): Contrast 1 | Word generation | Rest                                              | Y  | N  | N  | NANC | NANC | S  | S  | N  | Bilateral fronto-temporal and some other regions per text |
| Sharp et al. (2004): Contrast 1 | Semantic decision | Syllable count decision                   | Y  | Y  | Y  | Y N  | N  | S  | S  | Y  | The control data provided also include the noise vocoded conditions; only ventral temporal activations are shown, which are L-lateralized |
| Zahn et al. (2004): Contrast 1 | Semantic decision | Phonetic decision and lexical decision (conjunction) | Y  | Y  | Y  | AS  | UNR  | Y  | Y  | Y  | L-lateralized frontal activation, as well as temporal and parietal to a lesser extent; conjunction of baseline conditions not described in sufficient detail |
| Crinion & Price (2005): Contrast 1 | Listening to narrative speech | Listening to reversed speech                   | Y  | Y  | Y  | NANC | NANT | Y  | Y  | S  | Bilateral (L > R) temporal, L IFG and L dorsal precentral |
| de Boissezon et al. (2005): Contrast 1 | Word generation | Rest                                              | Y  | N  | N  | NANC | NANC | N  | U  | U  | |
| Connor et al. (2006): Contrast 1 | Word stem completion (novel items) | Word stem completion (repeated items) | Y  | Y  | Y  | Y  | N  | S  | U  | S  | No whole brain analysis of this contrast, but somewhat lateralized in the sense that L but not R frontal areas showed a learning effect; the only contrast analyzed in this paper is the "learning" contrast which corresponds to contrast 2 in Blasi et al. (2002) |
| Crinion et al. (2006): Contrast 1 | Listening to narrative speech | Listening to reversed speech                   | Y  | Y  | Y  | NANC | NANT | S  | Y  | S  | 11 participants; L-lateralized posterior temporal, bilateral anterior temporal, no frontal |
| Saur et al. (2006): Contrast 1 | Listening to sentences and making a plausibility judgment | Listening to reversed speech                   | Y  | Y  | N  | N  | UNR  | UNR  | Y  | Y  | L temporal and L > R frontal |
| Meinzer et al. (2008): Contrast 1 | Picture naming (trained items) | Rest                                              | N  | N  | N  | NANC | NANC | N  | U  | U  | |
| Meinzer et al. (2008): Contrast 2 | Picture naming (untrained items) | Rest                                              | N  | N  | N  | NANC | NANC | N  | U  | U  | |
| Raboyeau et al. (2008): Contrast 1 | Picture naming (native in patients; relearned foreign in controls) | Rest                                              | N  | N  | N  | NANC | NANC | N  | U  | U  | Presumably only the relearned foreign condition was used in controls (not the native condition), but this is not stated explicitly |
| Richter et al. (2008): Contrast 1 | Reading words silently | Rest                                              | N  | Y  | Y  | NANC | NANC | S  | U  | U  | Appears to be somewhat L-lateralized frontal, but not well visualized |
| Richter et al. | Word stem | Rest                                              | N  | Y  | Y  | NANC | NANC | S  | U  | N  | Bilateral frontal; other regions not |
| Year                  | Contrast | Task Type                        | Condition          | Y | N | N | N | N | N | S | S | N |
|----------------------|----------|----------------------------------|--------------------|---|---|---|---|---|---|---|---|---|
| de Boissezon et al.  | 2008     | Contrast 2 completion            | Rest               | Y | N | N | N | NANC | NANC | S | S | N |
| Fridriksson et al.   | 2009     | Contrast 1 Word generation       | Rest               | Y | Y | Y | Y | NBD | UNR | N/A | N/A | N/A |
| Fridriksson et al.   | 2009     | Contrast 1 Picture naming (correct trials) | Viewing scrambled images | Y | N | N | N | NANC | NANC | S | N | S |
| Fridriksson et al.   | 2009     | Contrast 2 Picture naming (correct trials) | Picture naming (correct trials) | Y | Y | Y | Y | NBD | UNR | N/A | N/A | N/A |
| Fridriksson et al.   | 2009     | Contrast 3 Picture naming (semantic paraphasias) | Picture naming (correct trials) | Y | Y | Y | Y | NBD | UNR | N/A | N/A | N/A |
| Menke et al.         | 2009     | Contrast 1 Picture naming (trained items) | Rest               | N | N | N | N | NANC | NANC | S | U | U |
| Menke et al.         | 2009     | Contrast 2 Picture naming (untrained items) | Rest               | N | N | N | N | NANC | NANC | S | U | U |
| Specht et al.        | 2009     | Contrast 1 Lexical decision (words vs pseudowords) | Lexical decision (words vs reversed foreign words) | Y | Y | Y | Y | UNR | UNR | Y | S | Y |
| Warren et al.        | 2009     | Contrast 1 Listening to narrative speech | Listening to reversed speech | Y | Y | Y | Y | NANC | NANT | S | Y | S |
| Chau et al.          | 2010     | Contrast 1 Answering questions from Cantonese Aphasia Battery | Visual decision | N | N | Y | N | NANC | NANC | N | U | U |
| Fridriksson          | 2010     | Contrast 1 Picture naming (correct trials) | Viewing abstract pictures | Y | N | N | N | NANC | NANC | S | S | S |
| Fridriksson et al.   | 2010     | Contrast 1 Picture naming (correct trials) | Viewing abstract pictures | Y | N | N | N | NANC | NANC | S | S | S |
| Sharp et al.         | 2010     | Contrast 1 Semantic decision (clear in patients; average of clear and noise voked in controls) | Syllable count decision (clear in patients; average of clear and noise voked in controls) | Y | Y | Y | N | N | N | S | S | Y |
| Thompson et al.      | 2010     | Contrast 1 Auditory sentence-picture matching (all three sentence types) | Rest               | N | N | N | N | NANC | NANC | N | U | U |
| Tyler et al.         | 2010     | Contrast 1 Listening to grammatical but meaningless sentences and | Listening to scrambled sentences and detecting a target word | Y | Y | Y | Y | UNR | AS | S | Y | N |

Control data in Cardebat et al. (2003); bilateral fronto-temporal and some other regions per text.

Control data in Fridriksson et al. (2007); motor activations are prominent; there is some L frontal activation but little temporal activation in either hemisphere.

Control data N/A because controls do not typically make errors.

11 participants; L-lateralized posterior temporal, bilateral anterior temporal, no frontal.

The contrast activated a ventral part of the L IFG, along with L anterior cingulate and L DLPFC.

The contrast was intended to be shown in Fridriksson et al. (2007); motor activations are prominent; there is some L frontal activation but little temporal activation in either hemisphere.

L-lateralized frontal and temporal activations, but also bilateral visual, motor and auditory.

Not stated exactly what contrast was used in controls.

There are more control participants in another paper (Tyler et al., 2010, Cereb Cortex), but the relevant contrast does not seem to be shown in that paper; the contrast is intended to...
| Study                        | Condition Description                                                                 | Task                        | Decision | Correct | Incorrect | Lateralization | Notes                                                                 |
|------------------------------|----------------------------------------------------------------------------------------|-----------------------------|----------|---------|-----------|----------------|-----------------------------------------------------------------------|
| van Oers et al. (2010)       | Written word-picture matching                                                           | Visual decision             | N        | Y       | Y         | UNR            | Not clearly stated that language tasks were contrasted only with     |
|                              |                                                                                        |                             |          |         |           | UNR            | arrow decision task and not rest for the first two contrasts, but this|
|                              |                                                                                        |                             |          |         |           | S              | can be inferred                                                       |
|                              | Semantic decision                                                                      | Visual decision             | N        | Y       | Y         | UNR            | Not clearly stated that language tasks were contrasted only with     |
|                              |                                                                                        |                             |          |         |           | UNR            | arrow decision task and not rest for the first two contrasts, but this|
|                              |                                                                                        |                             |          |         |           | S              | can be inferred                                                       |
| Papoutsi et al. (2011)       | Listening to ambiguous sentences with subordinate resolution ("subordinate")         | Listening to ambiguous sentences with dominant resolution ("dominant") | Y        | Y       | Y         | NANB           | Control data in Tyler et al. (2011); L frontal and temporal           |
| Sebastian & Kiran (2011)     | Picture naming (correct trials)                                                        | Viewing scrambled images and saying "pass" | Y        | Y       | N         | UNR            | Reporting is selective, but appears mostly bilateral with slight L-|
|                              |                                                                                        |                             |          |         |           | UNR            | lateralization of language areas                                     |
| Sebastian & Kiran (2011)     | Semantic decision (correct trials)                                                     | Visual decision             | Y        | Y       | Y         | UNR            | Clearly lateralized frontal activation, but very modest temporal     |
| Szaflarski et al. (2011)     | Semantic decision                                                                      | Tone decision               | Y        | Y       | Y         | AS             | Control data in Kim et al. (2011) and Szaflarski et al. (2008); L   |
|                              |                                                                                        |                             |          |         |           | UNR            | frontal and temporal, plus other semantic regions                    |
| Tyler et al. (2011): Contrast 1 | Listening to ambiguous sentences with dominant and subordinate                         | Listening to unambiguous sentences ("unambiguous") | Y        | Y       | Y         | NANB           | L frontal and parietal; R frontal (but L > R); no L temporal         |
| Tyler et al. (2011): Contrast 2 | Listening to ambiguous sentences with dominant resolution ("dominant")                | Listening to unambiguous sentences ("unambiguous") | Y        | Y       | Y         | NANB           | L frontal and parietal; no L temporal                                 |
| Tyler et al. (2011): Contrast 3 | Listening to ambiguous sentences with subordinate resolution ("subordinate")          | Listening to unambiguous sentences ("unambiguous") | Y        | Y       | Y         | NANB           | L frontal, temporal and parietal, R frontal (but L > R)              |
| Tyler et al. (2011): Contrast 4 | Listening to ambiguous sentences with subordinate resolution ("subordinate")          | Listening to ambiguous sentences ("dominant") | Y        | Y       | Y         | NANB           | L frontal and temporal                                                |
| Weiduschat et al. (2011)     | Verb generation                                                                        | Rest                        | Y        | N       | Y         | NANC           | Control data in Herholz et al. (1996); insufficient to fully validate the contrast |
| Allendorfer et al. (2012): Contrast 1 | Verb generation (covert, block) | Finger tapping (block) | Y | Y | N | N | **NANC** | **NANC** | Y | Y | Y | Strongly lateralized frontal and temporal activation |
| Allendorfer et al. (2012): Contrast 2 | Verb generation (overt, event-related) | Noun repetition (event-related) | Y | Y | Y | N | AM | UNR | Y | S | S | Somewhat L-lateralized frontal, temporal and parietal activations, but also extensive midline activation |
| Allendorfer et al. (2012): Contrast 3 | Verb generation (overt, event-related) | Verb generation (covert, event-related) | Y | N | N | Y | NANC | NANC | Y | S | N/A | Bilateral speech motor activations, but also extensive midline activation |
| Fridriksson, Hubbard, et al. (2012): Contrast 1 | Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) | Listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences | Y | Y | Y | **UNR** | **UNR** | S | N | N | Control and patient data are combined; this contrast activates bilateral anterior insula and posterior MTG, slightly more extensive on the L |
| Fridriksson, Hubbard, et al. (2012): Contrast 2 | Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) | Rest | N | N | N | NANC | NANC | N | U | U | Rest condition implied but not explicitly described |
| Fridriksson, Hubbard, et al. (2012): Contrast 3 | Listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences | Rest | N | N | N | NANC | NANC | N | U | U | Rest condition implied but not explicitly described |
| Fridriksson, Hubbard, et al. (2012): Contrast 4 | Listening to/watching audiovisual sentences and viewing a mouth | Rest | N | N | N | **NANC** | **NANT** | N | U | U | Rest condition implied but not explicitly described |
| Fridriksson, Richardson, et al. (2012): Contrast 1 | Picture naming | Viewing abstract pictures | Y | N | N | N | **NANC** | **NANC** | S | N | S | Control data in Fridriksson et al. (2007); motor activations are prominent; there is some L frontal activation but little temporal activation in either hemisphere |
| Marcotte et al. (2012): Contrast 1 | Picture naming (T1: known items; T2: trained items; correct trials) | Viewing scrambled images and saying "baba" | Y | Y | Y | N | YCT | UNR | N | U | U | Different contrasts at different time points not clearly explained |
| Marcotte et al. (2012): Contrast 2 | Picture naming (known items, correct trials) | Viewing scrambled images and saying "baba" | Y | Y | Y | N | YCT | UNR | N | U | U | Different contrasts at different time points not clearly explained |
| Marcotte et al. (2012): Contrast 3 | Picture naming (trained items, correct trials) | Viewing scrambled images and saying "baba" | Y | Y | Y | N | YCT | UNR | N | U | U | Different contrasts at different time points not clearly explained |
| Study (Year) | Contrast | Task | Rest | Condition 1 | Condition 2 | Condition 3 | Notes |
|-------------|----------|------|------|-------------|-------------|-------------|-------|
| Schofield et al. (2012): Contrast 1 | Listening to word pairs or reversed word pairs, speaker gender judgment | Rest | N | N | N | NANC | NANC | Y | N | N | Control data in Leff et al. (2008); auditory contrast, not intended to be language contrast |
| Schofield et al. (2012): Contrast 2 | Listening to word pairs, speaker gender judgment | Listening to reversed word pairs, speaker gender judgment | Y | Y | Y | UNR | UNR | Y | S | Y | Control data in Leff et al. (2008); L-lateralized activation of posterior STS |
| Wright et al. (2012): Contrast 1 | Listening to normal sentences and detecting a target word | Rest | N | N | N | NANC | NANC | Y | N | N | Bilateral superior temporal, sensorimotor and visual |
| Wright et al. (2012): Contrast 2 | Listening to grammatical but meaningless sentences and detecting a target word | Rest | N | N | N | NANC | NANC | N | U | U | |
| Szaflarski et al. (2013): Contrast 1 | Semantic decision | Tone decision | Y | Y | Y | AM | UNR | Y | Y | Y | Control data in Kim et al. (2011) and Szaflarski et al. (2008); L frontal and temporal, plus other semantic regions |
| Thiel et al. (2013): Contrast 1 | Verb generation | Rest | Y | N | N | NANC | NANC | S | U | U | Cites Weiduschat et al. (2011) which in turn cites Herholz et al. (1996) which provides some minimal control data |
| Abel et al. (2014): Contrast 1 | Picture naming (all conditions) | Rest | N | N | N | NANC | NANC | N | U | U | But see control data reported in a subsequent paper (Abel et al., 2015) |
| Abel et al. (2014): Contrast 2 | Picture naming (trained items) | Picture naming (untrained items) | Y | Y | Y | N | UNR | N | U | U | |
| Abel et al. (2014): Contrast 3 | Picture naming (semantic trained items) | Picture naming (phonological trained items) | Y | Y | Y | Y | UNR | N | U | U | |
| Benjamin et al. (2014): Contrast 1 | Word generation | Rest | N | N | N | NANC | NANC | N | U | U | Contrast not described explicitly but there is only one possible contrast |
| Brownsett et al. (2014): Contrast 1 | Listening to sentences | Listening to segmented white noise | Y | Y | Y | NANB | NANT | N | U | U | |
| Brownsett et al. (2014): Contrast 2 | Listening to sentences (patients) or listening to noise vocoded sentences (controls) | Listening to segmented white noise | Y | Y | Y | NANB | NANT | N | U | U | |
| Mattioli et al. (2014): Contrast 1 | Listening to sentences and making a plausibility judgment | Listening to reversed speech | Y | Y | N | NANC | NANC | S | S | Y | 10 participants; quite lateralized activity centered on the anterior Sylvian fissure; it is mentioned that "noise" was also included on the negative side of the contrast; it is unclear if this refers to the |
| Study                        | Task Description                                                                 | Signal-correlated noise | Control Data | Note                                                                 |
|-----------------------------|----------------------------------------------------------------------------------|-------------------------|--------------|----------------------------------------------------------------------|
| Mohr et al. (2014): Contrast 1 | Listening to sentences (high and low ambiguity)                                   | Y Y Y N               | NANT U U     | Some control data in Rodd et al. (2005), but half of the participants were performing a probe judgment task, unlike in the present study. |
| Mohr et al. (2014): Contrast 2 | Listening to high ambiguity sentences                                              | Y Y Y N               | NANT U U     | Some control data in Rodd et al. (2005), but half of the participants were performing a probe judgment task, unlike in the present study. |
| Robson et al. (2014): Contrast 1 | Semantic decision (written word and picture)                                      | N Y N N               | NANC NANC Y S | Control data are provided in Table 6 for contrasts of written word semantic decision vs dual baseline, and picture semantic decision vs dual baseline, but not for the main effect of semantic decision; these data suggest that the contrast activates ventral temporal regions bilaterally; two contrasts are described: (1) written word judgment versus a dual baseline of visual judgment and rest; (2) picture judgment versus a dual baseline of visual judgment and rest; these two primary contrasts are reported in patients and controls separately, but no between-group contrasts are reported, so these contrasts are excluded from our review; rather, the between-groups analyses in the paper take the form of ANOVAs; the main effect of group in these ANOVAs collapses across the two described contrasts, therefore we have coded the contrast as the average of the two described contrasts; the exact nature of the computation of dual baseline contrasts is not described. |
| Szafirski et al. (2014): Contrast 1 | Verb generation                                                                  | Y Y N N               | NANC NANC Y Y S | Control data in Szafirski et al. (2008); frontal activation L-lateralized, temporal less so. |
| van Hees et al. (2014): Contrast 1 | Picture naming (phonological trained items, correct trials)                     | Y N N N               | NANC NANC S U U | Control data are described for naming untrained items; the data are reported only briefly in the text; it is notable that no speech motor, visual, or auditory activations are reported, as might be expected in a picture naming task; correct and incorrect trials were apparently modeled separately, but this is not clearly stated, nor are the criteria for deciding whether trials were correct; it is generally not clear which contrasts exactly were run. |
| van Hees et al.              | Picture naming                                                                   | Y N N N               | NANC NANC S U U | Control data are described for. |
| Study                  | Contrast | Task Description                              | Baseline | Correct | Incorrect | Naming | Unrelated | Senses | Criteria for Deciding Correct | Contrasts Run | Results                                                                 |
|------------------------|----------|-----------------------------------------------|----------|---------|-----------|--------|-----------|--------|---------------------------------|----------------|-----------------------------------------------------------------------|
| Abel et al. (2015)     | Contrast 1 | Picture naming                               | Rest     | N       | N         | N      | NANC      | Y      | N                               | Bilateral somato-motor, auditory and to a lesser extent higher level visual regions; finite impulse analysis only |
| Kiran et al. (2015)    | Contrast 1 | Picture naming (trained)                     | Viewing scrambled images and saying “skip”     | Y       | Y        | Y        | N       | UNR       | UNR    | S                               | Overlap of individual participant activation maps; somewhat lateralized frontal and temporal, but also bilateral occipito-temporal |
| Kiran et al. (2015)    | Contrast 2 | Semantic feature decision                     | Visual decision                                  | Y       | Y        | Y        | N       | UNR       | UNR    | S                               | Overlap of individual participant activation maps; somewhat lateralized frontal and temporal, but also bilateral occipito-temporal; this contrast inferred but not described |
| Sandberg et al. (2015) | Contrast 1 | Concreteness judgment (abstract words, correct trials) | Rest     | N       | Y        | N      | NANC      | NANC   | U                               | The concreteness judgment task was compared to the letter string judgment task to define ROIs for connectivity analysis, but the group analysis meeting criteria for this review appears to be based only on comparisons between time points on the concreteness judgment conditions |
| Sandberg et al. (2015) | Contrast 2 | Concreteness judgment (concrete words, correct trials) | Rest     | N       | Y        | N      | NANC      | NANC   | U                               | The concreteness judgment task was compared to the letter string judgment task to define ROIs for connectivity analysis, but the group analysis meeting criteria for this review appears to be based only on comparisons between time points on the concreteness judgment conditions |
| Geranmayeh et al. (2016) | Contrast 1 | Propositional speech production               | Rest     | N       | N        | N      | NANC      | NANC   | S                               | Control data for univariate analysis in Geranmayeh et al. (2014), but note that the present paper does not describe a univariate analysis; control activations reflect speech rather than language |
| Geranmayeh et al. (2016) | Contrast 2 | Propositional speech production               | Counting | N       | Y        | Y      | NANC      | NANC   | S                               | Control data for univariate analysis in Geranmayeh et al. (2014), but note that the present paper does not describe a univariate analysis; control |
| Study                                      | Task/Decision                                                                 | Contrast | Control Data                                                                                           | ROI Description                                                                                   |
|--------------------------------------------|-------------------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Geranmayeh et al. (2016): Contrast 3       | Propositional speech production                                              | Target decision | N N N N N N NANC NANC N U U                                      | activations are L frontal, L pSTS, L SMA, L > R occipito-temporal |
| Griffis et al. (2016): Contrast 1          | Verb generation                                                              | Finger tapping | Y Y N N NANC NANC Y Y S                                      | Control data in Szaflarski et al. (2008); frontal activation L-lateralized, temporal less so       |
| Sims et al. (2016): Contrast 1             | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) | Visual decision or pseudoword identity decision | Y Y Y Y N UNR N U U                                      | 8 patients and 4 controls performed one paradigm, while 6 patients and 4 controls performed another; the data were combined based on the assumption that similar processes were implicated by the two contrasts |
| Darkow et al. (2017): Contrast 1            | Picture naming                                                              | Rest      | N N N N NANC NANC N U U                                      | Control data in Geranmayeh et al. (2014); speech not language; relevant activations are bilateral; not entirely clear that the whole brain analysis is indeed propositional speech production vs rest; a contrast of target decision vs mean of propositional speech and counting is also used to define the preSMA/dACC ROI |
| Geranmayeh et al. (2017): Contrast 1        | Propositional speech production                                              | Rest      | N N N N NANC NANC Y N N                                      | Temporal activation is mid MTG and AG rather than pSTS                                             |
| Griffis, Nenert, Allendorfer, & Szaflarski (2017): Contrast 1 | Semantic decision                                                           | Tone decision | Y Y Y Y UNR UNR Y Y Y                                      | Temporal activation is mid MTG and AG rather than pSTS                                             |
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017): Contrast 1 | Semantic decision                                                           | Tone decision | Y Y Y Y UNR UNR Y Y Y                                      | Temporal activation is mid MTG and AG rather than pSTS                                             |
| Harvey et al. (2017): Contrast 1            | Picture naming                                                              | Viewing patterns | Y N N N NANC NANC N U U                                      | It is difficult to determine exactly what contrasts were employed                                  |
| Nardo et al. (2017): Contrast 1             | Picture naming (all conditions, correct trials)                             | Rest      | N N N N NANC NANC N U U                                      | It is difficult to determine exactly what contrasts were employed                                  |
| Nardo et al. (2017): Contrast 2             | Picture naming (untrained items, no cue, correct trials)                    | Picture naming (trained items, no cue, correct trials) | Y Y Y Y YCT N N U U                                      | It is difficult to determine exactly what contrasts were employed                                  |
| Nenert et al. (2017): Contrast 1            | Semantic decision                                                           | Tone decision | Y Y Y Y AM UNR Y Y Y                                      | Lateralized frontal, temporal, and parietal                                                        |
| Nenert et al. (2017): Contrast 2            | Verb generation                                                             | Finger tapping | Y Y N N NANC NANC Y Y S                                      | Control data in Szaflarski et al. (2008); frontal activation L-lateralized, temporal less so        |
| Qiu et al. (2017): Contrast 1               | Picture naming                                                              | Rest      | N N N N NANC NANC S N S                                      | Somewhat L-lateralized frontal and anterior temporal language activations, but the majority of activation is in unexpected regions |
| Skipper-Kallal et al. (2017a): Contrast 1   | Picture naming (silently name, correct trials)                              | Rest      | N Y Y N NANC NANC Y N N                                      | Bilateral frontal and occipito-temporal, but not posterior temporal                                 |
| Skipper-Kallal et al. (2017b): Contrast 1   | Picture naming                                                              | Rest      | N N N N NANC NANC Y N N                                      | Bilateral frontal and occipito-temporal, but not posterior temporal                                 |
| Study Reference | Task | Design | Control | Frontal | Temporal | Parietal | Overall | Control Notes |
|-----------------|------|--------|---------|---------|---------|----------|---------|----------------|
| al. (2017a) | (produce the name, correct trials) | (produce the name, correct trials) | Y U U Y NBD UNR N/A N/A N/A | | | | Control data N/A because controls do not typically make errors; it is unclear whether there were no-response trials and whether they were modeled as incorrect. |
| Skipper-Kallal et al. (2017a): Contrast 3 | Picture naming (both phases, correct trials) | Picture naming (both phases, incorrect trials) | Rest | N Y Y N NANC NANC Y N N | Bilateral frontal and occipito-temporal, but not posterior temporal |
| Skipper-Kallal et al. (2017b): Contrast 1 | Picture naming (prepare to name, correct trials) | | Rest | N N N N NANC NANC Y N N | Bilateral frontal and occipito-temporal, but not posterior temporal |
| Skipper-Kallal et al. (2017b): Contrast 2 | Picture naming (produce the name, correct trials) | | Rest | N N N N NANC NANC Y N N | Bilateral frontal and occipito-temporal, but not posterior temporal |
| Dietz et al. (2018): Contrast 1 | Verb generation (overt) | Noun repetition | Y Y Y N UNR UNR Y S S | Control data in Allendorfer et al. (2012); somewhat L-lateralized frontal, temporal and parietal activations, but also extensive midline activation |
| Hallam et al. (2018): Contrast 1 | Listening to high or low ambiguity sentences | Listening to spectrally rotated speech | Y Y Y Y NAB NANT S U U | Hard to evaluate contrast because a “semantic mask” is used but is not described in detail |
| Hallam et al. (2018): Contrast 2 | Listening to high ambiguity sentences | Listening to low ambiguity sentences | Y Y Y Y NAB NANT N U U | |
| Nenert et al. (2018): Contrast 1 | Semantic decision | Tone decision | Y Y Y Y AM UNR Y Y Y | L lateral and medial frontal and AG, strongly lateralized |
| Nenert et al. (2018): Contrast 2 | Verb generation | Finger tapping | Y Y N N NANC NANC Y Y Y | L lateral and medial frontal and mid temporal, strongly lateralized |
| Pillay et al. (2018): Contrast 1 | Reading nouns aloud (correct trials) | Reading nouns aloud (incorrect trials) | Y Y Y Y NBD Y N/A N/A N/A | Control data N/A because controls do not typically make errors |
| Szaflarski et al. (2018): Contrast 1 | Semantic decision | Tone decision | Y Y Y Y UNR UNR Y Y Y | L frontal and temporal, plus other semantic regions |
| van de Sandt-Koenderman et al. (2018): Contrast 1 | Listening to narrative speech | Listening to reversed speech | Y Y Y Y NAB NANT N U U | Primarily bilateral visual activations; frontal activation is L-lateralized |
| van Oers et al. (2018): Contrast 1 | Written word-picture matching | Visual decision | N Y Y N UNR UNR S N S | L frontal, L posterior ITG, L superior parietal |
| van Oers et al. (2018): Contrast 2 | Semantic decision | Visual decision | N Y Y N UNR UNR S S Y | |
| Barbieri et al. (2019): Contrast 1 | Auditory sentence-picture verification | Listening to reversed speech and viewing scrambled pictures | Y Y Y N UNR UNR Y S S | L-lateralized inferior frontal and posterior temporal, but also bilateral posterior inferior temporal and lateral occipital activations; contrast described as “passive > control” but seems to involve active and passive sentences |
| Johnson et al. (2019): Contrast 1 | Picture naming (trained items) | Rest | N N N N NANC NANC S N N | Most ROIs deactivated in controls |
| Kristinsson et al. (2019): Contrast 1 | Picture naming | Viewing abstract pictures | Y N N N NANC NANC N U U | |
| Study                                      | Task                                                                 | Outcome | N | Y | N | N | N/A | N | C | U | U |
|-------------------------------------------|----------------------------------------------------------------------|---------|---|---|---|---|-----|---|---|---|---|
| Purcell et al. (2019): Contrast 1         | Spelling probe (training items)                                      | Rest    | N | N | N | N | NANC | N | U | U | U |
| Purcell et al. (2019): Contrast 2         | Spelling probe (known items)                                         | Rest    | N | N | N | N | NANC | N | U | U | U |
| Sreedharan, Chandran, et al. (2019): Contrast 1 | Neurofeedback (try to activate language areas)                      | Rest    | N | Y | Y | N | NANC | N | U | N | Y |
| Hartwigsen et al. (2020): Contrast 1      | Syllable count decision                                              | Rest    | Y | N | N | N | NANC | N | S | U | N |
| Hartwigsen et al. (2020): Contrast 2      | Semantic decision                                                    | Rest    | Y | N | N | N | NANC | N | Y | Y | Y |
| Stockert et al. (2020): Contrast 1        | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) | Listening to reversed speech | Y | Y | N | N | UNR | N | S | Y | Y |

Vis = Are the language and control conditions matched for visual demands?; Aud = Are the language and control conditions matched for auditory demands?; Mot = Are the language and control conditions matched for motor demands?; Cog = Are the language and control conditions matched for cognitive demands?; Acc = Is accuracy matched between the language and control tasks for all groups at all time points?; RT = Is reaction time matched between the language and control tasks for all groups at all time points?; Rep = Are control data reported in the paper, or in a previous publication that is cited?; Lang = Does the contrast selectively activate plausible relevant language regions in neurologically normal individuals?; Lat = Are activations lateralized in neurologically normal individuals?; AG = angular gyrus; AM = Appear mismatched; ANOVA = analysis of variance; AS = Appear similar; C = Accuracy or RT is covariate; DLPFC = dorsolateral prefrontal cortex; fMRI = functional magnetic resonance imaging; IFG = inferior frontal gyrus; ITG = inferior temporal gyrus; L = left; MIT = melodic intonation therapy; MTG = middle temporal gyrus; N = No; N/A = not applicable; NAM = No, but attempt made; NANC = Not applicable, no behavioral measure; NANT = Not applicable, tasks not comparable.; NBD = No, by design; PET = positron emission tomography; pSTS = posterior superior temporal sulcus; R = right; ROI = region of interest; S = Somewhat; SMA = supplementary motor area; STG = superior temporal gyrus; STS = superior temporal sulcus; T1, T2, etc. = first time point, second time point, etc.; U = Unknown; UNR = Unknown, not reported; UNT = Unknown, no test; Y = Yes; YCT = Yes, correct trials only; Yellow underline = minor limitation; Orange underline = moderate limitation; Red underline = major limitation.
| Analysis                  | First level contrast | Second level contrast | Matched for | Stats | Notes                                                                 | Findings                                                                                     |
|--------------------------|----------------------|-----------------------|-------------|-------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Weiller et al. (1995):   | Verb generation vs   | CAC                   | AM          | UNR   | Vox NDC                                                              | † R IFG<br> † R posterior STG/STS/MTG<br> † L posterior STG/STS/MTG notes: based more on Figure 2 than the text |
| Vox 1                    | rest                 | Aphasia vs control    |             |       |                                                                      |                                              |
| Weiller et al. (1995):   | Pseudoword repetition| CAC                   | AS          | UNR   | Vox NDC                                                              | † R ventral precentral/inferior frontal junction<br> † R IFG<br> † R posterior STG/STS/MTG<br> † L posterior STG/STS/MTG notes: based more on Figure 2 than the text |
| Vox 2                    | vs rest              | Aphasia vs control    |             |       |                                                                      |                                              |
| Belin et al. (1996):     | Word repetition with | CB                    | NBD         | UNR   | ROI Anat NC                                                          | † L IFG<br> † L dorsolateral prefrontal cortex<br> † R posterior STG |
| ROI 1                    | MIT-like intonation  | Aphasia               |             |       |                                                                      |                                              |
|                         | vs word repetition   |                       |             |       |                                                                      |                                              |
| Ohyama et al. (1996):    | Word repetition vs   | CAC                   | UNR         | UNR   | ROI Func NC                                                         | † R IFG<br> † R posterior STG/STS/MTG                                                       |
| ROI 1                    | rest                 | Aphasia vs control    |             |       |                                                                      |                                              |
|                         |                      |                       |             |       |                                                                      |                                              |
| Ohyama et al. (1996):    | Word repetition vs   | CAA                   | UNR         | UNR   | ROI Func NC                                                         | † R IFG<br> † R posterior STG/STS/MTG                                                       |
| ROI 2                    | rest                 | Aphasia fluent (n = 10) vs non-fluent (n = 6) |             |       |                                                                      |                                              |
|                         |                      |                       |             |       |                                                                      |                                              |
| Study               | Condition                  | Type  | ROIs                                                                 | Notes                                                                 |
|---------------------|----------------------------|-------|----------------------------------------------------------------------|----------------------------------------------------------------------|
| Ohyama et al. (1996): ROI 3 | Word repetition vs rest | CC    | L posterior inferior frontal; R posterior inferior frontal; L posterior superior temporal; R posterior superior temporal; L Rolandic; R Rolandic; SMA | Number of ROIs: 7; ROIs: (1) L posterior inferior frontal; (2) R posterior inferior frontal; (3) L posterior superior temporal; (4) R posterior superior temporal; (5) L Rolandic; (6) R Rolandic; (7) SMA; how ROIs defined: spheres around control peaks; no correction for multiple comparisons across WAB subscores |
| Ohyama et al. (1996): ROI 4 | Word repetition vs rest | CC    | L posterior inferior frontal; R posterior inferior frontal; L posterior superior temporal; R posterior superior temporal; L Rolandic; R Rolandic; SMA | Number of ROIs: 7; ROIs: (1) L posterior inferior frontal; (2) R posterior inferior frontal; (3) L posterior superior temporal; (4) R posterior superior temporal; (5) L Rolandic; (6) R Rolandic; (7) SMA; how ROIs defined: spheres around control peaks; this non-significant finding is implied but not stated explicitly |
| Ohyama et al. (1996): ROI 5 | Word repetition vs rest | CC    | L posterior inferior frontal; R posterior inferior frontal; L posterior superior temporal; R posterior superior temporal; L Rolandic; R Rolandic; SMA | Number of ROIs: 7; ROIs: (1) L posterior inferior frontal; (2) R posterior inferior frontal; (3) L posterior superior temporal; (4) R posterior superior temporal; (5) L Rolandic; (6) R Rolandic; (7) SMA; how ROIs defined: spheres around control peaks; this non-significant finding is implied but not stated explicitly |
| Ohyama et al. (1996): ROI 6 | Word repetition vs rest | CC    | L posterior inferior frontal; R posterior inferior frontal; L posterior superior temporal; R posterior superior temporal; L Rolandic; R Rolandic; SMA | Number of ROIs: 7; ROIs: (1) L posterior inferior frontal; (2) R posterior inferior frontal; (3) L posterior superior temporal; (4) R posterior superior temporal; (5) L Rolandic; (6) R Rolandic; (7) SMA; how ROIs defined: spheres around control peaks; this non-significant finding is implied but not stated explicitly |
| Heiss et al. (1997): Vox 1 | Word repetition vs rest | LAA   | L posterior STG/STS/MTG; R posterior STG/STS/MTG | Search volume: whole brain; software: not stated; qualitative generalization across individuals on pp. 214-6; the consistent aspects of the findings were that there was an emergence of L posterior temporal activation in patients with better recovery, and R posterior temporal activation in patients with worse recovery |
| Heiss et al. (1997): ROI 1 | Word repetition vs rest | LAA   | L posterior STG/STS/MTG; Heschl's gyrus | Number of ROIs: 2; ROIs: (1) L superior temporal cortex; (2) R superior temporal cortex; how ROIs defined: |
| Study | Task | Group | Covariates | ROI | ROIs | How ROIs Defined | Number of ROIs | Notes |
|-------|------|-------|------------|-----|------|------------------|----------------|-------|
| Karbe et al. (1998): ROI 1 | Word repetition vs rest | CAC Aphasia | T1 vs control | UNR | UNR | ROI | 8 | Number of ROIs: 8; ROIs: (1) L IFG; (2) L STG/HG; (3) L SMA; (4) L ventral precentral; (5-8) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 219, but only the L SMA comparison is explicitly quantified |
| Karbe et al. (1998): ROI 2 | Word repetition vs rest | CC Aphasia (subset who returned for follow-up) T1 (n = 7) | T1 Covariate: TT T1 | UNR | UNR | ROI | 8 | Number of ROIs: 8; ROIs: (1) L IFG; (2) L STG/HG; (3) L SMA; (4) L ventral precentral; (5-8) homotopic counterparts; how ROIs defined: individual anatomical images |
| Karbe et al. (1998): ROI 3 | Word repetition vs rest | CC Aphasia (subset who returned for follow-up) T2 (n = 7) | T2 Covariate: TT T2 | UNR | UNR | ROI | 8 | Number of ROIs: 8; ROIs: (1) L IFG; (2) L STG/HG; (3) L SMA; (4) L ventral precentral; (5-8) homotopic counterparts; how ROIs defined: individual anatomical images |
| Karbe et al. (1998): ROI 4 | Word repetition vs rest | LC Aphasia (subset who returned for follow-up) (n = 7) | T2 vs T1 Covariate: subsequent outcome (T2) TT | UNR | UNR | ROI | 1 | Number of ROIs: 1; ROI: L STG/HG; how ROI defined: individual anatomical images |
| Karbe et al. (1998): ROI 5 | Word repetition vs rest | CC Aphasia (subset who returned for follow-up) T2 (n = 7) | T2 vs T1 Covariate: previous Δ (T2 vs T1) activation in L STG/HG | UNR | UNR | ROI | 4 | Number of ROIs: 4; ROIs: (1) R IFG; (2) R STG/HG; (3) R SMA; (4) R ventral precentral; how ROIs defined: individual anatomical images |
patients with less severe initial aphasia would also be expected to show little L temporal increase, but would not be expected to show R temporal recruitment)

| Study | Task | Control | ROIs | ROIs Defined | ROIs Activation | ROIs Denotations |
|-------|------|---------|------|--------------|----------------|-----------------|
| Cao et al. (1999): ROI 1 | Picture naming vs viewing nonsense drawings | CAC Aphasia vs control | UNR UNR ROI Mix NC | Number of ROIs: 6; ROIs: (1) L IFG and MFG; (2) L pSTG, AG and SMG; (3) R IFG and MFG; (4) R pSTG, AG and SMG; (5) frontal Lt; (6) temporal Lt; how ROIs defined: (1-4) individual anatomical images; activation quantified in terms of extent | ↑ L IFG | R dorsolateral prefrontal cortex, R supramarginal gyrus, Rangular gyrus, R posterior STG, L (frontal), L (temporal) |
| Cao et al. (1999): ROI 2 | Picture naming vs viewing nonsense drawings | CC Aphasia Covariate: picture naming (outside scanner) | UNR UNR ROI Mix NC | Number of ROIs: 6; ROIs: (1) L IFG and MFG; (2) L pSTG, AG and SMG; (3) R IFG and MFG; (4) R pSTG, AG and SMG; (5) frontal Lt; (6) temporal Lt; how ROIs defined: (1-4) individual anatomical images; activation quantified in terms of extent | ↑ LI (frontal) |
| Heiss et al. (1999): ROI 1 | Noun repetition vs rest | LA Aphasia with subcortical damage (n = 9) T2 vs T1 | UNR UNR ROI Anat NDC | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 | ↑ L mid temporal, ↑ R Heschl's gyrus, ↓ R IFG pars opercularis |
| Heiss et al. (1999): ROI 2 | Noun repetition vs rest | LA Aphasia with frontal damage (n = 7) T2 vs T1 | UNR UNR ROI Anat NDC | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 | ↑ L posterior STG, ↑ L mid temporal, ↑ R Heschl's gyrus, ↓ R IFG pars opercularis |
| Heiss et al. (1999): ROI 3 | Noun repetition vs rest | LA Aphasia with temporal damage (n = 7) T2 vs T1 | UNR UNR ROI Anat NDC | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 | ↑ L ventral precentral/inferior frontal junction, ↑ L SMA/medial prefrontal, ↑ R ventral precentral/inferior frontal junction, ↑ R mid temporal, ↑ R SMA/medial prefrontal |
| Heiss et al. (1999): ROI 4 | Noun repetition vs rest | CAA Aphasia with temporal damage T1 | UNR UNR ROI Anat NDC | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus | ↑ L IFG pars opercularis, ↑ R SMA/medial prefrontal |
| Study | ROI | Task | Aphasial Region | Comparison Details |
|-------|-----|------|----------------|--------------------|
| Heiss et al. (1999): ROI 5 | CAA | Noun repetition vs rest | Aphasial Region | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl’s gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 |
| Heiss et al. (1999): ROI 6 | CAA | Noun repetition vs rest | Aphasial Region | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl’s gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 |
| Heiss et al. (1999): ROI 7 | CAA | Noun repetition vs rest | Aphasial Region | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl’s gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 |
| Heiss et al. (1999): ROI 8 | CAC | Noun repetition vs rest | Aphasial Region | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl’s gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 |
| Heiss et al. (1999): ROI 9 | CAC | Noun repetition vs rest | Aphasial Region | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl’s gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 |
Heiss et al. (1999): ROI 10  | Noun repetition vs rest | CAC Aphasia with temporal damage T1 (n = 7) vs control | UNR UNR ROI Anat  | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl’s gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 | ↓ L ventral precentral/inferior frontal junction ↓ L posterior STG/STS/MTG ↓ L Heschl’s gyrus ↓ L mid temporal ↓ R Heschl’s gyrus  

Heiss et al. (1999): ROI 11  | Noun repetition vs rest | CAC Aphasia with subcortical damage T2 (n = 9) vs control | UNR UNR ROI Anat  | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl’s gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 | ↓ L IFG pars opercularis ↓ R SMA/medial prefrontal ↓ L ventral precentral/inferior frontal junction ↓ L Heschl’s gyrus  

Heiss et al. (1999): ROI 12  | Noun repetition vs rest | CAC Aphasia with frontal damage T2 (n = 7) vs control | UNR UNR ROI Anat  | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl’s gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 | ↓ L IFG pars opercularis ↓ L ventral precentral/inferior frontal junction ↓ L Heschl’s gyrus  

Heiss et al. (1999): ROI 13  | Noun repetition vs rest | CAC Aphasia with temporal damage T2 (n = 7) vs control | UNR UNR ROI Anat  | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl’s gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts; how ROIs defined: individual anatomical images; qualitative comparison on p. 434 | ↑ L IFG pars opercularis ↑ L SMA/medial prefrontal ↑ R ventral precentral/inferior frontal junction ↓ L posterior STG ↓ L Heschl’s gyrus ↓ L mid temporal ↓ R posterior STG ↓ R Heschl’s gyrus  

Heiss et al. (1999): ROI 14  | Noun repetition vs rest | LA Aphasia with subcortical or frontal damage and good recovery (n = 11) T2 vs T1 | UNR UNR ROI Anat  | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl’s gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L | ↑ L SMA/medial prefrontal ↑ L Heschl’s gyrus ↑ R ventral precentral/inferior frontal junction
| Study                  | Task Condition                                      | ROI | Anat | NDC | Changes                                                                 | Controls                                                                 |
|-----------------------|-----------------------------------------------------|-----|------|-----|-------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Heiss et al. (1999):  | Noun repetition vs rest                             | UNR| UNR  | NDC | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars    | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars     |
| ROI 15                |                                                      |     |      |    | triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus;   | triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus;     |
|                       |                                                     |     |      |    | (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L   | (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L    |
|                       |                                                     |     |      |    | posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic| posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic |
|                       |                                                     |     |      |    | counterparts; how ROIs defined: individual anatomical images;         | counterparts; how ROIs defined: individual anatomical images;           |
|                       |                                                     |     |      |    | qualitative comparison on pp. 434-5                                    | qualitative comparison on pp. 434-5                                       |
| Heiss et al. (1999):  | Noun repetition vs rest                             | UNR| UNR  | NDC | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars    | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars     |
| ROI 16                |                                                      |     |      |    | triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus;   | triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus;     |
|                       |                                                     |     |      |    | (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L   | (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L    |
|                       |                                                     |     |      |    | posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic| posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic |
|                       |                                                     |     |      |    | counterparts; how ROIs defined: individual anatomical images;         | counterparts; how ROIs defined: individual anatomical images;           |
|                       |                                                     |     |      |    | qualitative comparison on p. 435                                       | qualitative comparison on p. 435                                          |
| Heiss et al. (1999):  | Noun repetition vs rest                             | UNR| UNR  | NDC | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars    | Number of ROIs: 14; ROIs: (1) L IFG pars opercularis; (2) L IFG pars     |
| ROI 17                |                                                      |     |      |    | triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus;   | triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus;     |
|                       |                                                     |     |      |    | (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L   | (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L    |
|                       |                                                     |     |      |    | posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic| posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic |
|                       |                                                     |     |      |    | counterparts; how ROIs defined: individual anatomical images;         | counterparts; how ROIs defined: individual anatomical images;           |
|                       |                                                     |     |      |    | qualitative comparison on p. 435                                       | qualitative comparison on p. 435                                          |
| Kessler et al. (2000):| Word repetition vs rest                             | UNR| UNR  | NDC | Number of ROIs: 14; ROIs: (1) L BA 44; (2) L BA 45; (3) L ventral PrCG;| Number of ROIs: 14; ROIs: (1) L BA 44; (2) L BA 45; (3) L ventral PrCG; |
| ROI 1                 |                                                      |     |      |    | (4) L HG; (5) L BA 41 and 42; (6) L BA 22; (7) L SMA; (8-14) homotopic| (4) L HG; (5) L BA 41 and 42; (6) L BA 22; (7) L SMA; (8-14) homotopic |
|                       |                                                      |     |      |    | counterparts; how ROIs defined: individual anatomical images           | counterparts; how ROIs defined: individual anatomical images            |
|                       |                                                      |     |      |    | qualitative comparison on p. 435                                       | qualitative comparison on p. 435                                          |
| Kessler et al. (2000):| Word repetition vs rest                             | UNR| UNR  | NDC | Number of ROIs: 14; ROIs: (1) L BA 44; (2) L BA 45; (3) L ventral PrCG;| Number of ROIs: 14; ROIs: (1) L BA 44; (2) L BA 45; (3) L ventral PrCG; |
| ROI 2                 |                                                      |     |      |    | (4) L HG; (5) L BA 41 and 42; (6) L BA 22; (7) L SMA; (8-14) homotopic| (4) L HG; (5) L BA 41 and 42; (6) L BA 22; (7) L SMA; (8-14) homotopic |
|                       |                                                      |     |      |    | counterparts; how ROIs defined: individual anatomical images           | counterparts; how ROIs defined: individual anatomical images            |
|                       |                                                      |     |      |    | qualitative comparison on p. 435                                       | qualitative comparison on p. 435                                          |
| Rosen et al. (2000):  | Word stem completion (PET) vs rest (PET)            | UNR| UNR  | NDC | Search volume: whole brain; software: not stated; correction for multiple| Search volume: whole brain; software: not stated; correction for multiple |
| Vox 1                 |                                                      |     |      |    | comparisons unclear; there may be circularity in only correcting for the| comparisons unclear; there may be circularity in only correcting for the |
|                       |                                                      |     |      |    | number of regions that seemed to show differences                      | number of regions that seemed to show differences                        |
| Rosen et al. (2000):  | Word stem completion (fMRI) vs rest (fMRI)          | UNR| UNR  | NDC | Search volume: whole brain; software: not stated; qualitative comparison| Search volume: whole brain; software: not stated; qualitative comparison |
| Vox 2                 |                                                      |     |      |    | on p. 1888                                                              | on p. 1888                                                               |
| Study                      | Task Description                                                                 | CAC          | UNR | UNR          | ROI          | Func      | Number of ROIs: 2; ROIs: (1) R IFG; (2) SMA; how ROIs defined: not stated but seem to be functional; possibly circular because not clear how ROIs defined |
|---------------------------|----------------------------------------------------------------------------------|--------------|-----|--------------|--------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rosen et al. (2000): ROI 1| Word stem completion (fMRI) vs rest (fMRI)                                       | CAC          | UNR | UNR          | UNR          | ROI Func  | NC                                                                                                                                  |
| Blasi et al. (2002): Vox 1| Word stem completion (novel items) vs rest                                        | CAC          | N   | N            | Vox          | U         | Behavioral data notes: covert task but overt data acquired separately; patients less accurate and slower than controls; search volume: whole brain; software: not stated; voxelwise p: ~.001 (z > 3); cluster extent cutoff: 45 voxels (size not stated); Monte Carlo analysis not described in detail; rather than fitting a HRF, the authors looked at the shape of the signal in the 8 volumes following each stimulus  |
| Blasi et al. (2002): ROI 1| Word stem completion (novel items) vs word stem completion (repeated items)      | CAC          | Y   | Y            | Y            | ROI Func  | NC                                                                                                                                  |
| Leff et al. (2002): Vox 1 | Higher word rates vs lower word rates                                           | CAC          | NANT| NANT         | Vox          | NDC       | Search volume: whole brain; software: SPM99; qualitative comparison on p. 555; a FWE-corrected SPM is reported of the relationship in the 6 patients with L pSTS damage (Fig. 2), however it is masked in a way that is not explained (see figure caption), and there is no direct comparison between patients with L pSTS damage and controls  |
| Leff et al. (2002): Vox 2 | Higher word rates vs lower word rates                                           | CAA          | NANT| NANT         | Vox          | NDC       | Search volume: whole brain; software: SPM99; qualitative comparison on p. 555; a FWE-corrected SPM is reported of the relationship in the 6 patients with L pSTS damage (Fig. 2), however it is masked in a way that is not explained (see figure caption), and there is no direct comparison between patients with L pSTS damage and controls  |
| Reference | Condition | ROI | Functional Data |
|-----------|-----------|-----|-----------------|
| Leff et al. (2002): ROI 1 | Higher word rates vs lower word rates | CAC | Aphasia with pSTS damage (n = 6) vs control (n = 8) | Number of ROIs: 1; ROI: R pSTS; how ROI defined: the peak voxel for the contrast in the R pSTS from each subject's individual analysis, but the search region is not stated; the controls and patients without pSTS damage were combined, however it is stated in the caption to Figure 2 that the patients with pSTS damage were significantly different to both | ↑ R posterior STS |
| Leff et al. (2002): ROI 2 | Higher word rates vs lower word rates | CAA | Aphasia with pSTS damage (n = 6) vs aphasia without pSTS damage (n = 9) | Number of ROIs: 1; ROI: R pSTS; how ROI defined: the peak voxel for the contrast in the R pSTS from each subject's individual analysis, but the search region is not stated; the controls and patients without pSTS damage were combined, however it is stated in the caption to Figure 2 that the patients with pSTS damage were significantly different to both | ↑ R posterior STS |
| Blank et al. (2003): Vox 1 | Propositional speech production vs rest | CAC | Aphasia with IFG POp damage (n = 7) vs control | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis | ↑ R IFG pars opercularis |
| Blank et al. (2003): Vox 2 | Propositional speech production vs rest | CAC | Aphasia without IFG POp damage (n = 7) vs control | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis | ↑ R IFG pars opercularis |
| Blank et al. (2003): Vox 3 | Propositional speech production vs rest | CAA | Aphasia with IFG POp damage (n = 7) vs without IFG POp damage (n = 7) | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis | None |
| Blank et al. (2003): Vox 4 | Propositional speech production vs counting | CAC | Aphasia with IFG POp damage (n = 7) vs control | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis | None |
| Blank et al. (2003): Vox 5 | Propositional speech production vs counting | CAC | Aphasia without IFG POp damage (n = 7) vs control | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis | None |
| Blank et al. (2003): Vox 6 | Propositional speech production vs counting | CAA | Aphasia with IFG POp damage (n = 7) vs without IFG POp damage (n = 7) | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis | None |
| Study (Year) | ROI | Task | Aphasia Type | Damage Location | Control Condition | ROI Definition | Number of ROIs | ROIs | MA | Unr | Vox | Notes |
|-------------|-----|------|--------------|----------------|------------------|----------------|----------------|------|-----|-----|-----|-------|
| Blank et al. (2003): ROI 1 | Propositional speech production vs rest | CC | Aphasia with IFG POp damage (n = 7) | Covariate: speech rate during scan | UNR | NANT | ROI Func One | 1 | ROI: R IFG pars opercularis; how ROI defined: defined by flipping L IFG pars opercularis activation in controls |
| Blank et al. (2003): ROI 2 | Propositional speech production vs rest | CC | Aphasia without IFG POp damage (n = 7) | Covariate: speech rate during scan | UNR | NANT | ROI Func One | 1 | ROI: R IFG pars opercularis; how ROI defined: defined by flipping L IFG pars opercularis activation in controls |
| Blank et al. (2003): ROI 3 | Propositional speech production vs rest | CC | Aphasia with IFG POp damage (n = 7) | Covariate: four different QPA measures | UNR | NANT | ROI Func One | 1 | ROI: R IFG pars opercularis; how ROI defined: defined by flipping L IFG pars opercularis activation in controls |
| Cardebat et al. (2003): Vox 1 | Word generation vs rest | LA | Aphasia T2 vs T1 | N | UNR | Vox CA | Search volume: whole brain; software: SPM99; voxelwise p: .05; cluster extent cutoff: 50 voxels (size not stated); nature of inclusive masks unclear |
| Cardebat et al. (2003): Vox 2 | Word generation vs rest | LC | Aphasia T2 vs T1 | C | UNR | Vox CA | Search volume: whole brain; software: SPM99; voxelwise p: .001; cluster extent cutoff: 100 voxels (size not stated); nature of inclusive masks unclear |
| Sharp et al. (2004): Vox 1 | Semantic decision vs syllable count decision | CAC | Aphasia vs control (clear speech) | AM | Y | Vox SVC | Behavioral data notes: interaction of group by task not reported for accuracy; search volume: whole brain; software: SPM99; voxelwise p: FWE p < .05 with SVC in fusiform gyri, temporal poles, L IFG, L orbitofrontal and L SFG |
| Sharp et al. (2004): Vox 2 | Semantic decision vs syllable count decision | CC | Aphasia | C | UNR | Vox SVC | Search volume: whole brain; software: SPM99; voxelwise p: FWE p < .05 with SVC in fusiform gyri, temporal poles, L IFG, L orbitofrontal and L SFG; fixed effects; this analysis is not clearly described |

Notes: Based on Figure 2
| Study | ROI | Task Description | BEHAVIORAL DATA | ROI | Search Volume | Notes |
|-------|-----|------------------|----------------|-----|---------------|-------|
| Sharp et al. (2004): ROI 1 | CAC | Semantic decision vs syllable count decision | Behavioral data notes: interaction of group by task not reported for accuracy; number of ROIs: 1; ROI: L fusiform gyrus; how ROI defined: probabilistic brain atlas | AM | L posterior inferior temporal gyrus/fusiform gyrus | None |
| Sharp et al. (2004): ROI 2 | CAC | Semantic decision vs syllable count decision | Behavioral data notes: patients were more accurate on semantic decisions than syllable decisions, whereas controls were less accurate on noise vocoded semantic decisions than clear syllable decisions (which were the baseline for this analysis); number of ROIs: 1; ROI: L fusiform gyrus; how ROI defined: probabilistic brain atlas | NAM | None | notes: this analysis suggests that the difference between groups in the L fusiform gyrus disappears when the controls perform a semantic task that is similarly challenging |
| Zahn et al. (2004): ROI 1 | CAC | Semantic decision vs phonetic decision and lexical decision (conjunction) | Behavioral data notes: relative performance on language and control tasks unclear; number of ROIs: 1; ROI: language network L; conjunction analyses not clearly described; in two patients, a different conjunction was used (lexical decision vs phonetic decision & semantic decision vs phonetic decision) | UNT | None | notes: LI > 0 in 12 out of 14 controls and 5 out of 7 patients; no significant difference |
| Crinion & Price (2005): Vox 1 | CAC | Listening to narrative speech vs listening to reversed speech | Search volume: whole brain; software: SPM2; voxelwise p: FWE p < .05; cluster extent cutoff: 5 voxels (size not stated) | NANB | L dorsal precentral | Notes: patients with better sentence comprehension had more activation in the L posterior STS and R somato-motor |
| Crinion & Price (2005): Vox 2 | CAC | Listening to narrative speech vs listening to reversed speech | Search volume: whole brain; software: SPM2; voxelwise p: FWE p < .05; cluster extent cutoff: 5 voxels (size not stated) | NANB | L posterior STS | Notes: L posterior STG/STS/MTG |
| Crinion & Price (2005): Vox 3 | CAC | Listening to narrative speech vs listening to reversed speech | Search volume: whole brain; software: SPM2; voxelwise p: FWE p < .05; cluster extent cutoff: 5 voxels (size not stated) | NANB | L posterior STG/STS/MTG | Notes: L mid temporal |
| Crinion & Price (2005): Vox 4 | CAC | Listening to narrative speech vs listening to reversed speech | Search volume: whole brain; software: SPM2; voxelwise p: FWE p < .05; cluster extent cutoff: 5 voxels (size not stated); conjunction with main effect of story comprehension (details hard to follow); this was a multiple regression also involving patients with temporal lobe damage | NANB | L posterior STS | Notes: patients with better sentence comprehension had more activation in the L posterior STS and R mid STS |
| Crinion & Price (2005): Vox 5 | CAC | Listening to narrative speech vs listening to reversed speech | Search volume: whole brain; software: SPM2; voxelwise p: FWE p < .05; cluster extent cutoff: 5 voxels (size not stated); conjunction with main effect of story comprehension (details hard to follow); this was a multiple regression also involving patients with temporal lobe damage | NANB | L posterior STS | Notes: patients with better sentence comprehension had more activation in the L posterior STS and R mid STS |
| Study                          | Task Description                                      | Aphasia Group 1 | Aphasia Group 2 | Correlation Method | Threshold |
|-------------------------------|-------------------------------------------------------|-----------------|-----------------|--------------------|-----------|
| Crinion & Price (2005): Cplx 1| Listening to narrative speech vs reversed speech      | CAA             | NANB            | Correlations       | p < .001, uncorrected for multiple comparisons |
|                              | Aphasia with temporal damage (n = 8) vs control        |                 | NANT            |                    |           |
|                              |                                                        |                 | Cplx            |                    |           |
|                              | Regression also involving patients with temporal lobe damage |                  |                 |                    |           |
|                              | Activation in the R mid STS                            |                  |                 |                    |           |
|                              | Other: Activity in the L posterior STS was positively correlated with sentence comprehension in patients without temporal lobe damage, but not in patients with temporal lobe damage |                  |                 |                    |           |
| Crinion & Price (2005): Cplx 2| Listening to narrative speech vs reversed speech      | CAC             | NANB            | Correlations       | p < 0.05 corrected, plus a minimum cluster size of 5 voxels |
|                              | Aphasia without temporal damage (n = 8) vs control     |                 | NANT            |                    |           |
|                              |                                                        |                 | Cplx            |                    |           |
| Crinion & Price (2005): Cplx 3| Listening to narrative speech vs reversed speech      | CAC             | NANB            | Correlations       | p < 0.05 corrected, plus a minimum cluster size of 5 voxels |
|                              | Aphasia with temporal damage (n = 8) vs control        |                 | NANT            |                    |           |
|                              |                                                        |                 | Cplx            |                    |           |
| Crinion & Price (2005): Cplx 4| Listening to narrative speech vs reversed speech      | CAA             | NANB            | Correlations       | p < 0.05 corrected, plus a minimum cluster size of 5 voxels |
|                              | Aphasia with temporal damage (n = 8) vs without temporal damage (n = 9) |                 | NANT            |                    |           |
|                              |                                                        |                 | Cplx            |                    |           |
| de Boissezon et al. (2005): Vox 1| Word generation vs rest                                | CC              | Y               | Behavioral data notes: no significant correlation between time post onset and accuracy; search volume: whole brain; software: SPM2; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) |
|                              | Aphasia T1 Covariate: time post onset                  |                 | UNR             |                    |           |
|                              |                                                        |                 | Vox             |                    |           |
|                              |                                                        |                 | CA              |                    |           |
| de Boissezon et al.           | Word generation vs rest                                 | CC              | C               | Search volume: whole brain; software: SPM2; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) |
|                              | Aphasia T1 Covariate: word                             |                 | UNR             |                    |           |
|                              |                                                        |                 | Vox             |                    |           |
|                              |                                                        |                 | CA              |                    |           |
| (2005): Vox 2 | generation accuracy T1 | de Boissezon et al. (2005): Vox 3 | Word generation vs rest | LA Aphasia T2 vs T1 | N UNR Vox CA | Search volume: whole brain; software: SPM2; voxelwise p: .001; cluster extent cutoff: 100 voxels (size not stated); description of masking unclear, but seems to be inclusively masked with T1, which seems inappropriate |
|---|---|---|---|---|---|---|
| LA Aphasia T2 vs T1 | N UNR Vox CA | Search volume: whole brain; software: SPM2; voxelwise p: .01; cluster extent cutoff: 20 voxels (size not stated) |
| Connor et al. (2006): Vox 1 | Word stem completion (novel items) vs word stem completion (repeated items) | C UNR Vox CA | CAC Aphasia vs control | Y Y Vox NDC | Behavioral data notes: covert task but overt data acquired separately; no interaction of group by practice for accuracy or RT; search volume: cerebellum; software: not stated; qualitative comparison on p. 174; Monte Carlo-based thresholding not described; rather than fitting a HRF, the authors looked at the shape of the signal in the 8 volumes following each stimulus |
| Connor et al. (2006): ROI 1 | Word stem completion (novel items) vs word stem completion (repeated items) | Y Y ROI Func One | CAC Aphasia vs control | Behavioral data notes: covert task but overt data acquired separately; no interaction of group by practice for accuracy or RT; number of ROIs: 1; ROI: L cerebellum; how ROI defined: L cerebellar region with a learning effect in the patients; circular because ROIs defined in one group; rather than fitting a HRF, the authors looked at the shape of the signal in the 8 volumes following each stimulus |
| Crinion et al. (2006): Vox 1 | Listening to narrative speech vs listening to reversed speech | NANB NANT Vox VFWE | CAC Aphasia vs control | Search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 |
| Crinion et al. (2006): Vox 2 | Listening to narrative speech vs listening to reversed speech | NANB NANT Vox VFWE | CAC Aphasia with temporal lobe damage (n = 6) vs control | Search volume: voxels spared in all included patients; software: SPM99; voxelwise p: FWE p < .05 |
| Crinion et al. (2006): Vox 3 | Listening to narrative speech vs listening to reversed speech | NANB NANT Vox VFWE | CAC Aphasia with temporal lobe damage (n = 18) vs control | Search volume: voxels spared in all included patients; software: SPM99; voxelwise p: FWE p < .05 |
| Crinion et | Listening to | NANB NANT ROI | Number of ROIs: 1; ROI: L ATL; how |
| Crinion et | Listening to | NANB NANT ROI | Number of ROIs: 1; ROI: L ATL; how |
| Crinion et | Listening to | NANB NANT ROI | Number of ROIs: 1; ROI: L ATL; how |

Notes: Based on coordinates in Table 2, Table 3b, Table 3c.
| Study | ROI  | Description | Language Disorder | Method | Number of ROIs | ROI Definition | Notes |
|-------|------|-------------|-------------------|--------|---------------|----------------|-------|
| al. (2006): ROI 1 | narrative speech vs listening to reversed speech | Aphasia with no temporal damage (excluding 1 with missing behavioral data and 1 outlier) or posterior temporal damage sparing anterior temporal cortex (n = 13) Covariate: auditory sentence comprehension (CAT) |  | Func One | ROI defined: activation in the control group; same result obtained with or without excluding one outlier; two other ROIs are described in the methods, but never used in any analyses | temporal notes: more activity in patients with better auditory sentence comprehension |
| Crinion et al. (2006): ROI 2 | Listening to narrative speech vs listening to reversed speech | CC Aphasia with no temporal damage (excluding 1 with missing behavioral data and 1 outlier) or posterior temporal damage sparing anterior temporal cortex (n = 13) Covariate: time post onset |  | NANT NANT | ROI: L ATL; how ROI defined: activation in the control group; two other ROIs are described in the methods, but never used in any analyses | None |
| Crinion et al. (2006): ROI 3 | Listening to narrative speech vs listening to reversed speech | CAA Aphasia with temporal damage excluding anterior temporal cortex (n = 9) vs with no temporal lobe damage (excluding 1 with missing behavioral data and 1 outlier) (n = 4) |  | NANT NANT | ROI: L ATL; how ROI defined: activation in the control group; two other ROIs are described in the methods, but never used in any analyses | ↓ L anterior temporal notes: patients with posterior temporal damage had less signal change |
| Crinion et al. (2006): ROI 4 | Listening to narrative speech vs listening to reversed speech | CAC Aphasia with temporal damage excluding anterior temporal cortex (n = 9) vs control |  | NANT NANT | ROI: L ATL; how ROI defined: activation in the control group; circular because ROI defined in one group; two other ROIs are described in the methods, but never used in any analyses | ↓ L anterior temporal notes: large difference 2.7 ± 0.8 (patients) vs 6.3 ± 1.4 (controls) makes finding suggestive even in light of the circularity |
| Crinion et al. (2006): ROI 5 | Listening to narrative speech vs listening to reversed speech | CC Aphasia with no temporal damage (excluding 1 with missing behavioral data and 1 outlier) or posterior temporal damage sparing anterior temporal cortex (n = 13) Covariate: auditory single word comprehension (CAT) |  | NANT NANT | ROI: L ATL; how ROI defined: activation in the control group; two other ROIs are described in the methods, but never used in any analyses | None notes: r = 0.39; p > 0.1; seems to be a clear trend so lack of significance may reflect only lack of power |
| Saur et al. (2006): Vox 1 | Listening to sentences and making a plausibility | LA Aphasia T2 vs T1 |  | AM UNR NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole | ↑ L insula ↑ R IFG pars orbitalis ↑ R insula |
| Saur et al. (2006): Vox 2 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA Aphasial T3 vs T2 | AM UNR Vox NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole brain; software: SPM2; voxelwise p: .005; cluster extent cutoff: none; threshold was lowered to reveal the R frontal change in activation | ↑ R SMA/medial prefrontal |
| --- | --- | --- | --- | --- | --- |
| Saur et al. (2006): Vox 3 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA Aphasial T3 vs T1 | AM UNR Vox NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole brain; software: SPM2; voxelwise p: .001; cluster extent cutoff: none | ↑ L IFG pars orbitalis |
| Saur et al. (2006): Vox 4 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | CAC Aphasial T1 vs control | AM UNR Vox NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole brain; software: SPM2; voxelwise p: .001; cluster extent cutoff: none | ↑ L IFG pars triangularis |
| Saur et al. (2006): Vox 5 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | CAC Aphasial T2 vs control | AM UNR Vox NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole brain; software: SPM2; voxelwise p: .005; cluster extent cutoff: none; threshold was lowered to reveal L IFG | ↑ L IFG pars orbitalis |
| Saur et al. (2006): Vox 6 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | CAC Aphasial T3 vs control | AS UNR Vox NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole brain; software: SPM2; voxelwise p: .001; cluster extent cutoff: none | ↑ L IFG |
| Saur et al. (2006): Vox 7 | Listening to sentences and making a plausibility judgment vs | CC Aphasial T1 Covariate: language recovery score T1 | AM UNR Vox NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole brain; software: SPM2; voxelwise p: .001; cluster extent cutoff: none | ↑ L IFG |

Notes: R IFG/insula activation noted to survive FWE correction at p < .05
L STG in table is actually MTG based on coordinates.
| Saur et al. (2006): Vox 8 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | CC Aphasia T2 Covariate: language recovery score T2 | UNT UNR Vox NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole brain; software: SPM2; voxelwise p: .001; cluster extent cutoff: none | None |
|--------------------------|--------------------------------------------------|---------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------|------|
| Saur et al. (2006): Vox 9 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | CC Aphasia T3 Covariate: language recovery score T3 | UNT UNR Vox NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole brain; software: SPM2; voxelwise p: .001; cluster extent cutoff: none | None |
| Saur et al. (2006): Vox 10 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LC Aphasia T2 vs T1 Covariate: % change in language recovery score | UNT UNR Vox NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole brain; software: SPM2; voxelwise p: .001; cluster extent cutoff: none | † L SMA/medial prefrontal † R insula † R SMA/medial prefrontal |
| Saur et al. (2006): Vox 11 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LC Aphasia T3 vs T2 Covariate: % change in language recovery score | UNT UNR Vox NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole brain; software: SPM2; voxelwise p: .001; cluster extent cutoff: none | None |
| Saur et al. (2006): Vox 12 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LC Aphasia T3 vs T1 Covariate: % change in language recovery score | UNT UNR Vox NC | Behavioral data notes: accuracy combines language and control conditions; search volume: whole brain; software: SPM2; voxelwise p: .001; cluster extent cutoff: none | None |
| Saur et al. (2006): ROI 1 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA Aphasia T2 vs T1 | AM UNR ROI Func FWE | Behavioral data notes: accuracy combines language and control conditions; number of ROIs: 6; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R insula; (5) R IFG pars triangularis; (6) R SMA; how ROIs defined: peak voxels of overall activation map based on all three time points in patients | † R insula † R SMA/medial prefrontal notes: some other ROIs also significant prior to correction for multiple comparisons; n.b. performance confound |
| Saur et al. (2006): ROI 2 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA Aphasia T3 vs T2 | AM UNR ROI Func FWE | Behavioral data notes: accuracy combines language and control conditions; number of ROIs: 6; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R insula; (5) R IFG pars triangularis; (6) R SMA; how ROIs defined: peak voxels of overall activation map based on all three time points in patients | None notes: some other ROIs also significant prior to correction for multiple comparisons; n.b. performance confound |
| Saur et al. (2006): ROI 3 | Listening to sentences and making a plausibility | LA Aphasia T3 vs T1 | AM UNR ROI Func FWE | Behavioral data notes: accuracy combines language and control conditions; number of ROIs: 6; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R insula; (5) R IFG pars triangularis; (6) R SMA; how ROIs defined: peak voxels of overall activation map based on all three time points in patients | † L posterior MTG notes: some other ROIs also significant prior to correction for multiple comparisons; n.b. performance confound |
| ROI | Description | Task | Condition | ROIs | Details |
|-----|-------------|------|-----------|------|---------|
| 4   | Listening to sentences and making a plausibility judgment vs listening to reversed speech | CAC Aphas T1 vs control | AM UNR Func NC | Behavioral data notes: accuracy combines language and control conditions; number of ROIs: 6; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R insula; (5) R IFG pars triangularis; (6) R SMA; how ROIs defined: peak voxels of overall activation map based on all three time points in patients; circular because ROIs defined in one group | None |
| 5   | Listening to sentences and making a plausibility judgment vs listening to reversed speech | CAC Aphas T2 vs control | AM UNR Func NC | Behavioral data notes: accuracy combines language and control conditions; number of ROIs: 6; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R insula; (5) R IFG pars triangularis; (6) R SMA; how ROIs defined: peak voxels of overall activation map based on all three time points in patients; circular because ROIs defined in one group | None |
| 6   | Listening to sentences and making a plausibility judgment vs listening to reversed speech | CAC Aphas T3 vs control | AS UNR Func NC | Behavioral data notes: accuracy combines language and control conditions; number of ROIs: 6; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R insula; (5) R IFG pars triangularis; (6) R SMA; how ROIs defined: peak voxels of overall activation map based on all three time points in patients; circular because ROIs defined in one group | None |
| 1   | Picture naming (trained items) vs rest | LC Aphas T2 vs T1 Covariate: Δ picture naming (trained items) | C UNR Oth NC | Behavioral data notes: picture naming score (trained items) increased from 51.7 ± 24.8 to 78.8 ± 22.1, which was statistically significant (p < 0.0001); number of ROIs: 4; ROIs: (1) perilesional area of slow wave activity determined with MEG; (2) right hemisphere homotopic to lesion; (3) right hemisphere homotopic to slow wave area; (4) remainder of left hemisphere; for one patient, maximal slow wave activity was in the right hemisphere and it is not clear how this was handled; how ROIs defined: the dependent measure was the number of voxels in each ROI exceeding certain thresholds that differed across subjects depending on their strength of activation; it appears that increases and decreases may have been summed, though the description is hard to follow; 2 of the 11 patients were classified as outliers and excluded from analyses, however no plots are provided to justify their status as outliers | Other: improved picture naming of trained items was correlated with increased signal in 3 of the 4 ROIs, the exception being the right hemisphere ROI homotopic to the slow wave area; after removing the two outliers, only the correlation in the left hemisphere area of slow wave activity remained significant |
| Study                                      | Panel | Condition                                      | Covariate                          | Other Notes                                                                 |
|-------------------------------------------|-------|------------------------------------------------|------------------------------------|-----------------------------------------------------------------------------|
| Raboyeau et al. (2008): Vox 1             |       | Picture naming (native in patients; relearned foreign in controls) vs rest | LAC                               | Behavioral data notes: relearned foreign language was an attempt to equate to recovery in patients; still, patients improved less than controls, as shown by a significant interaction of group by time (p < .0001); search volume: whole brain; software: SPM2; voxelwise p: .01; cluster extent cutoff: 30 voxels (size not stated); nature of control contrast not clear; negative tail of contrast was masked to exclude lesioned areas, but the mask may have been more extensive than that used by the control group. |
|                                          |       | Picture naming (native in patients; relearned foreign in controls) vs rest | LC                                | Search volume: whole brain; software: SPM2; voxelwise p: .01; cluster extent cutoff: 30 voxels (size not stated); nature of control contrast not clear. |
| Richter et al. (2008): Vox 1              |       | Reading words silently vs rest                  | C                                 | Search volume: R hemisphere; software: BrainVoyager QX 1.7; voxelwise p: R IFG/R insula ROI:.005; elsewhere: .001; cluster extent cutoff: R IFG/R insula ROI: 0.108 cc; elsewhere: none |
| Richter et al. (2008): Vox 2              |       | Word stem completion vs rest                    | C                                 | Search volume: R hemisphere; software: BrainVoyager QX 1.7; voxelwise p: R IFG/R insula ROI:.005; elsewhere: .001; cluster extent cutoff: R IFG/R insula ROI: 0.108 cc; elsewhere: none |

ROI 2 (untrained items) vs rest

Aphasia T2 vs T1

Covariate: Δ picture naming (untrained items)

NC

score (untrained items) increased from 54.0 ± 24.3 to 70.5 ± 26.7, which was statistically significant (p = 0.002); number of ROIs: 4; ROIs: (1) perilesional area of slow wave activity determined with MEG; (2) right hemisphere homotopic to lesion; (3) right hemisphere homotopic to slow wave area; (4) remainder of left hemisphere; for one patient, maximal slow wave activity was in the right hemisphere and it is not clear how this was handled; how ROIs defined: the dependent measure was the number of voxels in each ROI exceeding certain thresholds that differed across subjects depending on their strength of activation; it appears that increases and decreases may have been summed, though the description is hard to follow; 2 of the 11 patients were classified as outliers and excluded from analyses, however no plots are provided to justify their status as outliers.

improved picture naming of untrained items was correlated with increased signal in all 4 ROIs; after removing the two outliers, none of the correlations remained significant.
| Richter et al. (2008): Vox 3 | Reading words silently vs rest | CC | Aphasia T1 Covariate: subsequent $\Delta$ (T2 vs T1) overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility) | UNR | UNR | Vox | NC | Search volume: R hemisphere; software: BrainVoyager QX 1.7; voxelwise $p: .05$; cluster extent cutoff: none; *nature of thresholding not entirely clear*, so coded according to best guess | $\uparrow$ R IFG $\uparrow$ R insula $\uparrow$ R ventral precentral/inferior frontal junction $\uparrow$ R posterior MTG notes: increased activity correlated with more behavioral improvement |
|-----------------------------|---------------------------------|----|---------------------------------|-----|-----|-----|-----|---------------------------------|--------------------------------------------------|
| Richter et al. (2008): Vox 4 | Word stem completion vs rest | CC | Aphasia T1 Covariate: subsequent $\Delta$ (T2 vs T1) overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility) | UNR | UNR | Vox | NC | Search volume: R hemisphere; software: BrainVoyager QX 1.7; voxelwise $p: .05$; cluster extent cutoff: none; *nature of thresholding not entirely clear*, so coded according to best guess | $\uparrow$ R IFG $\uparrow$ R insula notes: increased activity correlated with more behavioral improvement |
| Richter et al. (2008): Vox 5 | Reading words silently vs rest | LA | Aphasia T2 vs T1 | UNR | UNR | Vox | M** | Search volume: R hemisphere; software: BrainVoyager QX 1.7; voxelwise $p: R$ IFG/R insula ROI: .005; elsewhere: .001; cluster extent cutoff: R IFG/R insula ROI: 0.108 cc; elsewhere: none | None |
| Richter et al. (2008): Vox 6 | Word stem completion vs rest | LA | Aphasia T2 vs T1 | UNR | UNR | Vox | M** | Search volume: R hemisphere; software: BrainVoyager QX 1.7; voxelwise $p: R$ IFG/R insula ROI: .005; elsewhere: .001; cluster extent cutoff: R IFG/R insula ROI: 0.108 cc; elsewhere: none | None |
| Richter et al. (2008): ROI 1 | Reading words silently vs rest | CC | Aphasia T1 Covariate: subsequent $\Delta$ (T2 vs T1) overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility) | UNR | UNR | ROI | Func | Number of ROIs: 1; ROI: L IFG/insula or L perilesional; how ROI defined: peak activations in individual patients in L IFG/insula or L perilesional regions (*somewhat unclear*) | None |
| Study | Task | ROI | Functional Imaging Data | Behavioral Data Notes |
|-------|------|-----|-------------------------|-----------------------|
| Richter et al. (2008): ROI 2 | Word stem completion vs rest | CC | Subsequent Δ (T2 vs T1) overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility) | Somewhat valid (T1 behavioral measure should be included in model) |
| Richter et al. (2008): ROI 3 | Reading words silently vs rest | LC | Δ overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility) | Number of ROIs: 4; ROIs: (1) R IFG/insula; (2) R precentral; (3) R MTG; (4) L IFG/insula or L perilesional; how ROIs defined: regions where T1 activation was correlated with subsequent improvement, along with the previously defined left hemisphere ROI; circular because functional ROIs based on related contrast on same data |
| Richter et al. (2008): ROI 4 | Word stem completion vs rest | LC | Δ overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility) | Number of ROIs: 3; ROIs: (1, 2) two clusters within R IFG/insula ROI; (3) L IFG/insula or L perilesional; how ROIs defined: regions where T1 activation was correlated with subsequent improvement, along with the previously defined left hemisphere ROI; circular because functional ROIs based on related contrast on same data |
| de Boissezon et al. (2009): Vox 1 | Word generation vs rest | LA | Aphasr with "good recovery" (n = 6) T2 vs T1 Somewhat valid (the "good recovery" group showed more improvement than the "poor recovery" group in terms of accuracy on the task, but the distinction was not borne out in behavioral data more generally) | Behavioral data notes: p = 0.07; search volume: whole brain; software: SPM2; voxelwise p: .001; cluster extent cutoff: 100 voxels (size not stated); contrast may not have included resting condition; inappropriate masking |
| de | Word generation vs rest | LA | | ↑ L ventral precentral/inferior frontal junction ↑ L SMA/medial prefrontal ↑ L posterior STG/STS/MTG ↑ R dorsolateral prefrontal cortex ↑ R SMA/medial prefrontal ↑ R angular gyrus ↑ R occipital ↑ R thalamus ↑ R basal ganglia ↑ L cerebellum notes: based on coordinates in Table 5 |
| Study | Task | Comparison | Subject Group | Analysis Details | Search Volume | ROIs |
|-------|------|------------|---------------|-----------------|--------------|------|
| Boissezon et al. (2009): Vox 2 | Aphasia with "poor recovery" (n = 7) T2 vs T1 | Somewhat valid (the "poor recovery" group showed less improvement than the "good recovery" group in terms of accuracy on the task, but the distinction was not borne out in behavioral data more generally) | SPM2: voxelwise p:.001; cluster extent cutoff: 100 voxels (size not stated); contrast may not have included resting condition; inappropriate masking | precentral/inferior frontal junction; R somato-motor; R cerebellum; R basal ganglia |
| de Boissezon et al. (2009): Vox 3 | Word generation vs rest | C | Search volume: whole brain; software: SPM2; voxelwise p: .01; cluster extent cutoff: 100 voxels (size not stated); each patient's two sessions may be entered into the model without accounting for the dependence between them | L supramarginal gyrus; L occipital; L anterior cingulate; R insula; R SMA/medial prefrontal; R posterior STG; R anterior temporal; R occipital; L cerebellum |
| Fridriksson et al. (2009): Vox 1 | Picture naming (correct trials) vs viewing scrambled images | CAC | Search volume: voxels spared in all patients; software: FSL (FEAT 5.4); voxelwise p: –.01 (z > 2.3); cluster extent cutoff: based on GRFT | None |
| Fridriksson et al. (2009): Vox 2 | Picture naming (phonemic paraphasias) vs picture naming (correct trials) | CB | Search volume: voxels spared in all patients; software: FSL (FEAT 5.4); voxelwise p: –.01 (z > 2.3); cluster extent cutoff: based on GRFT | L superior parietal; L posterior inferior temporal gyrus/fusiform gyrus; L occipital |
| Fridriksson et al. (2009): Vox 3 | Picture naming (semantic paraphasias) vs picture naming (correct trials) | CB | Search volume: voxels spared in all patients; software: FSL (FEAT 5.4); voxelwise p: –.01 (z > 2.3); cluster extent cutoff: based on GRFT | R posterior inferior temporal gyrus/fusiform gyrus; R occipital |
| Fridriksson et al. (2009): ROI 1 | Picture naming (correct trials) vs viewing scrambled images | CC | Number of ROIs: 5; ROIs: (1) R IFG/insula; (2) R motor/premotor; (3) R SMA; (4) R inferior parietal; (5) R superior temporal; how ROIs defined: regions activated for picture naming vs viewing scrambled images in aphasia | L IFG; R insula notes: R IFG showed more activation in patients who produced more correct responses |
| Menke et al. (2009): Vox 1 | Picture naming (trained items) vs rest | LC | Search volume: whole brain; software: SPM2; voxelwise p: .05, but at least one voxel in the cluster had to be p < .001; cluster extent cutoff: 0.270 cc; there was an exclusive mask based on activation changes for untrained pictures, but it is unclear what the behavioral covariate was for the mask generation, nor were the regions in the mask reported | L occipital; L hippocampus/MTL; L precuneus; R occipital; R posterior cingulate; R hippocampus/MTL |
| Study (2009) | Task | Contrast | Control | Control | Search volume | Software | Voxels | Clusters | Notes |
|-------------|------|----------|---------|---------|---------------|----------|--------|----------|-------|
| Menke et al. | Picture naming (untrained items) vs rest | LC Aphasia T3 vs T1 Covariate: subsequent outcome (T3) picture naming of trained items outside the scanner Not valid (the logic behind correlating activation changes and language outcome is unclear) | UNT UNR Vox M** | Search volume: whole brain; software: SPM2; voxelwise p: .05, but at least one voxel in the cluster had to be p < .001; cluster extent cutoff: 0.270 cc; there was an exclusive mask based on activation changes for untrained pictures, but it is unclear what the behavioral covariate was for the mask generation, nor were the regions in the mask reported | † R posterior STG/STS/MTG ↓ L SMA/medial prefrontal ↓ R inferior parietal lobule ↓ R posterior inferior temporal gyrus/fusiform gyrus ↓ R basal ganglia |
| Specht et al. | Lexical decision (words vs pseudowords) vs lexical decision (words vs reversed foreign words) | CAC Aphasia vs control | UNR UNR Vox CA | Search volume: whole brain; software: SPM5; voxelwise p: .001; cluster extent cutoff: 0.64 cc | † R posterior STG ↑ R Heschl’s gyrus notes: activation is 1105 voxels (> 8 cc) so quite convincing, but when the contrast was examined in the patient group, this region was not activated. |
| Specht et al. | Lexical decision (words vs pseudowords) vs lexical decision (words vs reversed foreign words) | CAC Aphasia vs control | UNR UNR Cplx | Joint ICA was performed on structural and functional contrast images using FIT 1.1b. Only 1 of the 8 components differed between groups in its loadings and was interpretable. The structural part of this component related to the patients’ lesions. The functional part was thresholded at voxelwise p < .001 (CDT), arbitrary minimum cluster extent = 0.64 cc. Other: The component that differed between groups showed more activation for patients than controls in the L anterior temporal lobe, L cerebellum, R posterior STG, R anterior temporal lobe, R posterior inferior temporal gyrus/fusiform gyrus, R cerebellum, and R brainstem, and less activation in patients than controls in the L IFG, L anterior temporal lobe, L occipital lobe, L anterior cingulate, L cerebellum, L thalamus, and R IFG. |
| Warren et al. | Listening to narrative speech vs listening to reversed speech | CAC Aphasia vs control | NANB NANT ROI Anat NC | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these | None notes: L IFG pars triangularis almost reached significance (p = .053) for more activation in patients |
(5-6); somewhat circular because ROIs were defined only in regions where controls showed significant connectivity (even though ROIs were anatomical)

| Study | ROIs | Task | Covariate | ROIs Defined | ROIs Identified |
|-------|------|------|------------|--------------|-----------------|
| Warren et al. (2009): ROI 2 | Listening to narrative speech vs listening to reversed speech | CC Aphasia | auditory sentence comprehension | NANB NANT ROI Anat NC | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | None |
| Warren et al. (2009): ROI 3 | Listening to narrative speech vs listening to reversed speech | CC Aphasia | written sentence comprehension | NANB NANT ROI Anat NC | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | None |
| Warren et al. (2009): ROI 4 | Listening to narrative speech vs listening to reversed speech | CC Aphasia | auditory single word comprehension | NANB NANT ROI Anat NC | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | None |
| Warren et al. (2009): ROI 5 | Listening to narrative speech vs listening to reversed speech | CC Aphasia | auditory syntactic comprehension | NANB NANT ROI Anat NC | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | None |
| Warren et al. (2009): ROI 6 | Listening to narrative speech vs listening to reversed speech | CC Aphasia | connectivity between L and R ATL | NANB NANT ROI Anat NC | Number of ROIs: 2; ROIs: (1) L anterior superior temporal cortex; (2) R anterior superior temporal cortex; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | None |
| Warren et al. (2009): ROI 7 | Listening to narrative speech vs listening to reversed speech | CC Aphasia | time post onset | NANB NANT ROI One | Number of ROIs: 1; ROI: L anterior superior temporal cortex; how ROI defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | None |
| Warren et | Listening to narrative speech vs listening to reversed speech | CC | | NANB NANT ROI | Number of ROIs: 1; ROI: L anterior | None |
| Study | ROI 8 | Comparison | Task | Lesion Volume | Region | Notes |
|-------|-------|------------|------|---------------|--------|-------|
| Warren et al. (2009) | Listening to narrative speech vs listening to reversed speech | CAC | Aphasia | Covariate: lesion volume | ROI | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6); somewhat circular because ROIs were defined only in regions where controls showed significant connectivity (even though ROIs were anatomical); excluded 3 patients with L IFG damage |

| Study | ROI 9 | Comparison | Task | Lesion Volume | Region | Notes |
|-------|-------|------------|------|---------------|--------|-------|
| Warren et al. (2009) | Listening to narrative speech vs listening to reversed speech | CAC | Aphasia with positive anterior temporal interconnectivity (n = 8) vs control | ROI | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6); somewhat circular because ROIs were defined only in regions where controls showed significant connectivity (even though ROIs were anatomical); excluded 1 patient with L IFG damage |

| Study | ROI 10 | Comparison | Task | Lesion Volume | Region | Notes |
|-------|-------|------------|------|---------------|--------|-------|
| Warren et al. (2009) | Listening to narrative speech vs listening to reversed speech | CAC | Aphasia with negative anterior temporal interconnectivity (n = 8) vs control | ROI | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6); somewhat circular because ROIs were defined only in regions where controls showed significant connectivity (even though ROIs were anatomical); excluded 1 patient with L IFG damage |

| Study | ROI 11 | Comparison | Task | Lesion Volume | Region | Notes |
|-------|-------|------------|------|---------------|--------|-------|
| Warren et al. (2009) | Listening to narrative speech vs listening to reversed speech | CAC | Aphasia with positive anterior temporal interconnectivity (n = 8) vs with negative anterior temporal interconnectivity (n = 8) | ROI | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6); excluded 4 patients with L IFG damage |

| Study | Cplx 1 | Comparison | Task | Lesion Volume | Region | Notes |
|-------|-------|------------|------|---------------|--------|-------|
| Warren et al. (2009) | Listening to narrative speech vs listening to reversed speech | CC | Aphasia | Covariate: lesion status of each voxel | ROI | VLSM with FDR correction was used to identify any regions in which damage was predictive of L anterior temporal activation. |

| Study | Vox 1 | Comparison | Task | Lesion Volume | Region | Notes |
|-------|-------|------------|------|---------------|--------|-------|
| Chau et al. (2010) | Answering questions from Cantonese Aphasia Battery vs visual decision | LC | Aphasia T2 vs T1 | Covariate: Δ WAB AQ Somewhat valid (no treatment effect) | Search volume: whole brain; software: SPM2; stated to be corrected p < 0.05, but the nature of correction is not described; it is not entirely clear whether the functional measure was the difference between T1 and T2 (we assume it is); it is also not clear whether or not 2 patients with low AQ were excluded (we assume not) |

| Study | Vox 2 | Comparison | Task | Lesion Volume | Region | Notes |
|-------|-------|------------|------|---------------|--------|-------|
| Fridriksson | Picture naming | LC | YCT | UNR | Search volume: whole brain; software: None |

↑ L IFG pars triangularis
| Study                        | Task Description                                      | Control Comparison | Covariate | Software | Voxelwise p | Cluster Extent Cutoff | Other Notes                                                                 |
|------------------------------|--------------------------------------------------------|--------------------|-----------|-----------|--------------|------------------------|-----------------------------------------------------------------------------|
| Fridriksson et al. (2010)    | Vox 1: Picture naming (correct trials) vs viewing abstract pictures | CC: Aphasia vs control | Δ picture naming accuracy | YCT UNR Vox | FSL 4.1; voxelwise p: ~.01 (z > 2.3); cluster extent cutoff: based on GRFT | | prefrontal cortex ↑ L ventral precentral/inferior frontal junction ↑ L supramarginal gyrus ↑ L intraparietal sulcus ↑ L superior parietal ↑ L precuneus notes: activated regions were on the borders on the lesion distribution in the 19 included patients |
| Fridriksson et al. (2010)    | Vox 1: Picture naming (correct trials) vs viewing abstract pictures | CC: Aphasia vs control | Δ picture naming accuracy | YCT UNR Vox | FSL 4.1; voxelwise p: ~.02 (z > 2); cluster extent cutoff: based on GRFT | | None |
| Fridriksson et al. (2010)    | Vox 2: Picture naming (correct trials) vs viewing abstract pictures | CC: Aphasia vs control | Δ picture naming accuracy | YCT UNR Func | Search volume: whole brain; software: FSL 4.1; voxelwise p: ~.02 (z > 2); cluster extent cutoff: based on GRFT | | L IFG pars orbitalis ↑ L occipital ↑ L anterior cingulate notes: greater activation was associated with better picture naming; L IFG pars orbitalis activation classified as middle frontal gyrus in the paper, but coordinates suggest otherwise |
| Fridriksson et al. (2010)    | ROI 1: Picture naming (correct trials) vs viewing abstract pictures | CC: Aphasia vs control | Δ lesion status of each voxel | YCT UNR Cplx | VLSM was used to identify any regions in which damage was predictive of activation in the regions identified in SPM analysis 1, considered as a single ROI. There was no correction for multiple comparisons, and the analysis is appropriately presented as exploratory. | | Other: patients with better naming showed greater activation than controls, while the patients with poorer naming showed less activation than controls. |
| Sharp et al. (2010)          | ROI 1: Semantic decision (clear in patients; average of clear and noise vocoded) | CC: Aphasia vs control | NAM AS ROI Oth NDC | | Behavioral data notes: accuracy and RT were not significantly different for the semantic task; statistics are not reported for the syllable counting task, | | Other: patients showed greater connectivity |
in controls) vs syllable count decision (clear in patients; average of clear and noise vocoded in controls) but the data provided suggest that accuracy was probably not matched, while RT probably was; number of ROIs: 12; ROIs: functional connectivity between pairs of spared nodes of the L hemisphere semantic network and R hemisphere homotopic regions: (1) L SFG-L AG; (2) L SFG-L IFG; (3) L SFG-L IT; (4) L AG-L IFG; (5) L AG-L IT; (6) L IFG-L IT; (7-12) homotopic counterparts; how ROIs defined: partial correlations between nodes between L SFG and L AG than controls while performing the semantic task; this was not the case for the syllable counting task, however connectivity during performance of the two tasks was not compared directly.

| Thompson et al. (2010): ROI 1 | Auditory sentence-picture matching (all three sentence types) vs rest | LA | AS | AS | ROI | Anat NC | Number of ROIs: 18; ROIs: (1) L BA 7; (2) L BA 9; (3) L BA 13; (4) L BA 21; (5) L BA 22; (6) L BA 39; (7) L BA 40; (8) L BA 44; (9) L BA 45; (10-18) homotopic counterparts; how ROIs defined: WFU pickatlas; proportion of patients who showed increases and decreases in (parts of) each ROI in individual fixed effects SPM analyses |
| Tyler et al. (2010): Vox 1 | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word | CAC | UNR | AS | Vox NDC | Behavioral data notes: the two groups showed similar differences between RTs in the two conditions of the contrast; search volume: whole brain; software: SPM5; qualitative comparison on pp. 3402-3; each group is presented at voxelwise p < .005 (CDT), cluster-corrected p < .05 with GRFT |
| Tyler et al. (2010): ROI 1 | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word | CC | UNR | UNR | ROI Func One | Behavioral data notes: analyses focuses on RT differences between early and late targets, not on mean RT per se; number of ROIs: 1; ROI: L IFG pars triangularis and orbitalis; how ROI defined: activated for the same contrast |
| Tyler et al. (2010): ROI 2 | Listening to grammatical but meaningless sentences and | CC | UNR | UNR | ROI Func One | Number of ROIs: 1; ROI: L IFG pars triangularis and orbitalis; how ROI defined: activated for the same contrast |

| Thompson et al. (2010): ROI 1 | Auditory sentence-picture matching (all three sentence types) vs rest | LA | AS | AS | ROI | Anat NC | Number of ROIs: 18; ROIs: (1) L BA 7; (2) L BA 9; (3) L BA 13; (4) L BA 21; (5) L BA 22; (6) L BA 39; (7) L BA 40; (8) L BA 44; (9) L BA 45; (10-18) homotopic counterparts; how ROIs defined: WFU pickatlas; proportion of patients who showed increases and decreases in (parts of) each ROI in individual fixed effects SPM analyses |
| Tyler et al. (2010): Vox 1 | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word | CAC | UNR | AS | Vox NDC | Behavioral data notes: the two groups showed similar differences between RTs in the two conditions of the contrast; search volume: whole brain; software: SPM5; qualitative comparison on pp. 3402-3; each group is presented at voxelwise p < .005 (CDT), cluster-corrected p < .05 with GRFT |
| Tyler et al. (2010): ROI 1 | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word | CC | UNR | UNR | ROI Func One | Behavioral data notes: analyses focuses on RT differences between early and late targets, not on mean RT per se; number of ROIs: 1; ROI: L IFG pars triangularis and orbitalis; how ROI defined: activated for the same contrast |
| Tyler et al. (2010): ROI 2 | Listening to grammatical but meaningless sentences and | CC | UNR | UNR | ROI Func One | Number of ROIs: 1; ROI: L IFG pars triangularis and orbitalis; how ROI defined: activated for the same contrast |
| Study            | Task Description                                                                 | Control Condition | ROIs | Behavior Notes | Other Notes |
|------------------|----------------------------------------------------------------------------------|-------------------|------|----------------|-------------|
| Tyler et al. (2010): ROI 3 | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word | CC Aphasia Covariate: RT difference between early and late targets on normal sentences | UNR UNR | Number of ROIs: 1; ROI: L IFG pars triangularis and orbitalis; how ROI defined: activated for the same contrast | None |
| Tyler et al. (2010): ROI 4 | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word | CC Aphasia Covariate: damage to L IFG, estimated from T1 signal | UNR UNR | Number of ROIs: 1; ROI: R IFG pars triangularis and orbitalis; how ROI defined: activated for the same contrast | None notes: no correlation (p = .57) |
| Tyler et al. (2010): ROI 5 | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word | CC Aphasia Covariate: syntactic processing (presumably the target position effect, though this is not stated) | UNR UNR | Number of ROIs: 1; ROI: R IFG pars triangularis and orbitalis; how ROI defined: activated for the same contrast | None notes: no correlation (p = .41) |
| Tyler et al. (2010): Cplx 1 | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word | CC Aphasia Covariate: lesion status of each voxel | UNR UNR | VBM was used to identify any regions where damage was predictive of activation in the L IFG pars triangularis and orbitalis. Tissue integrity was quantified in terms of T1 signal. Clusterwise correction was used, which is not appropriate for VBM. | Other: Only in the L IFG itself was damage predictive of reduced activation in the L IFG. |
| van Oers et al. (2010): ROI 1 | Written word-picture matching vs visual decision | CAC Aphasia vs control | UNR UNR ROI Mix NC | Behavioral data notes: accuracy not reported for control condition; number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI; how ROIs defined: WFU pickatlas | ↓ L IFG ↓ LI (language network) ↓ LI (frontal) |
| van Oers et al. (2010): ROI 2 | Semantic decision vs visual decision | CAC Aphasia vs control | UNR UNR ROI Mix NC | Behavioral data notes: accuracy not reported for control condition; number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI; how ROIs defined: WFU pickatlas | ↓ L IFG ↓ LI (language network) ↓ LI (frontal) |
| Study | Task Description | Group Comparisons | ROIs | Number of ROIs | ROIs Defined |
|-------|------------------|-------------------|------|----------------|--------------|
| van Oers et al. (2010): ROI 3 | Verb generation vs rest | CAC Aphasia vs control | UNR UNR Mix NC | 1 | L anterior language region (IFG); 2 | L posterior language region (AG, SMG, STG, MTG); 3 | R anterior language region (IFG); 4 | R posterior language region (AG, SMG, STG, MTG); 5 | Frontal LI; 6 | Temporal LI; 7 | Whole network LI; how ROIs defined: WFU pickatlas |
| van Oers et al. (2010): ROI 4 | Written word-picture matching vs visual decision | C Aphasia vs control | UNR UNR Mix NC | 1 | L anterior language region (IFG); 2 | L posterior language region (AG, SMG, STG, MTG); 3 | R anterior language region (IFG); 4 | R posterior language region (AG, SMG, STG, MTG); 5 | Frontal LI; 6 | Temporal LI; 7 | Whole network LI; how ROIs defined: WFU pickatlas |
| van Oers et al. (2010): ROI 5 | Semantic decision vs visual decision | C Aphasia vs control | UNR UNR Mix NC | 1 | L anterior language region (IFG); 2 | L posterior language region (AG, SMG, STG, MTG); 3 | R anterior language region (IFG); 4 | R posterior language region (AG, SMG, STG, MTG); 5 | Frontal LI; 6 | Temporal LI; 7 | Whole network LI; how ROIs defined: WFU pickatlas |
| van Oers et al. (2010): ROI 6 | Written word-picture matching vs visual decision | C Aphasia vs control | UNR UNR Mix NC | 1 | L anterior language region (IFG); 2 | L posterior language region (AG, SMG, STG, MTG); 3 | R anterior language region (IFG); 4 | R posterior language region (AG, SMG, STG, MTG); 5 | Frontal LI; 6 | Temporal LI; 7 | Whole network LI; how ROIs defined: WFU pickatlas |
| van Oers et al. (2010): ROI 7 | Semantic decision vs visual decision | C Aphasia vs control | UNR UNR Mix NC | 1 | L anterior language region (IFG); 2 | L posterior language region (AG, SMG, STG, MTG); 3 | R anterior language region (IFG); 4 | R posterior language region (AG, SMG, STG, MTG); 5 | Frontal LI; 6 | Temporal LI; 7 | Whole network LI; how ROIs defined: WFU pickatlas |
| van Oers et al. (2010): ROI 8 | Verb generation vs rest | C Aphasia vs control | UNR UNR Mix NC | 1 | L anterior language region (IFG); 2 | L posterior language region (AG, SMG, STG, MTG); 3 | R anterior language region (IFG); 4 | R posterior language region (AG, SMG, STG, MTG); 5 | Frontal LI; 6 | Temporal LI; 7 | Whole network LI; how ROIs defined: WFU pickatlas |
| van Oers et al. (2010): ROI 9 | Written word-picture matching vs visual decision | C Aphasia vs control | UNR UNR Mix NC | 1 | L anterior language region (IFG); 2 | L posterior language region (AG, SMG, STG, MTG); 3 | R anterior language region (IFG); 4 | R posterior language region (AG, SMG, STG, MTG); 5 | Frontal LI; 6 | Temporal LI; 7 | Whole network LI; how ROIs defined: WFU pickatlas |
| van Oers et al. (2010): ROI 10 | Semantic decision vs visual decision | C Aphasia vs control | UNR UNR Mix NC | 1 | L anterior language region (IFG); 2 | L posterior language region (AG, SMG, STG, MTG); 3 | R anterior language region (IFG); 4 | R posterior language region (AG, SMG, STG, MTG); 5 | Frontal LI; 6 | Temporal LI; 7 | Whole network LI; how ROIs defined: WFU pickatlas |
| ROI No. | Task Description | Covariate: lesion volume | ROIs | ROI Defined | Number of ROIs | ROIs Defined |
|---------|------------------|--------------------------|------|-------------|---------------|--------------|
| 11      | Verb generation vs rest | CC Aphasia | UNR UNR | ROI 1 | Number of ROIs: 2; ROIs: (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG); how ROIs defined: WFU pickatlas | None |
| 12      | Written word-picture matching vs visual decision | CC Aphasia | UNR UNR | ROI 1 | Number of ROIs: 2; ROIs: (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG); how ROIs defined: WFU pickatlas | None |
| 13      | Semantic decision vs visual decision | CC Aphasia | UNR UNR | ROI 1 | Number of ROIs: 2; ROIs: (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG); how ROIs defined: WFU pickatlas | None |
| 14      | Verb generation vs rest | CC Aphasia | UNR UNR | ROI 1 | Number of ROIs: 2; ROIs: (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG); how ROIs defined: WFU pickatlas | None |
| 15      | Written word-picture matching vs visual decision | CC Aphasia | UNR UNR | ROI 1 | Number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI; how ROIs defined: WFU pickatlas | None |
| 16      | Semantic decision vs visual decision | CC Aphasia | UNR UNR | ROI 1 | Number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI; how ROIs defined: WFU pickatlas | ↑ L IFG |
| 17      | Verb generation vs rest | CC Aphasia | UNR UNR | ROI 1 | Number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI; how ROIs defined: WFU pickatlas | ↑ L IFG |
| 18      | Written word-picture matching vs visual decision | CC Aphasia | UNR UNR | ROI 1 | Number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI; how ROIs defined: WFU pickatlas | None |
| Study               | Task                                         | Results                                                                 |
|---------------------|----------------------------------------------|-------------------------------------------------------------------------|
| van Oers et al. (2010): ROI 19 | Semantic decision vs visual decision         | LI; (7) whole network LI; how ROIs defined: WFU pickatlas               |
|                     | CC Aphasıa                                   | Number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI; how ROIs defined: WFU pickatlas |
|                     | Covariate: previous (current vs subacute) Δ TT | Not valid (current activation will reflect not just prior recovery, but also current language function; TT not optimal measure of overall language function) |
|                     | Anat NC                                      | ▲ L IFG R IFG                                                             |
| van Oers et al. (2010): ROI 20 | Verb generation vs rest                      | LI; (7) whole network LI; how ROIs defined: WFU pickatlas               |
|                     | CC Aphasıa                                   | Number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI; how ROIs defined: WFU pickatlas |
|                     | Covariate: previous (current vs subacute) Δ TT | Not valid (current activation will reflect not just prior recovery, but also current language function; TT not optimal measure of overall language function) |
|                     | Anat NC                                      | ▲ L IFG R IFG                                                             |
| Papoutsi et al. (2011): Vox 1 | Listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to ambiguous sentences with dominant resolution ("dominant") | Search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: based on GRFT |
|                     | CC Aphasıa                                   | ▲ L insula R posterior STG/STS/MTG L mid temporal                          |
|                     | Covariate: difference in percent of unacceptable judgments between subordinate and dominant sentences (dominance effect) |                                                                            |
| Papoutsi et al. (2011): Cplx 1 | Listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to ambiguous sentences with dominant resolution ("dominant") | A PPI analysis was carried out with the L IFG as the seed region. Correlations were computed between voxelwise modulation of connectivity with this region, and a behavioral measure of syntactic processing, which was the dominance effect: the difference in percent of unacceptable judgments between subordinate and dominant sentences. The resultant SPM was thresholded at voxelwise p < .01 (CDT), then corrected for multiple corrections based on cluster extent and GRFT using SPM8. |
|                     | CC Aphasıa                                   | Other: patients with better syntactic performance had more connectivity from the L IFG seed region to L pMTG and adjacent areas (including the insula); pMTG also significant at voxelwise p < .001 in Figure 2B, corrected for |
|                     | Covariate: modulation of L IFG connectivity by dominance effect |                                                                            |
| Study                                      | Task                                                                 | Region                                                                 | Method                                                                 | Findings                                                                 |
|-------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Papoutsi et al. (2011): Cplx 2            | Listening to ambiguous sentences with subordinate resolution vs listening to ambiguous sentences with dominant resolution | CC                                                                   | NAB                                                                   | A similar PPI analysis was carried out with the L pMTG as the seed region. Thresholding was the same as in the previous analysis. |
| Sebastian & Kiran (2011): ROI 1           | Picture naming (correct trials) vs viewing scrambled images and saying “pass” | CC                                                                   | YCT                                                                  | Number of ROIs: 4; ROIs: (1) L IFG (oper/tri); (2) L posterior perisylvian (pSTG, pMTG, AG, SMG); (3) R IFG (oper/tri); (4) R posterior perisylvian (pSTG, pMTG, AG, SMG); (5) language network LI; how ROIs defined: Harvard-Oxford atlas |
| Sebastian & Kiran (2011): ROI 2           | Semantic decision (correct trials) vs visual decision                | CC                                                                   | YCT                                                                  | Number of ROIs: 4; ROIs: (1) L IFG (oper/tri); (2) L posterior perisylvian (pSTG, pMTG, AG, SMG); (3) R IFG (oper/tri); (4) R posterior perisylvian (pSTG, pMTG, AG, SMG); (5) language network LI; how ROIs defined: Harvard-Oxford atlas |
| Szafarski et al. (2011): Vox 1            | Semantic decision vs tone decision                                   | LA                                                                  | Y                                                                    | Behavioral data notes: language and control tasks both matched; search volume: whole brain; software: in-house; voxelwise p: .05; cluster extent cutoff: none; the figure shows a cutoff of z > 10, which would not correspond to p < .05; increases and decreases in Figure 3 do not accord with the data from T1 and T2 in Figure 2, raising concerns about the implementation of the analyses; there is no explicit description of the second level analysis |

Multiple comparisons with GRFT
| Study                  | Task Description                                                                 | ROI 1                | ROI 2                | ROI 3                | ROI 4                | ROI 5                | Notes                                                                 |
|-----------------------|----------------------------------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------------------------------------------------------|
| Szaflarski et al. (2011): ROI 1 | Semantic decision vs tone decision                                               | LA                   | Y                    | UNR                  | ROI Func NC          |                       | Behavioral data notes: language and control tasks both matched; number of ROIs: 3; ROIs: (1) frontal L1; (2) temporal L1; (3) language network L1; T1 LI (temporal) is reported to be negative, which does not accord with the voxelwise analysis in Figure 2; increases and decreases in Figure 3 do not accord with the data from T1 and T2 in Figure 2, raising concerns about the implementation of the analyses |
| Tyler et al. (2011): Vox 1 | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences ("unambiguous") | CAC                  | NANB                 | NANT                 | Vox NDC             |                       | Search volume: plausible fronto-temporo-parietal language regions; software: SPM5; qualitative comparison on p. 423 |
| Tyler et al. (2011): Vox 2 | Listening to ambiguous sentences with dominant resolution ("dominant") vs listening to unambiguous sentences ("unambiguous") | CAC                  | NANB                 | NANT                 | Vox NDC             |                       | Search volume: plausible fronto-temporo-parietal language regions; software: SPM5; qualitative comparison on p. 423 |
| Tyler et al. (2011): Vox 3 | Listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to unambiguous sentences ("unambiguous") | CAC                  | NANB                 | NANT                 | Vox NDC             |                       | Search volume: plausible fronto-temporo-parietal language regions; software: SPM5; qualitative comparison on p. 423 |
| Tyler et al. (2011): Vox 4 | Listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to unambiguous sentences with dominant resolution ("dominant") | CAC                  | NANB                 | NANT                 | Vox NDC             |                       | Search volume: plausible fronto-temporo-parietal language regions; software: SPM5; qualitative comparison on p. 423 |
| Tyler et al. (2011): Vox 5 | Listening to ambiguous sentences (dominant and subordinate)                      | CC                   | NANB                 | NANT                 | Vox C                |                       | Search volume: plausible fronto-temporo-parietal language regions; software: SPM5; voxelwise p: .01; cluster extent cutoff: based on GRFT |

Notes: based on a combination of coordinates in Table 2, and Figure 3.
| Tyler et al. (2011): Vox 6 | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences ("unambiguous") | CC | Aphasia | Covariate: performance on sentence-picture matching task | NANB | NANT | Vox CA | Search volume: plausible fronto-temporal-parietal language regions; software: SPM5; voxelwise p: .01; cluster extent cutoff: 30 (units not stated) | ↑ R insula | ↑ R mid temporal | notes: also L pMTG but this did not reach significance |
| Tyler et al. (2011): Vox 7 | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences ("unambiguous") | CC | Aphasia | Covariate: performance on word monitoring task | NANB | NANT | Vox CA | Search volume: plausible fronto-temporal-parietal language regions; software: SPM5; voxelwise p: .05; cluster extent cutoff: 10 (units not stated) | ↑ L IFG pars orbitalis | ↑ L posterior MTG | ↑ R insula | ↑ R mid temporal |
| Tyler et al. (2011): Vox 8 | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences ("unambiguous") | CC | Aphasia | Covariate: difference in percent of unacceptable judgments between subordinate and dominant sentences (dominance effect) | NANB | NANT | Vox C- | Search volume: plausible fronto-temporal-parietal language regions; software: SPM5; voxelwise p: .01; cluster extent cutoff: based on GRFT | None |
| Tyler et al. (2011): ROI 1 | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences ("unambiguous") | CC | Aphasia | Covariate: performance on acceptability judgment task (difference in percent of unacceptable judgments between ambiguous and unambiguous sentences) | NANB | NANT | ROI Anat NC | Number of ROIs: 3; ROIs: (1) IFG pars opercularis; (2) IFG pars triangularis; (3) IFG pars orbitalis; how ROIs defined: AAL | ↑ L IFG pars triangularis | ↑ L IFG pars orbitalis |
| Tyler et al. (2011): ROI 2 | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences ("unambiguous") | CC | Aphasia | Covariate: difference in percentage of unacceptable judgments between subordinate and dominant sentences (dominance effect) | NANB | NANT | ROI Anat NC | Number of ROIs: 3; ROIs: (1) IFG pars opercularis; (2) IFG pars triangularis; (3) IFG pars orbitalis; how ROIs defined: AAL | None |
| Weiduschat et al. (2011): ROI 1 | Verb generation vs rest | LA | Aphasia T2 vs T1 (regardless of rTMS) | UNR | UNR | ROI LI NC | Number of ROIs: 3; ROIs: (1) IFG LI; (2) superior temporal LI; (3) SMA LI | None |
| Weiduschat | Verb generation vs LA | UNR | UNR | ROI | Number of ROIs: 3; ROIs: (1) IFG LI; (2) None | None |
| Author(s) | ROI | Task | Region | Controls | Contrast | Condition | Number of ROIs | ROIs | Notes |
|----------|-----|------|--------|----------|----------|------------|----------------|-------|-------|
| et al. (2011): ROI 2 | | Verb generation vs rest | Superior temporal LI | (with sham rTMS (n = 4) T2 vs T1) | UNR | ROI | 2 | LI; (3) SMA LI | |
| Weiduschat et al. (2011): ROI 3 | | Verb generation vs rest |Verb generation vs rest | LI | UNR | UNR | ROI | LI; NC | Number of ROIs: 3; ROIs: (1) IFG LI; (2) superior temporal LI; (3) SMA LI |
| Weiduschat et al. (2011): ROI 4 | | Verb generation vs rest | Verb generation vs rest | CAC | Aphasia vs control | UNR | UNR | ROI | LI; NC | Number of ROIs: 1; ROI: IFG LI |
| Allendorfer et al. (2012): ROI 1 | | Verb generation (covert, block) vs finger tapping (block) | Verb generation (covert, block) vs finger tapping (block) | | Aphas | UNR | UNR | ROI | LI; NC | Number of ROIs: 2; ROIs: (1) frontal LI; (2) temporal LI |
| Allendorfer et al. (2012): ROI 2 | | Verb generation (overt, event-related) vs noun repetition (event-related) | Verb generation (overt, event-related) vs noun repetition (event-related) | | Aphas | N | UNR | ROI | LI; NC | Number of ROIs: 2; ROIs: (1) frontal LI; (2) temporal LI |
| Allendorfer et al. (2012): ROI 3 | | Verb generation (overt, event-related) vs verb generation (covert, event-related) | Verb generation (overt, event-related) vs verb generation (covert, event-related) | | Aphas | N | UNR | ROI | LI; NC | Behavioral data notes: patients less accurate and produced less responses on both conditions, but the difference between groups was greater for verb generation; number of ROIs: 2; ROIs: (1) frontal LI; (2) temporal LI |
| Allendorfer et al. (2012): ROI 4 | | Verb generation (overt, event-related) vs noun repetition (event-related) | Verb generation (overt, event-related) vs noun repetition (event-related) | | Aphas | C | UNR | ROI | Func; NC | Behavioral data notes: overt performance differed, so covert performance probably did too; number of ROIs: 2; ROIs: (1) frontal LI; (2) temporal LI |
| Allendorfer et al. (2012): ROI 5 | | Verb generation (overt, event-related) vs verb generation (covert, event-related) | Verb generation (overt, event-related) vs verb generation (covert, event-related) | | Aphas | C | UNR | ROI | Func; NC | Number of ROIs: 2; ROIs: (1) R insula/IFG; (2) R STG; how ROIs defined: prominent R hemisphere activations for the contrast of overt and covert verb generation in patients |
| Fridriksson, Hubbard, et al. (2012): Vox 1 | | Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) vs listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences | Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) vs listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences | | CAC | UNR | NANT | Vox | U | Search volume: whole brain; software: FSL (FEAT 5.98); thresholding not stated |

Notes: IFG LI was stable in the stimulation group, but shifted to the R in the sham group, yielding a significant difference between groups.
### Fridriksson, Hubbard, et al. (2012): Vox 2

| Activity | Group | Analysis | Search Parameters |
|----------|-------|----------|-------------------|
| Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) vs rest | LA Aphasia T2 vs T1 | UNR NANT Vox U | FSL (FEAT 5.98); thresholding not stated |

**Notes:** Some labels changed based on coordinates.

### Fridriksson, Hubbard, et al. (2012): Vox 3

| Activity | Group | Analysis | Search Parameters |
|----------|-------|----------|-------------------|
| Listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences vs rest | LA Aphasia T2 vs T1 | UNR NANT Vox U | FSL (FEAT 5.98); thresholding not stated |

**Notes:** None.

### Fridriksson, Hubbard, et al. (2012): Vox 4

| Activity | Group | Analysis | Search Parameters |
|----------|-------|----------|-------------------|
| Listening to/watching audiovisual sentences and viewing a mouth vs rest | LA Aphasia T2 vs T1 | NANT UNR Vox U | FSL (FEAT 5.98); thresholding not stated |

**Notes:** None.

### Fridriksson, Hubbard, et al. (2012): ROI 1

| Activity | Group | Analysis | Search Parameters |
|----------|-------|----------|-------------------|
| Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) vs listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences | CAC Aphasia T1 vs control | UNR NANT Func NC | Number of ROIs: 6; ROIs: (1) L anterior insula/IFG pars orbitalis; (2) R anterior insula/IFG pars orbitalis; (3) Broca’s area; (4) L MTG; (5) L BA 37; (6) R BA 37; how ROIs defined: regions activated in both groups considered together; there were no interactions of group by condition; two regions showed main effects of group but this is not pertinent to the contrast |

**Notes:** None.

### Fridriksson, Richardson, et al. (2012): ROI 1

| Activity | Group | Analysis | Search Parameters |
|----------|-------|----------|-------------------|
| Picture naming vs viewing abstract pictures | LC Aphasia T2 vs T1 Covariate: Δ picture naming accuracy | C UNR ROI Oth NC | Number of ROIs: 3; ROIs: (1) perilesional L hemisphere language regions; (2) perilesional L hemisphere non-language regions; (3) undamaged non-perilesional L hemisphere language regions; how ROIs defined: based on individual lesions and control activation for picture naming | Other: change in perilesional non-language regions positively correlated with improvement in accuracy |

### Fridriksson, Richardson, et al. (2012): ROI 2

| Activity | Group | Analysis | Search Parameters |
|----------|-------|----------|-------------------|
| Picture naming vs viewing abstract pictures | LC Aphasia T2 vs T1 Covariate: Δ (decrease in) semantic errors | UNR UNR ROI Oth NC | Number of ROIs: 3; ROIs: (1) perilesional L hemisphere language regions; (2) perilesional L hemisphere non-language regions; (3) undamaged non-perilesional L hemisphere language regions; how ROIs defined: based on individual lesions and control activation for picture naming | Other: change in undamaged non-perilesional language regions negatively correlated with decrease in semantic errors |

### Fridriksson, Picture naming vs | LC | UNR UNR ROI | Number of ROIs: 3; ROIs: (1) | Other:
| Study                          | Task Description                                      | Reference | ROIs | Number of ROIs | ROIs: | Search Volume | Analysis | Notes |
|-------------------------------|-------------------------------------------------------|-----------|------|----------------|-------|---------------|----------|-------|
| Richardson, et al. (2012): ROI 3 | Viewing abstract pictures                             | Aphas. T2 vs T1 | Oth  | NC             | perilesional L hemisphere language regions; (2) perilesional L hemisphere non-language regions; (3) undamaged non-perilesional L hemisphere language regions; how ROIs defined: based on individual lesions and control activation for picture naming change in perilesional language regions, and change in undamaged non-perilesional language regions, negatively correlated with decrease in phonological paraphasias | |
| Fridriksson, Richardson, et al. (2012): ROI 4 | Picture naming vs viewing abstract pictures          | CC Aphas. T1 | UNR  | UNR            | UNR   | ROI Oth       | Number of ROIs: 3; ROIs: (1) perilesional L hemisphere language regions; (2) perilesional L hemisphere non-language regions; (3) undamaged non-perilesional L hemisphere language regions; how ROIs defined: based on individual lesions and control activation for picture naming | None |
| Fridriksson, Richardson, et al. (2012): ROI 5 | Picture naming vs viewing abstract pictures          | CC Aphas. T1 | UNR  | UNR            | UNR   | ROI Oth       | Number of ROIs: 3; ROIs: (1) perilesional L hemisphere language regions; (2) perilesional L hemisphere non-language regions; (3) undamaged non-perilesional L hemisphere language regions; how ROIs defined: based on individual lesions and control activation for picture naming | Other: change in perilesional language regions correlated with decrease in phonological paraphasias |
| Fridriksson, Richardson, et al. (2012): ROI 6 | Picture naming vs viewing abstract pictures          | CC Aphas. T1 | UNR  | UNR            | UNR   | ROI Oth       | Number of ROIs: 3; ROIs: (1) perilesional L hemisphere language regions; (2) perilesional L hemisphere non-language regions; (3) undamaged non-perilesional L hemisphere language regions; how ROIs defined: based on individual lesions and control activation for picture naming | None |
| Marcotte et al. (2012): Vox 1  | Picture naming (T1: known items; T2: trained items; correct trials) vs viewing scrambled images and saying "baba" | LA Aphas. T2 vs T1 | YCT  | UNR            | YCT   | Vox NDC       | Search volume: whole brain; software: SPM5; qualitative comparison on p. 1780; different contrasts at different time points not clearly explained | † L supramarginal gyrus † L dorsal precentral † L posterior MTG notes: labels based on figures rather than text |
| Marcotte et al. (2012): Vox 2  | Picture naming (known items, correct trials) vs viewing scrambled images and saying "baba" | CC Aphas. T1 | YCT  | UNR            | YCT   | Vox CA        | Search volume: whole brain; software: SPM5; voxelwise p. .005; cluster extent cutoff: 10 voxels (size not stated); different contrasts at different time points not clearly explained | † L dorsolateral prefrontal cortex † L SMA/medial prefrontal † L somato-motor † L anterior cingulate † R dorsolateral prefrontal cortex † R somato-motor † R thalamus |
| Study Authors | Study Type | Condition 1 | Condition 2 | Software | Contrast | Search Volume | Notes |
|---------------|------------|-------------|-------------|----------|-----------|---------------|-------|
| Marcotte et al. (2012): Vox 3 | Picture naming | Trained items, correct trials vs viewing scrambled images and saying "baba" | CC | Aphasiform T2 | YCT | UNR | Vox | Search volume: whole brain; software: SPM5; voxelwise p: .005; cluster extent cutoff: 10 voxels (size not stated); different contrasts at different time points not clearly explained |
| Schofield et al. (2012): Vox 1 | Listening to word pairs or reversed word pairs, speaker gender judgment vs rest | Moderate aphasia (n = 11) vs control | CAC | UNR | UNR | Vox | Search volume: whole brain; software: SPM8; voxelwise p: .001; cluster extent cutoff: none |
| Schofield et al. (2012): Vox 2 | Listening to word pairs or reversed word pairs, speaker gender judgment vs rest | Severe aphasia (n = 9) vs control | CAC | UNR | UNR | Vox | Search volume: whole brain; software: SPM8; voxelwise p: .001; cluster extent cutoff: none |
| Schofield et al. (2012): Vox 3 | Listening to word pairs or reversed word pairs, speaker gender judgment vs rest | Severe (n = 9) vs moderate (n = 11) aphasia | CAA | UNR | UNR | Vox | Search volume: whole brain; software: SPM8; voxelwise p: .001; cluster extent cutoff: none |
| Wright et al. (2012): Vox 1 | Listening to normal sentences and detecting a target word vs rest | Aphasia vs control | CAC | UNR | UNR | Vox | Search volume: whole brain; software: SPM5; voxelwise p: .01 |
| Wright et al. (2012): Cplx 1 | Listening to normal sentences and detecting a target word vs rest | Aphasiform | CC | UNR | UNR | Cplx | Joint ICA was performed on structural and functional contrast images for each of the two contrasts using FIT 2.0b. Seven components were derived, of which 2 were further investigated since their loadings correlated with relevant behavioral measures. Functional components were Other: Contrast 1 loaded primarily on the R STG for component 1 (the "semantics component") and on the L ITG for |
Joint ICA was performed on structural and functional contrast images for each of the two contrasts using FIF 2.0b. Seven components were derived, of which 2 were further investigated since their loadings correlated with relevant behavioral measures. Functional components were thresholded at $p < .001$, cluster-corrected for multiple comparisons, minimum cluster extent $= 1.27$ cc. Component 1 was considered a "semantics component" because it correlated with the semantic behavioral measure and not with either of the two syntactic measures. This component did not have any anatomical aspect to it. Component 2 was considered a "syntax component" because it correlated with both syntactic behavioral measures and not with the semantic measure. This conceptualization seems somewhat speculative, given that WPE NP and WPE AP are rather indirect measures of syntactic and semantic processing. Component 2 involved damage to left frontal and insular cortex, and underlying dorsal white matter.

| Wright et al. (2012): Cplx 2 | Listening to grammatical but meaningless sentences and detecting a target word vs rest | CC | UNR | UNR | Cplx |
|-----------------------------|--------------------------------------------------------------------------------------------------|----|-----|-----|------|
| Szaflarski et al. (2013): Vox 1 | Semantic decision vs tone decision | CAA | AM | UNR | Vox |

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Behavioral data notes: interaction of group by condition not reported; non-recovered patients were significantly less accurate only on the semantic decision condition, but they actually showed a smaller difference between conditions than the recovered patients; search volume: whole brain; software: AFNI; voxelwise $p: .05$; cluster extent cutoff: $4.16$ cc; cluster-defining threshold (CDT) $p < 0.05$ too lenient.

| Wright et al. (2012): Cplx 2 | Listening to grammatical but meaningless sentences and detecting a target word vs rest | CC | UNR | UNR | Cplx |
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| Wright et al. (2012): Cplx 2 | Listening to grammatical but meaningless sentences and detecting a target word vs rest | CC | UNR | UNR | Cplx |
|-----------------------------|--------------------------------------------------------------------------------------------------|----|-----|-----|------|
| Szaflarski et al. (2013): Vox 1 | Semantic decision vs tone decision | CAA | AM | UNR | Vox |

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Behavioral data notes: interaction of group by condition not reported; non-recovered patients were significantly less accurate only on the semantic decision condition, but they actually showed a smaller difference between conditions than the recovered patients; search volume: whole brain; software: AFNI; voxelwise $p: .05$; cluster extent cutoff: $4.16$ cc; cluster-defining threshold (CDT) $p < 0.05$ too lenient.

| Wright et al. (2012): Cplx 2 | Listening to grammatical but meaningless sentences and detecting a target word vs rest | CC | UNR | UNR | Cplx |
|-----------------------------|--------------------------------------------------------------------------------------------------|----|-----|-----|------|
| Szaflarski et al. (2013): Vox 1 | Semantic decision vs tone decision | CAA | AM | UNR | Vox |

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Behavioral data notes: interaction of group by condition not reported; non-recovered patients were significantly less accurate only on the semantic decision condition, but they actually showed a smaller difference between conditions than the recovered patients; search volume: whole brain; software: AFNI; voxelwise $p: .05$; cluster extent cutoff: $4.16$ cc; cluster-defining threshold (CDT) $p < 0.05$ too lenient.

| Wright et al. (2012): Cplx 2 | Listening to grammatical but meaningless sentences and detecting a target word vs rest | CC | UNR | UNR | Cplx |
|-----------------------------|--------------------------------------------------------------------------------------------------|----|-----|-----|------|
| Szaflarski et al. (2013): Vox 1 | Semantic decision vs tone decision | CAA | AM | UNR | Vox |

Joint ICA was performed on structural and functional contrast images for each of the two contrasts using FIF 2.0b. Seven components were derived, of which 2 were further investigated since their loadings correlated with relevant behavioral measures. Functional components were thresholded at $p < .001$, cluster-corrected for multiple comparisons, minimum cluster extent $= 1.27$ cc. Component 1 was considered a "semantics component" because it correlated with the semantic behavioral measure and not with either of the two syntactic measures. This component did not have any anatomical aspect to it. Component 2 was considered a "syntax component" because it correlated with both syntactic behavioral measures and not with the semantic measure. This conceptualization seems somewhat speculative, given that WPE NP and WPE AP are rather indirect measures of syntactic and semantic processing. Component 2 involved damage to left frontal and insular cortex, and underlying dorsal white matter.

Behavioral data notes: interaction of group by condition not reported; non-recovered patients were significantly less accurate only on the semantic decision condition, but they actually showed a smaller difference between conditions than the recovered patients; search volume: whole brain; software: AFNI; voxelwise $p: .05$; cluster extent cutoff: $4.16$ cc; cluster-defining threshold (CDT) $p < 0.05$ too lenient.

| Wright et al. (2012): Cplx 2 | Listening to grammatical but meaningless sentences and detecting a target word vs rest | CC | UNR | UNR | Cplx |
|-----------------------------|--------------------------------------------------------------------------------------------------|----|-----|-----|------|
| Szaflarski et al. (2013): Vox 1 | Semantic decision vs tone decision | CAA | AM | UNR | Vox |

Joint ICA was performed on structural and functional contrast images for each of the two contrasts using FIF 2.0b. Seven components were derived, of which 2 were further investigated since their loadings correlated with relevant behavioral measures. Functional components were thresholded at $p < .001$, cluster-corrected for multiple comparisons, minimum cluster extent $= 1.27$ cc. Component 1 was considered a "semantics component" because it correlated with the semantic behavioral measure and not with either of the two syntactic measures. This component did not have any anatomical aspect to it. Component 2 was considered a "syntax component" because it correlated with both syntactic behavioral measures and not with the semantic measure. This conceptualization seems somewhat speculative, given that WPE NP and WPE AP are rather indirect measures of syntactic and semantic processing. Component 2 involved damage to left frontal and insular cortex, and underlying dorsal white matter.

Behavioral data notes: interaction of group by condition not reported; non-recovered patients were significantly less accurate only on the semantic decision condition, but they actually showed a smaller difference between conditions than the recovered patients; search volume: whole brain; software: AFNI; voxelwise $p: .05$; cluster extent cutoff: $4.16$ cc; cluster-defining threshold (CDT) $p < 0.05$ too lenient.

| Wright et al. (2012): Cplx 2 | Listening to grammatical but meaningless sentences and detecting a target word vs rest | CC | UNR | UNR | Cplx |
|-----------------------------|--------------------------------------------------------------------------------------------------|----|-----|-----|------|
| Szaflarski et al. (2013): Vox 1 | Semantic decision vs tone decision | CAA | AM | UNR | Vox |

Joint ICA was performed on structural and functional contrast images for each of the two contrasts using FIF 2.0b. Seven components were derived, of which 2 were further investigated since their loadings correlated with relevant behavioral measures. Functional components were thresholded at $p < .001$, cluster-corrected for multiple comparisons, minimum cluster extent $= 1.27$ cc. Component 1 was considered a "semantics component" because it correlated with the semantic behavioral measure and not with either of the two syntactic measures. This component did not have any anatomical aspect to it. Component 2 was considered a "syntax component" because it correlated with both syntactic behavioral measures and not with the semantic measure. This conceptualization seems somewhat speculative, given that WPE NP and WPE AP are rather indirect measures of syntactic and semantic processing. Component 2 involved damage to left frontal and insular cortex, and underlying dorsal white matter.

Behavioral data notes: interaction of group by condition not reported; non-recovered patients were significantly less accurate only on the semantic decision condition, but they actually showed a smaller difference between conditions than the recovered patients; search volume: whole brain; software: AFNI; voxelwise $p: .05$; cluster extent cutoff: $4.16$ cc; cluster-defining threshold (CDT) $p < 0.05$ too lenient.
| Study                                      | Condition                          | Control or Comparator | ROI Type | ROI Description                                                                 | Number of ROIs | ROIs (Specific Regions)                                                                 | Notes                     |
|-------------------------------------------|------------------------------------|-----------------------|----------|---------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------------|---------------------------|
| Szaflarski et al. (2013): ROI 1           | Semantic decision vs tone decision | CC Aphasia (recovered and non-recovered) | UNR UNR | ROI 1: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | 4              | Number of ROIs: 4; ROIs: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | L dorsolateral prefrontal cortex |
| Szaflarski et al. (2013): ROI 2           | Semantic decision vs tone decision | CC Aphasia (recovered and non-recovered) | UNR UNR | ROI 2: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | 4              | Number of ROIs: 4; ROIs: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | L dorsolateral prefrontal cortex |
| Szaflarski et al. (2013): ROI 3           | Semantic decision vs tone decision | CC Aphasia (recovered and non-recovered) | UNR UNR | ROI 3: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | 4              | Number of ROIs: 4; ROIs: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | L dorsolateral prefrontal cortex |
| Szaflarski et al. (2013): ROI 4           | Semantic decision vs tone decision | CC Aphasia (recovered and non-recovered) | UNR UNR | ROI 4: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | 4              | Number of ROIs: 4; ROIs: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | L dorsolateral prefrontal cortex |
| Szaflarski et al. (2013): ROI 5           | Semantic decision vs tone decision | CC Aphasia (recovered and non-recovered) | UNR UNR | ROI 5: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | 4              | Number of ROIs: 4; ROIs: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | R posterior STG |
| Szaflarski et al. (2013): ROI 6           | Semantic decision vs tone decision | CC Aphasia (recovered and non-recovered) | C UNR   | ROI 6: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | 4              | Number of ROIs: 4; ROIs: (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus; how ROIs defined: regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs; circular because defined based on recovered status | None                     |
| Thiel et al. (2013): Vox 1                | Verb generation vs rest            | LAA (Aphasia with rTMS (n = 13) T2 vs T1) | UNR UNR | Vox 1: Search volume: whole brain; software: SPM8; qualitative comparison on p. 2244 |                | Search volume: whole brain; software: SPM8; qualitative comparison on p. 2244 | L IFG                     |
| Study/ROI | Task | Region | Activity | Search Volume | Notes |
|-----------|------|--------|----------|---------------|-------|
| Thiel et al. (2013): ROI 1 | Verb generation vs rest | LAA (Aphasia with rTMS (n = 13) T2 vs T1) vs (aphasia with sham (n = 11) T2 vs T1) | UNR | ROI LI One | Number of ROIs: 1; ROI: language network LI; actual LIs are not reported, only change in LI ↑ LI (language network) notes: T1 R lateralization surprising relative to other findings from this group |
| Thiel et al. (2013): ROI 2 | Verb generation vs rest | LC Aphasiant vs T1 Covariate: Δ AAT total score | UNR | ROI LI One | Number of ROIs: 1; ROI: language network LI; model did not include treatment group (rTMS vs sham) ↑ LI (language network) notes: patients who improved more showed a greater leftward shift of activation; T1 R lateralization surprising relative to other findings from this group |
| Abel et al. (2014): Vox 1 | Picture naming (all conditions) vs rest | CC Aphasiant Covariate: subsequent Δ (T2 vs T1) picture naming Somewhat valid (T1 behavioral measure should be included in model) | C | Vox CCB | Search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) ↑ L IFG pars opercularis ↑ R basal ganglia |
| Abel et al. (2014): Vox 2 | Picture naming (all conditions) vs rest | LC Aphasiant Covariate: Δ picture naming accuracy | C | Vox CCB | Search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) ↑ L somato-motor ↑ L inferior parietal lobule ↑ L supramarginal gyrus ↑ L posterior STS ↑ L posterior MTG ↑ L occipital |
| Abel et al. (2014): Vox 3 | Picture naming (trained items) vs picture naming (untrained items) | LA Aphasiant | N | Vox CCB | Behavioral data notes: trained items improved more than untrained items; search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) ↑ L precuneus ↑ L posterior STG ↑ L Heschl's gyrus ↑ L mid temporal ↑ L posterior cingulate ↑ L thalamus ↑ R ventral precentral/inferior frontal junction ↑ R somato-motor ↑ R Heschl's gyrus ↑ R posterior cingulate ↑ R thalamus ↑ R basal ganglia |
| Abel et al. | Picture naming | LA | Y | Vox | Behavioral data notes: no differential ↑ R superior |
| Reference | Type | Control | Design | Imaging Parameters | Region of Interest (s) | Notes |
|-----------|------|---------|--------|--------------------|------------------------|-------|
| Abel et al. (2014): Vox 4 | (semantic trained items) vs picture naming (phonological trained items) | Aphasia T2 vs T1 | CCTB | effects for semantic vs phonological trained items; search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) | parietal ↓ L dorsolateral prefrontal cortex ↓ L somato-motor ↓ L occipital ↓ L anterior cingulate ↓ L posterior cingulate ↓ R precuneus ↓ R occipital ↓ R anterior cingulate ↓ R posterior cingulate ↓ R hippocampus/MTL |
| Abel et al. (2014): Vox 5 | Picture naming (all conditions) vs rest | CAA Aphasia with semantic impairment T1 (n = 8) vs with phonological impairment T1 (n = 6) | UNR UNR Vox CCTB | Search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) | R IFG pars triangularis ↑ R dorsolateral prefrontal cortex |
| Abel et al. (2014): Vox 6 | Picture naming (all conditions) vs rest | LAA Aphasia with semantic impairment (n = 8) T2 vs T1 vs (aphasia with phonological impairment (n = 6) T2 vs T1) | N UNR Vox CCTB | Behavioral data notes: phonological patients showed more improvement on trained items; search volume: whole brain; software: SPM8; voxelwise p:.01; cluster extent cutoff: 11 voxels (size not stated) | L somato-motor ↑ L Heschl's gyrus ↑ L anterior temporal ↑ L occipital ↑ L thalamus ↑ L basal ganglia ↑ R somato-motor ↑ R IFG pars opercularis |
| Abel et al. (2014): Vox 7 | Picture naming (all conditions) vs rest | LA Aphasia with semantic impairment (n = 8) T2 vs T1 | N UNR Vox CCTB | Search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) | L basal ganglia |
| Abel et al. (2014): Vox 8 | Picture naming (all conditions) vs rest | LA Aphasia with phonological impairment (n = 6) T2 vs T1 | N UNR Vox CCTB | Search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) | None |
| Benjamin et al. (2014): ROI 1 | Word generation vs rest | LA Aphasia with intention treatment (n = 7) T2 vs T1 | UNR UNR ROI LI NC | Number of ROIs: 3; ROIs: (1) lateral frontal Lt; (2) medial frontal Lt; (3) posterior perisylvian Lt | ↓ Lt (frontal) notes: laterality shift for lateral frontal Lt, not medial frontal Lt |
| Benjamin et al. (2014): ROI 2 | Word generation vs rest | LA Aphasia with intention treatment (n = 6) T3 vs T1 | UNR UNR ROI LI NC | Number of ROIs: 3; ROIs: (1) lateral frontal Lt; (2) medial frontal Lt; (3) posterior perisylvian Lt | ↓ Lt (frontal) notes: laterality shift for both lateral and medial frontal LIs |
| Benjamin et al. (2014): ROI 3 | Word generation vs rest | LA Aphasia with control treatment (n = 7) T2 vs T1 | UNR UNR ROI LI NC | Number of ROIs: 3; ROIs: (1) lateral frontal Lt; (2) medial frontal Lt; (3) posterior perisylvian Lt | None |
| Benjamin et al. (2014): ROI 4 | Word generation vs rest | LA Aphasia with control treatment (n = 7) T3 vs T1 | UNR UNR ROI LI NC | Number of ROIs: 3; ROIs: (1) lateral frontal Lt; (2) medial frontal Lt; (3) posterior perisylvian Lt | None |
| Benjamin | Word generation | LC | UNR UNR ROI | Number of ROIs: 3; ROIs: (1) lateral | ↓ Lt (temporal) |
| Study                                       | ROI | Task                          | Control Group | Treatment Group | Timepoints | Covariates  | ROIs Comment |
|---------------------------------------------|-----|-------------------------------|---------------|----------------|------------|-------------|--------------|
| et al. (2014): ROI 5                        |     | Aphasia with intention treatment (n = 7) T2 vs T1 | LI            | NC            | front Li; (2) medial frontal Li; (3) posterior perisylvian Li |
| Benjamin et al. (2014): ROI 6               |     | Word generation vs rest       | UNR           | UNR           | ROI Li NC | Number of ROIs: 3; ROIs: (1) lateral frontal Li; (2) medial frontal Li; (3) posterior perisylvian Li | None |
| Benjamin et al. (2014): ROI 7               |     | Word generation vs rest       | UNR           | UNR           | ROI Li NC | Number of ROIs: 3; ROIs: (1) lateral frontal Li; (2) medial frontal Li; (3) posterior perisylvian Li | None |
| Benjamin et al. (2014): ROI 8               |     | Word generation vs rest       | UNR           | UNR           | ROI Li NC | Number of ROIs: 3; ROIs: (1) lateral frontal Li; (2) medial frontal Li; (3) posterior perisylvian Li | None |
| Brownsett et al. (2014): Vox 1             |     | Listening to sentences vs listening to segmented white noise | N             | NANT          | Vox C-     | Behavioral data notes: significant difference in accuracy of subsequent repetition; search volume: whole brain; software: FSL (FEAT 5.98); voxelwise p: ~.01 (z > 2.3); cluster extent cutoff: based on GRFT | ↑ L insula
↑ L anterior cingulate
↑ R insula
↑ R anterior cingulate
↑ L SMA/medial prefrontal
↑ L precuneus
↑ L posterior cingulate
↑ R SMA/medial prefrontal
↑ R precuneus
↑ R posterior cingulate
Notes: findings are approximate since description is partially in terms of networks; at the earlier time point only, patients also showed reduced activity in left ventral prefrontal cortex and right medial planum temporale |
| Brownsett et al. (2014): Vox 2             |     | Listening to sentences (patients) or listening to noise vouched sentences (controls) vs CAC Aphasia (T2 and T3) vs control (T1 and T2) | Y             | NANT          | Vox C-     | Behavioral data notes: no significant difference in accuracy of subsequent repetition; search volume: whole brain; software: FSL (FEAT 5.98); voxelwise p: ~.01 (z > 2.3); cluster extent cutoff: based on GRFT | None |
| Study (Author Year) | Task | Contrast | Control Condition | Method | Search Volume | Software | Cluster Extent | Results | Notes |
|---------------------|------|----------|-------------------|--------|---------------|----------|---------------|---------|-------|
| Listening to segmented white noise | Brownsett et al. (2014): ROI 1 | Listening to sentences vs listening to segmented white noise | CC | Aphasica mean of T1, T2, T3 Covariate: picture description score (CAT), mean of T1, T2, T3 | UNR NANT ROI Func One | Behavioral data notes: referring to accuracy of subsequent repetition; correlation with picture description is not reported; number of ROIs: 1; ROI: dorsal anterior cingulate cortex/midline superior frontal gyrus; how ROI defined: contrast of listening to vocoded speech and listening to normal speech in controls; same result obtained with age and lesion volume included in the model | ↑ L SMA/medial prefrontal ↑ L anterior cingulate ↑ R SMA/medial prefrontal ↑ R anterior cingulate | notes: increased activation of dACC/SFG was correlated with higher scores on picture description |
| Listening to sentences and making a plausibility judgment vs listening to reversed speech | Mattioli et al. (2014): Vox 1 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | CAA | Aphasia treated T2 (n = 6) vs untreated T2 (n = 6) Somewhat valid (groups were different but not due to treatment) | Y UNR Vox CA | Search volume: whole brain; software: BrainVoyager QX 1.9; voxelwise p: .001; cluster extent cutoff: 0.16 cc; methods report cluster extent threshold (we assume this was done), but figure caption states uncorrected | ↑ L IFG pars opercularis ↑ L IFG pars triangularis ↑ L SMA/medial prefrontal ↑ L angular gyrus ↑ R ventral precentral/inferior frontal junction ↑ R supramarginal gyrus | notes: based on coordinates in Table 2 |
| Listening to sentences and making a plausibility judgment vs listening to reversed speech | Mattioli et al. (2014): Vox 2 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | CAA | Aphasia treated T3 (n = 6) vs untreated T3 (n = 6) Somewhat valid (groups were different but not due to treatment) | Y UNR Vox CA | Search volume: whole brain; software: BrainVoyager QX 1.9; voxelwise p: .001; cluster extent cutoff: 0.16 cc; methods report cluster extent threshold (we assume this was done), but figure caption states uncorrected | ↑ L IFG pars triangularis ↑ L insula ↑ L supramarginal gyrus | notes: based on coordinates in Table 2; also increases in R IFG and R supramarginal gyrus but only uncorrected |
| Listening to sentences and making a plausibility judgment vs listening to reversed speech | Mattioli et al. (2014): Vox 3 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LAA | (Aphasia treated (n = 6) T2 vs T1) vs (untreated (n = 6) T2 vs T1) Somewhat valid (no treatment effect) | Y UNR Vox NDC | Search volume: whole brain; software: BrainVoyager QX 1.9; qualitative comparison on p. 548 | ↑ L IFG ↑ R posterior STG ↑ L inferior parietal lobule ↑ R IFG | notes: treated patients showed increases in L IFG and R STG, while untreated patients showed increases in L IPL and R IFG |
| Listening to sentences and making a plausibility judgment vs | Mattioli et al. (2014): Vox 4 | Listening to sentences and making a plausibility judgment vs | LAA | (Aphasia treated (n = 6) T3 vs T2) vs (untreated (n = 6) T3 vs T2) | Y UNR Vox NDC | Search volume: whole brain; software: BrainVoyager QX 1.9; qualitative comparison on p. 548 | None | notes: the two groups were reported to have comparable |
| Study: Mattioli et al. (2014) | ROI | Experimental Design | Language Area | Number of ROIs | ROIs | How ROIs defined | Notes |
|--------------------------------|-----|---------------------|---------------|----------------|------|-----------------|-------|
| **Listening to sentences and making a plausibility judgment vs listening to reversed speech** | **VA** | Aphasias (n = 6) T2 vs T1 | Y UNR | Vox NC | Number of ROIs: 4; ROIs: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG; how ROIs defined: based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used | ∧ L IFG notes; interaction of time by treatment: treated group showed greater L IFG activity at T2 |
| Listening to reversed speech | Somewhat valid (no treatment effect) | Increases in L hemisphere language areas | |
| Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA | Aphasias treated (n = 6) T2 vs T1 | Y UNR | Vox NC | Number of ROIs: 4; ROIs: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG; how ROIs defined: based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used | |
| Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA | Aphasias untreated (n = 6) T2 vs T1 | Y UNR | Vox NC | Number of ROIs: 4; ROIs: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG; how ROIs defined: based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used | |
| Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA | Aphasias treated (n = 6) T3 vs T2 | Y UNR | Vox NC | Number of ROIs: 4; ROIs: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG; how ROIs defined: based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used | |
| Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA | Aphasias untreated (n = 6) T3 vs T2 | Y UNR | Vox NC | Number of ROIs: 4; ROIs: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG; how ROIs defined: based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used | |
| Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA | (Aphasias treated (n = 6) T1 ≠ T2 ≠ T3) vs (untreated (n = 6) T1 ≠ T2 ≠ T3) Somewhat valid (no treatment effect) | Y UNR | ROI Func NC | Number of ROIs: 4; ROIs: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG; how ROIs defined: based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used | |
| Listening to sentences and making a plausibility judgment vs listening to reversed speech | LC | Aphasias treated (n = 6) T2 vs T1 Covariate: Δ written language (AAT) | Y UNR | ROI Func NC | Number of ROIs: 4; ROIs: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG; how ROIs defined: based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used | |
| Listening to sentences and making a plausibility judgment vs listening to reversed speech | LC | Aphasias treated (n = 6) T2 vs T1 Covariate: Δ naming (AAT) | Y UNR | ROI Func NC | Number of ROIs: 4; ROIs: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG; how ROIs defined: based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used | |
| Study | Condition | ROI | Notes |
|-------|-----------|-----|-------|
| **Mattioli et al. (2014): ROI 4** | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LC | Aphasiallpic untreated (n = 6) T2 vs T1 Covariate: Δ written language (AAT) | Y | UNR | ROI Func NC | Number of ROIs: 4; ROIs: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG; how ROIs defined: based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used | None |
| **Mattioli et al. (2014): ROI 5** | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LC | Aphasiallpic untreated (n = 6) T2 vs T1 Covariate: Δ naming (AAT) | Y | UNR | ROI Func NC | Number of ROIs: 4; ROIs: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG; how ROIs defined: based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used | ↑ R IFG |
| **Mohr et al. (2014): Vox 1** | Listening to sentences (high and low ambiguity) vs listening to signal-correlated noise | LA | Aphasiallpic T2 vs T1 | NANB NANT Vox NDC | Search volume: whole brain; software: SPM8; qualitative generalization across individuals on pp. 8-9 | None |
| **Mohr et al. (2014): ROI 1** | Listening to high ambiguity sentences vs listening to low ambiguity sentences | LA | Aphasiallpic T2 vs T1 | NANB NANT ROI Func NC | Number of ROIs: 4; ROIs: (1) L IFG; (2) R IFG; (3) L ITG; (4) R ITG; the temporal ROIs are described as STG but they seem to be in the ITG; how ROIs defined: defined based on control data from Rodd et al. (2005) but the coordinates do not match so it is not clear exactly how they were defined; ANOVA of timepoint by hemisphere by site, with a significant interaction of timepoint by hemisphere | ↑ R IFG ↑ R posterior inferior temporal gyrus/fusiform gyrus notes: all signal changes were negative (i.e. less activation for ambiguous sentences), making interpretation challenging |
| **Robson et al. (2014): Vox 1** | Semantic decision (written word and picture) vs visual decision and rest | CAC | Aphasiallpic vs control | N N Vox CA | Behavioral data notes: patients also less accurate on control condition, but control condition includes rest so coded based on language condition only; search volume: whole brain; software: SPM8; voxelwise p: .005; cluster extent cutoff: 4 voxels (size not stated); dual baseline computation not explained | ↑ L IFG pars orbitalis ↑ L mid temporal ↑ L anterior temporal ↑ L cerebellum ↑ L hippocampus/MTL ↑ R mid temporal ↑ R anterior temporal ↑ R posterior inferior temporal gyrus/fusiform gyrus ↑ R cerebellum ↑ R hippocampus/MTL ↑ R posterior cingulate |
| **Robson et al. (2014): ROI 1** | Semantic decision (written word and picture) vs visual decision and rest | CAC | Aphasiallpic vs control | N N ROI Func NC | Behavioral data notes: patients also less accurate on control condition, but control condition includes rest so | ↑ L anterior temporal ↑ L posterior |
| Study                          | Task Comparison                                                                 | ROI Count | ROIs                                                                                           | Notes                                                                 |
|--------------------------------|----------------------------------------------------------------------------------|-----------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Szafierski et al. (2014): Vox 1| Verb generation vs finger tapping                                                 | 10        | (1) L anterior fusiform gyrus; (2) L temporal pole; (3) L anterior STS; (4) L IFG; (5) L ventral occipito-temporal; (6-10) homotopic counterparts; how ROIs defined: spheres around functional peaks from literature; dual baseline computation not explained | Inferior temporal gyrus/fusiform gyrus ↑ R posterior inferior temporal gyrus/fusiform gyrus |
| van Hees et al. (2014): Vox 1 | Picture naming (phonological trained items, correct trials) vs viewing scrambled images | 3         | (1) frontal LI; (2) temporal LI; (3) language network LI | L inferior parietal lobule ↓ L superior parietal ↓ L posterior STG/STS/MTG ↓ L occipital ↑ R occipital |
| van Hees et al. (2014): Vox 2 | Picture naming (semantic trained items, correct trials) vs viewing scrambled images | 3         | (1) frontal LI; (2) temporal LI; (3) language network LI | L LI (language network) ↓ LI (frontal) notes: temporal LI was also marginally significantly reduced (p = .08) |
| van Hees et al. (2014): Vox 3 | Picture naming (phonological trained items, correct trials) vs viewing scrambled images | 3         | (1) frontal LI; (2) temporal LI; (3) language network LI | L basal ganglia ↑ L supramarginal gyrus ↑ R precuneus |
| van Hees et al. (2014): Vox 1 | Picture naming                                                                    | 3         | (1) temporal LI; (2) language network LI | None |
| Study                          | Vox | Design                                                                 | Analysis | Search Volume | Software       | Cluster Cutoff |
|-------------------------------|-----|----------------------------------------------------------------------|----------|---------------|----------------|----------------|
| Abel et al. (2015): Vox 1     | N   | Picture naming vs rest                                              | N        | LA            | SPM8           | 11 voxels      |
| van Hees et al. (2014): Vox 4 |     | (semantic trained items, correct trials) vs viewing scrambled images |          |               | AFNI           | 0.999 cc       |
| van Hees et al. (2014): Vox 5 |     | Picture naming (phonological trained items, correct trials) vs viewing scrambled images |          |               | AFNI           | 0.999 cc       |
| van Hees et al. (2014): Vox 6 |     | Picture naming (semantic trained items, correct trials) vs viewing scrambled images |          |               | AFNI           | 0.999 cc       |
| van Hees et al. (2014): Vox 7 |     | Picture naming (phonological trained items, correct trials) vs viewing scrambled images |          |               | AFNI           | 0.999 cc       |
| van Hees et al. (2014): Vox 8 |     | Picture naming (semantic trained items, correct trials) vs viewing scrambled images |          |               | AFNI           | 0.999 cc       |
|                              |     | ApHasia T2 Covariate: previous Δ (T2 vs T1) picture naming (semantic treated items) Not valid (T2 activation not an appropriate measure of treatment-induced recovery because it reflects T2 performance) |          |               |                |                |
|                              |     | Covariate: subsequent outcome (T2) picture naming Not valid (not appropriate to correlate T1 imaging with T2 behavior without T1 behavior in model) |          |               |                |                |
|                              |     | Covariate: picture naming T2                                        |          |               |                |                |
|                              |     | Search volume: whole brain; software: AFNI; voxelwise p: 0.005; cluster extent cutoff: 0.999 cc |          |               |                |                |
|                              |     | Behavioral data notes: RT shorter at T2; search volume: whole brain; software: SPM8; voxelwise p: 0.01; cluster extent cutoff: 11 voxels (size not stated) |          |               |                |                |
| Study          | Task Description            | Contrast                      | AM | N  | Vox | Behavioral Data Notes                                                                 |
|---------------|----------------------------|-------------------------------|----|----|-----|--------------------------------------------------------------------------------------------|
| Abel et al.   | Picture naming vs rest     | CAC                           | AM | N  | Vox | Behavioral data notes: controls responded more quickly; search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) |
| (2015): Vox 2 |                            | Aphasia T1 vs control T1      |    |    |     |                                                                                           |
|               |                            | L cerebellum                  |    |    |     |                                                                                           |
|               |                            | R SMA/medial prefrontal       |    |    |     |                                                                                           |
|               |                            | R somato-motor                |    |    |     |                                                                                           |
|               |                            | R precuneus                   |    |    |     |                                                                                           |
|               |                            | R posterior STS               |    |    |     |                                                                                           |
|               |                            | R posterior MTG               |    |    |     |                                                                                           |
|               |                            | R posterior cingulate         |    |    |     |                                                                                           |
|               |                            | R cerebellum                  |    |    |     |                                                                                           |
|               |                            | R thalamus                    |    |    |     |                                                                                           |
|               |                            | R hippocampus/MTL             |    |    |     |                                                                                           |
|               |                            | R precuneus                   |    |    |     |                                                                                           |
|               |                            | L somato-motor                |    |    |     |                                                                                           |
|               |                            | L Heschl’s gyrus              |    |    |     |                                                                                           |
|               |                            | L anterior cingulate          |    |    |     |                                                                                           |
|               |                            | L posterior cingulate         |    |    |     |                                                                                           |
|               |                            | L thalamus                    |    |    |     |                                                                                           |
|               |                            | L basal ganglia               |    |    |     |                                                                                           |
|               |                            | R insula                      |    |    |     |                                                                                           |
|               |                            | R somato-motor                |    |    |     |                                                                                           |
|               |                            | R mid temporal                |    |    |     |                                                                                           |
|               |                            | R anterior cingulate          |    |    |     |                                                                                           |
|               |                            | R posterior STS               |    |    |     |                                                                                           |
|               |                            | R posterior MTG               |    |    |     |                                                                                           |
|               |                            | R posterior cingulate         |    |    |     |                                                                                           |
|               |                            | R thalamus                    |    |    |     |                                                                                           |
|               |                            | R hippocampus/MTL             |    |    |     |                                                                                           |
|               |                            | None                          |    |    |     | Behavioral data notes: RT not reported for controls; search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) |
| Abel et al.   | Picture naming vs rest     | LAC                           | AM | UNR| Vox | Behavioral data notes: RT not reported for controls; search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) |
| (2015): Vox 3 |                            | Aphasia T2 vs T1              |    |    |     |                                                                                           |
|               |                            | (control T2 vs T1)            |    |    |     |                                                                                           |
|               |                            | L cerebellum                  |    |    |     |                                                                                           |
|               |                            | R SMA/medial prefrontal       |    |    |     |                                                                                           |
|               |                            | R somato-motor                |    |    |     |                                                                                           |
|               |                            | R precuneus                   |    |    |     |                                                                                           |
|               |                            | R posterior STS               |    |    |     |                                                                                           |
|               |                            | R posterior MTG               |    |    |     |                                                                                           |
|               |                            | R posterior cingulate         |    |    |     |                                                                                           |
|               |                            | R cerebellum                  |    |    |     |                                                                                           |
|               |                            | R thalamus                    |    |    |     |                                                                                           |
|               |                            | R hippocampus/MTL             |    |    |     |                                                                                           |
|               |                            | L cerebellum                  |    |    |     |                                                                                           |
|               |                            | R SMA/medial prefrontal       |    |    |     |                                                                                           |
|               |                            | R somato-motor                |    |    |     |                                                                                           |
|               |                            | R precuneus                   |    |    |     |                                                                                           |
|               |                            | R posterior STS               |    |    |     |                                                                                           |
|               |                            | R posterior MTG               |    |    |     |                                                                                           |
|               |                            | R posterior cingulate         |    |    |     |                                                                                           |
|               |                            | R cerebellum                  |    |    |     |                                                                                           |
|               |                            | R thalamus                    |    |    |     |                                                                                           |
|               |                            | R hippocampus/MTL             |    |    |     |                                                                                           |
|               |                            | None                          |    |    |     | Behavioral data notes: RT not reported for controls; search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) |
| Abel et al.   | Picture naming vs rest     | CAC                           | AM | UNR| Vox | Behavioral data notes: RT not reported for controls; search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) |
| (2015): Vox 4 |                            | Aphasia T1 vs control T1      |    |    |     |                                                                                           |
|               |                            | L cerebellum                  |    |    |     |                                                                                           |
|               |                            | R SMA/medial prefrontal       |    |    |     |                                                                                           |
|               |                            | R somato-motor                |    |    |     |                                                                                           |
|               |                            | R precuneus                   |    |    |     |                                                                                           |
|               |                            | R posterior STS               |    |    |     |                                                                                           |
|               |                            | R posterior MTG               |    |    |     |                                                                                           |
|               |                            | R posterior cingulate         |    |    |     |                                                                                           |
|               |                            | R cerebellum                  |    |    |     |                                                                                           |
|               |                            | R thalamus                    |    |    |     |                                                                                           |
|               |                            | R hippocampus/MTL             |    |    |     |                                                                                           |
|               |                            | None                          |    |    |     | Behavioral data notes: RT not reported for controls; search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: 11 voxels (size not stated) |
| Abel et al.   | Picture naming vs rest     | CAC                           | N  | UNR| Cplx| Behavioral data notes: RT not reported for controls; Joint ICA was performed on structural and functional contrast images using FIT 1.2c. Three of the 7 components differed between groups in their loadings. Components were thresholded at z > 3.09, not corrected for multiple comparisons. |
| (2015): Cplx 1|                            | Aphasia vs control            |    |    |     |                                                                                           |
|               |                            | L cerebellum                  |    |    |     |                                                                                           |
|               |                            | R SMA/medial prefrontal       |    |    |     |                                                                                           |
|               |                            | R somato-motor                |    |    |     |                                                                                           |
|               |                            | R precuneus                   |    |    |     |                                                                                           |
|               |                            | R posterior STS               |    |    |     |                                                                                           |
|               |                            | R posterior MTG               |    |    |     |                                                                                           |
|               |                            | R posterior cingulate         |    |    |     |                                                                                           |
|               |                            | R cerebellum                  |    |    |     |                                                                                           |
|               |                            | R thalamus                    |    |    |     |                                                                                           |
|               |                            | R hippocampus/MTL             |    |    |     |                                                                                           |
|               |                            | L cerebellum                  |    |    |     |                                                                                           |
|               |                            | R SMA/medial prefrontal       |    |    |     |                                                                                           |
|               |                            | R somato-motor                |    |    |     |                                                                                           |
|               |                            | R precuneus                   |    |    |     |                                                                                           |
|               |                            | R posterior STS               |    |    |     |                                                                                           |
|               |                            | R posterior MTG               |    |    |     |                                                                                           |
|               |                            | R posterior cingulate         |    |    |     |                                                                                           |
|               |                            | R cerebellum                  |    |    |     |                                                                                           |
|               |                            | R thalamus                    |    |    |     |                                                                                           |
|               |                            | R hippocampus/MTL             |    |    |     |                                                                                           |
|               |                            | None                          |    |    |     | Behavioral data notes: RT not reported for controls; Joint ICA was performed on structural and functional contrast images using FIT 1.2c. Three of the 7 components differed between groups in their loadings. Components were thresholded at z > 3.09, not corrected for multiple comparisons. |
|               |                            | None                          |    |    |     | None notes: the time course of response is stated to be similar in patients and controls, however the response in patients appears like it could be a couple of seconds slower |
|               |                            | None                          |    |    |     | Other: Three structural-functional components are described in Figure 5 and Table 4. Functional activations are generally small and do not obviously relate to |
| Authors          | Task Description                                                                 | Search Volume: Whole Brain; Software: SPM8; Analyses were carried out in individual patients at p < .001, uncorrected; Regions were considered activated when they were found in 6 or more (out of 8) patients | Notes: Regions are approximate since only broad regions are described in Table 6 |
|------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Kiran et al. (2015): Vox 1 | Picture naming (trained) vs viewing scrambled images and saying “skip” | L IFG<br>↑ L dorsolateral prefrontal cortex<br>↑ L ventral precentral/inferior frontal junction<br>↑ L dorsal precentral<br>↑ L SMA/medial prefrontal<br>↑ L supramarginal gyrus<br>↑ L angular gyrus<br>↑ L posterior MTG<br>↑ R IFG<br>↑ R dorsolateral prefrontal cortex<br>↑ R SMA/medial prefrontal<br>↑ R supramarginal gyrus<br>↑ R posterior STG<br>↑ R posterior MTG<br>↑ R posterior inferior temporal gyrus/fusiform gyrus |
| Kiran et al. (2015): Vox 2 | Semantic feature decision vs visual decision | L ventral precentral/inferior frontal junction<br>↑ L dorsal precentral<br>↑ L posterior MTG<br>↑ R IFG<br>↑ R dorsolateral prefrontal cortex<br>↑ R SMA/medial prefrontal<br>↑ R angular gyrus<br>↑ R posterior STG<br>↑ R posterior MTG<br>↑ R posterior inferior temporal gyrus/fusiform gyrus |
| Sandberg | Concreteness | Y | Y |

Notes: Regions are approximate since only broad regions are described in Table 6.
| Authors          | Task Description                                                                 | Subject Group | Control Group | Analysis Details                                                                 |
|------------------|----------------------------------------------------------------------------------|----------------|---------------|----------------------------------------------------------------------------------|
| et al. (2015): Vox 1 | Judgment (abstract words, correct trials) vs rest                               | Aphasia with response to treatment (n = 9) T2 vs T1 | NC            | SPM8; voxelwise p: .001; cluster extent cutoff: none; images show peaks instead of activations |
| Sandberg et al. (2015): Vox 2 | Concreteness judgment (concrete words, correct trials) vs rest | LA Aphasia with generalization of treatment effects to concrete words (n = 7) T2 vs T1 | Y Y Vox NC    | Search volume: whole brain; software: SPM8; voxelwise p: .001; cluster extent cutoff: none; images show peaks instead of activations |
| Geranmayeh et al. (2016): ROI 1 | Propositional speech production vs rest                                         | CAC Aphasia vs control | N UNR ROI Func NC | Behavioral data notes: difference in AICW/trial; number of ROIs: 4; ROIs: (1) L fronto-temporo-parietal network; (2) R fronto-temporo-parietal network; (3) cingulo-oculcular network; (4) default mode network; how ROIs defined: identified using ICA in controls; circular because ROIs defined in one group |
| Geranmayeh et al. (2016): ROI 2 | Propositional speech production vs counting                                      | CAC Aphasia vs control | N UNR ROI Func NC | Behavioral data notes: difference in AICW/trial; number of ROIs: 4; ROIs: (1) L fronto-temporo-parietal network; (2) R fronto-temporo-parietal network; (3) cingulo-oculcular network; (4) default mode network; how ROIs defined: identified using ICA in controls; circular because ROIs defined in one group |

Opercularis
- ↑ L dorsolateral prefrontal cortex
- ↑ L SMA/medial prefrontal
- ↑ L inferior parietal lobe
- ↑ L supramarginal gyrus
- ↑ L angular gyrus
- ↑ L precuneus
- ↑ L posterior inferior temporal gyrus/fusiform gyrus
- ↑ L posterior cingulate
- ↑ L basal ganglia
- ↑ R orbitofrontal
- ↑ R supramarginal gyrus
- ↑ R angular gyrus
- ↑ R anterior temporal
- ↑ R occipital

Opercularis
- ↓ L IFG
- ↓ L inferior parietal lobule
- ↓ L precuneus
- ↓ L occipital
- ↑ R dorsolateral prefrontal cortex
- ↑ R ventral precentral/inferior frontal junction
- ↑ R posterior STG
- ↑ R posterior cingulate

Cingulate
- ↑ L insula
- ↑ L posterior inferior parietal lobule
- ↑ L supramarginal gyrus
- ↑ L anterior cingulate
- ↑ L occipital
- ↓ R insula
- ↓ R anterior cingulate
- ↓ L IFG
- ↓ L posterior inferior parietal lobule
- ↓ L posterior inferior temporal gyrus/fusiform gyrus

Parietal
- ↑ L insula
- ↑ L anterior cingulate
- ↑ L posterior inferior parietal lobule
- ↓ R insula
- ↓ R anterior cingulate
- ↓ L IFG
- ↓ L posterior inferior temporal gyrus/fusiform gyrus

Occipital
- ↑ L insula
- ↑ L anterior cingulate
- ↑ L posterior inferior parietal lobule
- ↓ R insula
- ↓ R anterior cingulate
- ↓ L IFG
- ↓ L posterior inferior temporal gyrus/fusiform gyrus
Geranmayeh et al. (2016): ROI 3
Propositional speech production vs target decision
CAC Aphasia vs control
N UNR ROI Func NC
Behavioral data notes: difference in AICW/trial; number of ROIs: 4; ROIs: (1) L fronto-temporo-parietal network; (2) R fronto-temporo-parietal network; (3) cingulo-opercular network; (4) default mode network; how ROIs defined: identified using ICA in controls; circular because ROIs defined in one group

Geranmayeh et al. (2016): Cplx 1
Propositional speech production vs rest
CAC Aphasia vs control
N UNR Cplx
Behavioral data notes: difference in AICW/trial; Activity was compared between pairs of ICA-derived networks. However, circularity was introduced because the networks were defined based on the control group.
Other: Patients showed greater differential activation than controls between (1) L fronto-temporo-parietal network and the DMN; (2) R fronto-temporo-parietal network and the DMN; (3) cingulo-opercular network and the DMN.

Geranmayeh et al. (2016): Cplx 2
Propositional speech production vs rest
CC Aphasia Covariate: appropriate information-carrying words
C UNR Cplx
Multiple regression was used to determine whether differential activation between networks was predictive of the behavioral measure: appropriate information-carrying words. There is no issue of circularity with this analysis since it involved only individuals with aphasia.
Other: Differential activation between L fronto-temporo-parietal network and the DMN was positively correlated with AICW. Differential activation between R fronto-temporo-parietal network and the DMN was negatively correlated with AICW.

Geranmayeh et al. (2016): Cplx 3
Propositional speech production vs rest
CAC Aphasia vs control
N UNR Cplx
Behavioral data notes: difference in AICW/trial; PPI analyses were used to investigate how the speech condition modulated functional connectivity between (1) L fronto-temporo-parietal network and the DMN; (2) R fronto-temporo-parietal network and the DMN. However, circularity was introduced because the networks were defined based on the control group.
Other: In controls, the L FTP network reduced connectivity with the DMN during speech, while the R FTP network increased connectivity with the DMN during speech. Both of these interactions were significantly decreased in patients. This was also true for contrasts 2 and 3.

Griffis et al. (2016): Vox 1
Verb generation vs finger tapping
LA Aphasia T2 vs T1 Somewhat valid (patients improved
UNR UNR Vox NC
Search volume: whole brain; software: SPM12; voxelwise p: .001; cluster extent cutoff: none
† L IFG pars opercularis
† R cerebellum
† R thalamus
† R anterior
| Study | Type of Analysis | Description | Number of ROIs | ROIs Defined | Covariates | Other Notes |
|-------|-----------------|-------------|----------------|--------------|------------|-------------|
| Griffis et al. (2016): ROI 1 | Verb generation vs finger tapping | LA Aphasia T2 vs T1 Somewhat valid (patients improved only on semantic fluency) | UNR UNR | ROI Mix FDR | Number of ROIs: 3; ROIs: (1) L IFG; (2) R IFG; (3) frontal LI; how ROIs defined: first principal component of 8 mm spheres defined based on previously reported control peaks; lesion volume included in model | temporal ↓ R cerebellum notes: based on description in text; it is noted that no regions survived FDR correction |
| Griffis et al. (2016): ROI 2 | Verb generation vs finger tapping | LC Aphasia T2 vs T1 Covariate: Δ semantic fluency Somewhat valid (patients improved only on semantic fluency) | UNR UNR | ROI Mix FDR | Number of ROIs: 3; ROIs: (1) L IFG; (2) R IFG; (3) frontal LI; how ROIs defined: first principal component of 8 mm spheres defined based on previously reported control peaks; lesion volume included in model | ↓ L IFG ↓ R IFG ↑ LI (frontal) |
| Griffis et al. (2016): Cplx 1 | Verb generation vs finger tapping | LA Aphasia T2 vs T1 Somewhat valid (patients improved only on semantic fluency) | UNR UNR | Cplx | PPI analyses were used to investigate change over time in modulation by verb generation of functional connectivity between L IFG and R IFG. | Other: There was a significant decrease in modulation by verb generation of functional connectivity between L IFG and R IFG (p = 0.03). Prior to TMS, connectivity increased during verb generation compared to finger tapping, while after TMS, connectivity decreased during verb generation compared to finger tapping. |
| Griffis et al. (2016): Cplx 2 | Verb generation vs finger tapping | LC Aphasia T2 vs T1 Covariate: Δ semantic fluency in association with modulation of interhemispheric IFG connectivity by verb generation Somewhat valid (patients improved only on semantic fluency) | UNR UNR | Cplx | PPI analyses were used to investigate whether change over time in modulation by verb generation of functional connectivity between L IFG and R IFG was associated with changes in semantic fluency scores, which are limited as a measure of language improvement. | None |
| Griffis et al. (2016): Cplx 3 | Verb generation vs finger tapping | LA Aphasia T2 vs T1 Somewhat valid (patients improved only on semantic fluency) | UNR UNR | Cplx | PPI analyses were used to investigate change over time in modulation by verb generation of functional connectivity between R IFG and all other brain regions. Voxelwise p < .001, not corrected for multiple comparisons. | Other: Reduced connectivity was observed in the L IFG pars opercularis, L anterior temporal |
| Sims et al. (2016): ROI 1 | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision | CC Aphasia Covariate: semantic feature decision accuracy | C UNR ROI Anat NC | Number of ROIs: 16; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars opercularis; (3) L IFG pars triangularis; (4) L SFG; (5) L MFG; (6) L MTG; (7) L AG/SMG; (8) L ACC; (9-16) homotopic counterparts; how ROIs defined: AAL | \[↑\] L IFG pars opercularis \[↑\] L IFG pars triangularis |
| Sims et al. (2016): ROI 2 | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision | CC Aphasia Covariate: WAB AQ | UNR UNR ROI Anat NC | Number of ROIs: 16; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars opercularis; (3) L IFG pars triangularis; (4) L SFG; (5) L MFG; (6) L MTG; (7) L AG/SMG; (8) L ACC; (9-16) homotopic counterparts; how ROIs defined: AAL | None |
| Sims et al. (2016): ROI 3 | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision | CC Aphasia Covariate: BNT | UNR UNR ROI Anat NC | Number of ROIs: 16; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars opercularis; (3) L IFG pars triangularis; (4) L SFG; (5) L MFG; (6) L MTG; (7) L AG/SMG; (8) L ACC; (9-16) homotopic counterparts; how ROIs defined: AAL | None |
| Sims et al. (2016): ROI 4 | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision | CC Aphasia Covariate: PPT | UNR UNR ROI Anat NC | Number of ROIs: 16; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars opercularis; (3) L IFG pars triangularis; (4) L SFG; (5) L MFG; (6) L MTG; (7) L AG/SMG; (8) L ACC; (9-16) homotopic counterparts; how ROIs defined: AAL | None |
| Sims et al. (2016): ROI 5 | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision | CC Aphasia | Y UNR ROI Anat NC | Behavioral data notes: no correlation between lesion volume and accuracy, not clear whether control condition | \[↑\] R supramarginal gyrus \[↑\] R angular gyrus |
| Study                                    | Design                                                                 | Control/Condition                                      | Results/Findings                                                                 |
|-----------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------|
| Sims et al. (2016): Cplx 1              | Semantic feature decision (6 patients, 4 controls) vs semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision | CC Aphasia vs control                                   | Multivariate mixed-effects linear regression analyses were used to identify relationships between structural damage to 8 regions, and functional activation in 16 regions. Results were corrected for multiple comparisons based on FDR. This analysis was not described in sufficient detail. |
| Sims et al. (2016): Cplx 2              | Semantic feature decision (6 patients, 4 controls) vs semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision | CAC Aphasia vs control                                  | Correlations were computed between functional activation in 16 regions, and qualitatively compared between patients and controls (p. 123). There was no correction for multiple comparisons. |
| Darkow et al. (2017): Vox 1             | Picture naming vs rest                                                | CAA Aphasia after tDCS (n = 16) vs aphasia after sham stimulation (n = 16); same patients, order counterbalanced, repeated measures Somewhat valid (no behavioral difference) | Search volume: whole brain; software: SPM8; voxelwise p: .001; cluster extent cutoff: based on GRFT; repeated measures |
| Darkow et al. (2017): ROI 1             | Picture naming vs rest                                                | CAC Aphasia after sham stimulation (n = 16) vs control  | Behavioral data notes: patients named > 90% correctly in all sessions; control RT not reported; number of ROIs: 3; ROIs: (1) bilateral anterior cingulate; |
|                                        |                                                                        |                                                        | † R posterior MTG                                                                  |
|                                        |                                                                        |                                                        | notes: MTG included anterior too; SMG/AG was single ROI                            |
|                                        |                                                                        |                                                        |                                                                                   |
|                                        |                                                                        |                                                        |                                                                                   |
| Study                          | Task Description                        | ROI 2 | Cplex 1 | Cplex 2 | Cplex 3 | Vox 1 |
|-------------------------------|-----------------------------------------|-------|---------|---------|---------|-------|
| Darkow et al. (2017): ROI 2   | Picture naming vs rest                  | AS    | UNR     | UNR     | Cplx    | UNR   |
|                               | CAC                                      |       |         |         |         |       |
|                               | Aphasia after tDCS (n = 16) vs control   |       |         |         |         |       |
|                               | Behavioral data notes: patients named > 90% correctly in all sessions; control RT not reported; number of ROIs: 3; ROIs: (1) bilateral anterior cingulate; (2) L insula; (3) R lingual gyrus; how ROIs defined: regions that were less active in patients with tDCS vs sham; circular because ROIs defined in one group |       |         |         |         |       |
| Darkow et al. (2017): Cplx 1  | Picture naming vs rest                  | Y     | Y       | Cplx    |         |       |
|                               | CAA                                      |       |         |         |         |       |
|                               | Aphasia after tDCS (n = 16) vs aphasia after sham stimulation (n = 16); same patients, order counterbalanced, repeated measures |       |         |         |         |       |
|                               | Somewhat valid (no behavioral difference) |       |         |         |         |       |
| Darkow et al. (2017): Cplx 2  | Picture naming vs rest                  | UNR   | UNR     | Cplx    |         |       |
|                               | CAC                                      |       |         |         |         |       |
|                               | Aphasia after sham stimulation (n = 16) vs control |       |         |         |         |       |
|                               | ICA was used to derive three task-relevant components: language, motor and visual. Thresholding of the functional maps is not described, but they appear to reflect coherent components of a picture naming network. These components were compared between stimulation conditions in terms of mean activity and power in three frequency bins. It should be noted that the language component is left-lateralized, unlike the model-based picture naming contrast. |       |         |         |         |       |
| Darkow et al. (2017): Cplx 3  | Picture naming vs rest                  | UNR   | UNR     | Cplx    |         |       |
|                               | CAC                                      |       |         |         |         |       |
|                               | Aphasia after tDCS (n = 16) vs control   |       |         |         |         |       |
|                               | ICA was used to derive three task-relevant components: language, motor and visual. Thresholding of the functional maps is not described, but they appear to reflect coherent components of a picture naming network. These components were compared between stimulation conditions in terms of mean activity and power in three frequency bins. It should be noted that the language component is left-lateralized, unlike the model-based picture naming contrast. |       |         |         |         |       |
| Gerammayeh et al. (2017): Vox 1 | Propositional speech production vs rest | AM    | UNR     | Vox     |         |       |
|                               | CC                                       |       |         | CA      |         |       |
|                               | Aphasia mean of T1, T2                   |       |         |         |         |       |
|                               | Covariate: simultaneous Δ (T2 vs T1)     |       |         |         |         |       |
|                               | Behavioral data notes: T1 AICW correlated with change in AICW, but not stated whether T2 AICW correlated with change in AICW; search volume: voxels spared in all |       |         |         |         |       |
|                               | 110                                      |       |         |         |         |       |

|                  |                              |       |         |         |         |       |
|                  |                              |       |         |         |         |       |

None
| Study | ROI | Task | Contrast | Behavioral Data Notes | ROIs | Language Function | ROI Definition | Lesion Size Covariate | Notes |
|-------|-----|------|----------|-----------------------|------|-------------------|-----------------|----------------------|-------|
| Geranmayeh et al. (2017): ROI 1 | | Propositional speech production vs rest | LA Aphasia T2 vs T1 | N UNR ROI Func One | Number of ROIs: 1; ROI: L pre-SMA; how ROI defined: peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia; no main effect of session in session by language recovery ANOVA | | | | |
| Geranmayeh et al. (2017): ROI 2 | | Propositional speech production vs rest | LC Aphasia T2 vs T1 Covariate: Δ number of appropriate information-carrying words | UNR UNR ROI Func One | Number of ROIs: 1; ROI: L pre-SMA; how ROI defined: peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia; no interaction of session by language recovery in ANOVA | | | | |
| Geranmayeh et al. (2017): ROI 3 | | Propositional speech production vs rest | CC Aphasia mean of T1, T2 Covariate: simultaneous Δ (T2 vs T1) number of appropriate information-carrying words | AM UNR ROI Func One | Behavioral data notes: T1 AICW correlated with change in AICW, but not stated whether T2 AICW correlated with change in AICW; number of ROIs: 1; ROI: L pre-SMA; how ROI defined: peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia | | | | |
| Geranmayeh et al. (2017): ROI 4 | | Propositional speech production vs rest | CC Aphasia mean of T1, T2 Covariate: simultaneous Δ (T2 vs T1) number of appropriate information-carrying words | AM UNR ROI Func One | Behavioral data notes: T1 AICW correlated with change in AICW, but not stated whether T2 AICW correlated with change in AICW; number of ROIs: 1; ROI: L pre-SMA; how ROI defined: peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia; lesion size covariate | | | | |

- **T1**: number of appropriate information-carrying words
- **Somewhat valid**: (potentially confounded by T1 and T2 language function; language function at T1 was predictive of change in language function)
- **presfrontal ↑**: R somato-motor; R posterior STS; R anterior cingulate
- **Notes**: findings based on figures and coordinates; the pre-SMA/dACC peak noted to survive FWE correction at p < .001
- **Geranmayeh et al. (2017)**: ROI 1/2/3/4
- **Propositional speech production vs rest**: LA/LC/CC
- **Aphasia T2 vs T1**: LA/LC/CC
- **Covariate**: Δ number of appropriate information-carrying words
- **AM UNR ROI Func One**: Behavioral data notes: number of AICW increased; number of ROIs: 1; ROI: L pre-SMA; how ROI defined: peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia; no main effect of session in session by language recovery ANOVA
- **Unrelated**
| Study                                               | ROI | Task                                      | Analysis | Behavioral Notes                                                                 | Notes                                                                 |
|-----------------------------------------------------|-----|-------------------------------------------|----------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Geranmayeh et al. (2017): ROI 5                     |     | Propositional speech production vs rest   | CC       | Aphasia mean of T1, T2 Covariate: simultaneous Δ (T2 vs T1) number of appropriate information-carrying words | Behavioral data notes: T1 AICW correlated with change in AICW, but not stated whether T2 AICW correlated with change in AICW; number of ROIs: 1; ROI: L pre-SMA; how ROI defined: peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia; lesion size, T1 performance, and age covariates. |
| Geranmayeh et al. (2017): ROI 6                     |     | Propositional speech production vs rest   | CC       | Aphasia mean of T1, T2 Covariate: subsequent outcome (T2) number of appropriate information-carrying words Not valid (mathematically equivalent to the previous analysis, because of the inclusion of T1 performance as a covariate) | Behavioral data notes: T1 AICW correlated with change in AICW, but not stated whether T2 AICW correlated with change in AICW; number of ROIs: 1; ROI: L pre-SMA; how ROI defined: peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia; lesion size, T1 performance, and age covariates. |
| Geranmayeh et al. (2017): ROI 7                     |     | Propositional speech production vs rest   | CC       | Aphasis T1 Covariate: subsequent Δ (T2 vs T1) number of appropriate information-carrying words Somewhat valid (potentially confounded by T1 language function; language function at T1 was predictive of change in language function) | Behavioral data notes: T1 AICW correlated with change in AICW; number of ROIs: 1; ROI: L pre-SMA; how ROI defined: peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia. |
| Geranmayeh et al. (2017): ROI 8                     |     | Propositional speech production vs rest   | CC       | Aphasis T2 Covariate: previous Δ (T2 vs T1) number of appropriate information-carrying words Not valid (the logic behind correlating activation changes and language outcome is unclear) | Behavioral data notes: T1 AICW correlated with change in AICW, but not stated whether T2 AICW correlated with change in AICW; number of ROIs: 1; ROI: L pre-SMA; how ROI defined: peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia. |
| Grifis, Nenert, Allendorfer, & Szafarski (2017): ROI 1 |     | Semantic decision vs tone decision        | CC       | Aphasis Covariate: semantic decision accuracy | Number of ROIs: 3; ROIs: (1) L AG and bilateral midline components of the canonical semantic network, along with reduced activity in R frontal, temporal and parietal regions; (2) bilateral IFG pars orbitalis; (3) L IFG and DLPFC along with bilateral midline. |
Griffis, Nenert, Allendorfer, & Szafarski (2017): ROI 2

| Semantic decision vs tone decision | CC Aphasia | UNR | UNR | ROI Oth | FWE |
|-----------------------------------|------------|-----|-----|---------|-----|
| Semantic decision vs tone decision | Aphasia | UNR | UNR | ROI Oth | FWE |
| Semantic decision vs tone decision | Aphasia | UNR | UNR | ROI Oth | FWE |
| Semantic decision vs tone decision | Aphasia | UNR | UNR | ROI Oth | FWE |

Number of ROIs: 3; ROIs: (1) L AG and bilateral midline components of the canonical semantic network, along with reduced activity in R frontal, temporal and parietal regions; (2) bilateral IFG pars orbitalis; (3) L IFG and DLPFC along with bilateral midline regions; how ROIs defined: ROIs are mixing coefficients of functional networks arising from mCCA + jICA that were differently represented in the patient and control groups

† L posterior cingulate
† R IFG pars orbitalis
† R SMA/medial prefrontal
† R precuneus
† R posterior cingulate
† L insula
† R IFG pars opercularis
† R IFG pars triangularis
† R insula
† R dorsal precentral
† R supramarginal gyrus
† R posterior STG
† R mid temporal

Notes: all 3 networks were significantly correlated; analysis of networks so involvement of each individual region cannot be assured
| Study | Semantic decision vs tone decision | CC | UNR | UNR | ROI | Oth | FWE | Number of ROIs: 3; ROIs: (1) L AG and bilateral midline components of the canonical semantic network, along with reduced activity in R frontal, temporal and parietal regions; (2) bilateral IFG pars orbitalis; (3) L IFG and DLPFC along with bilateral midline regions; how ROIs defined: ROIs are mixing coefficients of functional networks arising from mCCA + jICA that were differently represented in the patient and control groups |
|-------|---------------------------------|----|-----|-----|-----|-----|-----|--------------------------------------------------|
| Griffis, Nenert, Allendorfer, & Szafarski (2017): ROI 3 | Semantic decision vs tone decision | CC | Aphasia | BNT | UNR | UNR | ROI | Oth | FWE | Number of ROIs: 3; ROIs: (1) L AG and bilateral midline components of the canonical semantic network, along with reduced activity in R frontal, temporal and parietal regions; (2) bilateral IFG pars orbitalis; (3) L IFG and DLPFC along with bilateral midline regions; how ROIs defined: ROIs are mixing coefficients of functional networks arising from mCCA + jICA that were differently represented in the patient and control groups |
| Griffis, Nenert, Allendorfer, & Szafarski (2017): Cplx 1 | Semantic decision vs tone decision | CAC | Aphasia vs control | N | UNR | Cplx | Behavioral data notes: semantic decision accuracy not matched, but tone decision accuracy not reported; Multimodal canonical correlation analysis (mCCA) and joint ICA were used to identify 3 joint ICs (structural/functional) that were differently represented in the patient and control groups. Although there was no correction for multiple comparisons when the functional maps were thresholded, the maps for the three networks each appeared to relate to coherent parts of the semantic network. |

Other: The first joint IC comprised preservation of tissue in L posterior temporoparietal region, activity in the L AG and bilateral midline components of the canonical semantic network, and reduced activity in R frontal, temporal and parietal regions. The second joint IC comprised preservation of...
tissue in the the L basal ganglia/insula region, and activity predominantly in the IFG pars orbitalis bilaterally. The third joint IC comprised preservation of the L IFG and activity in the L IFG and DLPFC along with bilateral midline regions. The first joint IC was considered to provide more robust evidence for structure-function relationships than the other two, because it was the only one where individual structural and functional mixing coefficients remained correlated even when lesion volume was included as a covariate.

Griffis, Nenert, Allendorfer, Vannest, et al. (2017): Vox 1

| Semantic decision vs tone decision | CC Aphasia | Search volume: whole brain; software: SPM12/in-house; voxelwise p: .01; cluster extent cutoff: 126 voxels (size not stated); lesion volume covariate |
|-----------------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------|
| | L dorsolateral prefrontal cortex | |
| | L angular gyrus | |
| | L precuneus | |
| | L mid temporal | |
| | L anterior temporal | |
| | L posterior cingulate | |
| | L cerebellum | |
| | L brainstem | |
| | L hippocampus/MTL | |
| | R IFG pars orbitalis | |
| | R angular gyrus | |
| | R precuneus | |
| | R anterior temporal | |
| | R occipital | |
| | R brainstem | |
| | R hippocampus/MTL | |
| | L somato-motor | |

Notes: based on figure and table; larger activations
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017): Vox 2 | Semantic decision vs tone decision | CC Aphasia Covariate: average of semantic and phonemic fluency | UNR UNR Vox CCTB | Search volume: whole brain; software: SPM12/in-house; voxelwise p: .01; cluster extent cutoff: 126 voxels (size not stated); lesion volume covariate |
|-----------------|-------------------------------|------------------------------------------------|-------------|------------------------------------------------|
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017): Vox 3 | Semantic decision vs tone decision | CC Aphasia Covariate: BNT | UNR UNR Vox CCTB | Search volume: whole brain; software: SPM12/in-house; voxelwise p: .01; cluster extent cutoff: 126 voxels (size not stated); lesion volume covariate |

are compelling; smaller activations are not due to lenient correction approach

↑ L IFG pars orbitalis
↑ L SMA/medial prefrontal
↑ L angular gyrus
↑ L precuneus
↑ L posterior STS
↑ L mid temporal
↑ L anterior temporal
↑ L posterior cingulate
↑ L brainstem
↑ L hippocampus/MTL
↑ R IFG pars orbitalis
↑ R SMA/medial prefrontal
↑ R angular gyrus
↑ R precuneus
↑ R posterior cingulate
↑ R hippocampus/MTL
↑ R posterior STS
notes: based on figure and table; larger activations are compelling; smaller activations are not due to lenient correction approach
| Study                                      | Design                        | Controls       | Methodology | Results                                                                 |
|-------------------------------------------|-------------------------------|----------------|-------------|--------------------------------------------------------------------------|
| Grifis, Nenert, Allendorfer, Vannest, et al. (2017): Vox 4 | Semantic decision vs tone decision | CC Aphasia Covariate: lesion volume | UNR UNR Vox CCTB | Search volume: R hemisphere; software: SPM12/in-house; voxelwise p: .01; cluster extent cutoff: 126 voxels (size not stated) |
|                                          |                               |                |             | ↑ R IFG pars opercularis |
|                                          |                               |                |             | ↑ R dorsolateral prefrontal cortex |
|                                          |                               |                |             | ↑ R SMA/medial prefrontal |
|                                          |                               |                |             | ↓ R orbitofrontal |
|                                          |                               |                |             | ↓ R anterior temporal |
|                                          |                               |                |             | ↓ R cerebellum |
|                                          |                               |                |             | ↓ R thalamus |
|                                          |                               |                |             | notes: based on figure and table; larger activations are compelling; smaller activations are not due to lenient correction approach |
| Grifis, Nenert, Allendorfer, Vannest, et al. (2017): ROI 1 | Semantic decision vs tone decision | CAC Aphasia vs control | N UNR ROI Func FWE | Behavioral data notes: semantic decision accuracy not matched, but tone decision accuracy not reported; number of ROIs: 5; ROIs: (1) overall canonical semantic network (CSN); (2) L CSN; (3) R CSN; (4) mirror L CSN in R; (5) out-of-network CSN in R; how ROIs defined: control data; circular because ROI defined in one group |
|                                          |                               |                |             | ↑ L IFG |
|                                          |                               |                |             | ↑ L dorsolateral prefrontal cortex |
|                                          |                               |                |             | ↑ L SMA/medial prefrontal |
|                                          |                               |                |             | ↓ L angular gyrus |
|                                          |                               |                |             | ↓ L precuneus |
|                                          |                               |                |             | ↓ L anterior temporal |
|                                          |                               |                |             | ↓ L mid temporal |
|                                          |                               |                |             | ↓ L occipital |
|                                          |                               |                |             | ↓ L posterior cingulate |
|                                          |                               |                |             | ↓ L cerebellum |
|                                          |                               |                |             | ↑ R IFG |
|                                          |                               |                |             | ↑ R dorsolateral prefrontal cortex |
|                                          |                               |                |             | ↑ R SMA/medial prefrontal |
|                                          |                               |                |             | ↓ R angular gyrus |
|                                          |                               |                |             | ↓ R precuneus |
|                                          |                               |                |             | ↓ R anterior temporal |
|                                          |                               |                |             | ↓ R occipital |
|                                          |                               |                |             | ↓ R posterior cingulate |
|                                          |                               |                |             | ↓ R cerebellum |
|                                          |                               |                |             | notes: results are for whole networks of regions, so individual regions cannot be assured; out-of-network R regions |
| Study | Region Type | Region Description | Number of ROIs | ROI Definition | Lesion Volume Covariate |
|-------|-------------|---------------------|----------------|----------------|------------------------|
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017): ROI 2 | Semantic decision vs tone decision | CC Aphasia Covariate: lesion volume | 5 | ROIs: (1) overall canonical semantic network (CSN); (2) L CSN; (3) R CSN; (4) mirror L CSN in R; (5) out-of-network CSN in R; how ROIs defined: control data | None |
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017): ROI 3 | Semantic decision vs tone decision | CC Aphasia Covariate: semantic decision accuracy | 1 | ROI defined: control data; lesion volume covariate | ↑ L IFG ↑ L dorsolateral prefrontal cortex ↑ L SMA/medial prefrontal ↑ L angular gyrus ↑ L precuneus ↑ L mid temporal ↑ L anterior temporal ↑ L posterior cingulate ↑ L cerebellum ↑ R IFG ↑ R dorsolateral prefrontal cortex ↑ R SMA/medial prefrontal ↑ R angular gyrus ↑ R precuneus ↑ R anterior temporal ↑ R posterior cingulate ↑ R cerebellum |
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017): ROI 4 | Semantic decision vs tone decision | CC Aphasia Covariate: average of semantic and phonemic fluency | 1 | ROI defined: control data; lesion volume covariate | ↑ L IFG ↑ L dorsolateral prefrontal cortex ↑ L SMA/medial prefrontal ↑ L angular gyrus ↑ L precuneus ↑ L mid temporal ↑ L anterior temporal ↑ L posterior cingulate ↑ L cerebellum ↑ R IFG ↑ R dorsolateral prefrontal cortex ↑ R SMA/medial prefrontal ↑ R angular gyrus ↑ R precuneus |
| Study             | Task/Condition                                                                 | Control/Comparison | ROI | Number of ROIs | Notes                                                                 |
|-------------------|-------------------------------------------------------------------------------|--------------------|-----|----------------|----------------------------------------------------------------------|
| Grissi, Nenert, Allendorfer, Vannest, et al. (2017): Cplx 1 | Semantic decision vs tone decision | Aphasia vs control | UNR | 1; ROI: CSN; how ROI defined: control data; lesion volume covariate | None |
|                   | CAC                                                                            | CC                 | UNR | Number of ROIs: 1; ROI: CSN; how ROI defined: control data; lesion volume covariate | 119 |

*Behavioral data notes: semantic decision accuracy not matched, but tone decision accuracy not reported; Correlations between activation magnitudes in the L and R canonical semantic network (CSN) were compared between groups. However, this analysis is circular because the CSN ROIs were defined based on controls only.*
| Study | Task | Control | ROIs | Other |
|-------|------|---------|------|-------|
| Gris, Nenert, Allendorfer, Vannest, et al. (2017): Cplx 3 | Semantic decision vs tone decision | CAC Aphasia vs control | N UNR Cplx | Behavioral data notes: semantic decision accuracy not matched, but tone decision accuracy not reported; Correlations between activation magnitudes in the L CSN and R out-of-network homotopic regions were compared between groups. However, this analysis is circular because the CSN ROIs were defined based on controls only. |
| | | | | Other: Correlations between activations in the L CSN and R out-of-network homotopic regions were stronger in patients than controls. |
| Gris, Nenert, Allendorfer, Vannest, et al. (2017): Cplx 4 | Semantic decision vs tone decision | CAC Aphasia vs control | N UNR Cplx | Behavioral data notes: semantic decision accuracy not matched, but tone decision accuracy not reported; The difference in activation between the L CSN and R CSN was compared between patients and controls. However, this analysis is circular because the CSN ROIs were defined based on controls only. |
| | | | | Other: The difference was smaller in patients. |
| Gris, Nenert, Allendorfer, Vannest, et al. (2017): Cplx 5 | Semantic decision vs tone decision | CAC Aphasia vs control | N UNR Cplx | Behavioral data notes: semantic decision accuracy not matched, but tone decision accuracy not reported; The difference in activation between the L CSN and mirror L CSN in the R was compared between patients and controls. However, this analysis is circular because the CSN ROIs were defined based on controls only. |
| | | | | Other: The difference was smaller in patients. |
| Gris, Nenert, Allendorfer, Vannest, et al. (2017): Cplx 6 | Semantic decision vs tone decision | CAC Aphasia vs control | N UNR Cplx | Behavioral data notes: semantic decision accuracy not matched, but tone decision accuracy not reported; The difference in activation between the R CSN and out-of-network homotopic regions in the R was compared between patients and controls. However, this analysis is circular because the CSN ROIs were defined based on controls only. |
| | | | | Other: For 1 of the 4 regions (R SMA), there were significant interactions such that in patients with larger lesions, more activation was associated with higher semantic fluency scores and higher BNT scores, while in patients with smaller lesions, more activation was associated with lower fluency and BNT scores. There was a similar |
| | | | | For the 4 R hemisphere regions that were more activated in patients with larger lesions (SPM analysis 4), analyses were carried out to determine whether the semantic fluency or naming measures were differentially impacted by activation depending on whether lesions were larger or smaller. |
| Study | Comparison | Region | Parameter | Software | significance | Notes |
|-------|------------|--------|-----------|----------|--------------|-------|
| Harvey et al. (2017): Vox 1 | Picture naming vs viewing patterns | LA Aphasia T3 vs T1 | UNR UNR Vox NDC | Search volume: voxels spared in all patients; software: SPM8; qualitative comparison on pp. 138-9 | relationship with semantic fluency in the R IFG pars opercularis but only at p(FDR) = 0.07. | \[L SMA/medial prefrontal \[L posterior inferior temporal gyrus/fusiform gyrus \[L occipital \[L anterior cingulate \[R IFG pars opercularis \[R ventral precentral/inferior frontal junction \[L dorsolateral prefrontal cortex \[R IFG pars triangularis \[R posterior inferior temporal gyrus/fusiform gyrus \[R occipital | \[R hippocampus/MTL notes: based on Figure 5 and Table 4 |
| Nardo et al. (2017): Vox 1 | Picture naming (all conditions, correct trials) vs rest | LA Aphasia T2 vs T1 | YCT N Vox VFWE | Behavioral data notes: RT faster at T2; search volume: whole brain; software: SPM12; voxelwise p: .05 | None | \[R IFG pars opercularis \[R insula |
| Nardo et al. (2017): ROI 1 | Picture naming (untrained items, no cue, correct trials) vs picture naming (trained items, no cue, correct trials) | CC Aphasia T2 Covariate: "a change in un-cued naming RT" (exact measure unclear) Somewhat valid (unclear whether behavioral measure is longitudinal) | YCT UNR ROI Func NC | Number of ROIs: 4; ROIs: (1) R anterior insula; (2) R IFG; (3) dorsal anterior cingulate; (4) L premotor cortex; how ROIs defined: peaks (only with SVC) for the main effect of untrained (4 conditions) vs trained (4 conditions) in T2 aphasia; unclear what the behavioral measure was exactly | \[R IFG pars opercularis \[R insula |
| Nenert et al. (2017): Vox 1 | Semantic decision vs tone decision | CAA Aphasia CIAT T2 (n = 11) vs untreated T2 (n = 8) Somewhat valid (no treatment effect) | AS UNR Vox CA | Search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | \[L somato-motor \[L superior parietal \[L brainstem \[R ventral precentral/inferior frontal junction \[R somato-motor \[R superior parietal notes: based on coordinates in Table 4 |
| Nenert et al. (2017): Vox 1 | Semantic decision vs tone decision | CAA Aphasia CIAT T3 (n = | UNT UNR Vox CA | Search volume: voxels spared in all patients; software: SPM12; voxelwise | \[L superior parietal |
| Tag | Task 1 | Task 2 | Task 3 | Task 4 | Task 5 |
|-----|--------|--------|--------|--------|--------|
| Vox 2 | 11) vs untreated T3 (n = 8) | Somewhat valid (no treatment effect) | p: .01; cluster extent cutoff: 50 voxels (size not stated) |↑ L anterior temporal ↑ L hippocampus/MTL ↑ R orbitofrontal ↓ L dorsolateral prefrontal cortex ↓ L posterior inferior temporal gyrus/fusiform gyrus ↓ R IFG pars opercularis ↓ R ventral precentral/inferior frontal junction ↓ R posterior STS notes: based on coordinates in Table 4 |
| Nenert et al. (2017): Vox 3 | Verb generation vs finger tapping | CAA Aphasia CIAT T2 (n = 11) vs untreated T2 (n = 8) Somewhat valid (no treatment effect) |UNR UNR Vox CA | Search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) |↓ L precuneus ↓ R dorsolateral prefrontal cortex ↓ R posterior STS ↓ R anterior temporal ↓ R posterior inferior temporal gyrus/fusiform gyrus notes: based on coordinates in Table 4 |
| Nenert et al. (2017): Vox 4 | Verb generation vs finger tapping | CAA Aphasia CIAT T3 (n = 11) vs untreated T3 (n = 8) Somewhat valid (no treatment effect) |UNR UNR Vox CA | Search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) |↑ L SMA/medial prefrontal ↑ R basal ganglia ↓ L anterior temporal ↓ R posterior STS ↓ R Heschl's gyrus ↓ R posterior inferior temporal gyrus/fusiform gyrus |
| Nenert et al. (2017): Vox 5 | Semantic decision vs tone decision | CAC Aphasia CIAT T1 (n = 11) vs control | AM UNR Vox CA | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) |↑ L orbitofrontal ↑ L hippocampus/MTL ↑ R IFG pars opercularis ↑ R SMA/medial prefrontal ↑ R supramarginal gyrus ↑ R posterior STG/STS/MTG ↑ R anterior temporal ↑ R anterior cingulate ↑ R dorsolateral prefrontal cortex ↑ L anterior temporal |
| Nenert et al. (2017): Vox 5 | Semantic decision vs tone decision | CAC Aphasia CIAT T1 (n = 11) vs control | AM UNR Vox CA | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) |↑ L orbitofrontal ↑ L hippocampus/MTL ↑ R IFG pars opercularis ↑ R SMA/medial prefrontal ↑ R supramarginal gyrus ↑ R posterior STG/STS/MTG ↑ R anterior temporal ↑ R anterior cingulate ↑ R dorsolateral prefrontal cortex ↑ L anterior temporal |

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| Study                         | Task                          | Group 1                                      | Group 2                                      | Behavioral data | Voxels spared | Software | Cluster extent | Note | Regions                            |
|-------------------------------|-------------------------------|---------------------------------------------|---------------------------------------------|-----------------|---------------|-----------|----------------|------|------------------------------------|
| Nenert et al. (2017): Vox 6   | Semantic decision vs tone decision | Aphasia CIAT T2 (n = 11) vs control         | CA                                         | Behavioral data | voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | | CA | SPM12 | 50 voxels (size not stated) | | R IFG pars opercularis |
|                               |                               |                                             |                                             |                 |               |           |                |      | R insula |
|                               |                               |                                             |                                             |                 |               |           |                |      | R ventral precentral/inferior frontal junction |
|                               |                               |                                             |                                             |                 |               |           |                |      | R supramarginal gyrus |
|                               |                               |                                             |                                             |                 |               |           |                |      | R Heschl's gyrus |
|                               |                               |                                             |                                             |                 |               |           |                |      | L dorsolateral prefrontal cortex |
|                               |                               |                                             |                                             |                 |               |           |                |      | L SMA/medial prefrontal |
|                               |                               |                                             |                                             |                 |               |           |                |      | L cerebellum |
| Nenert et al. (2017): Vox 7   | Semantic decision vs tone decision | CAC Aphasia CIAT T3 (n = 11) vs control     | AM UNR VOC CA                               | Behavioral data | voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | | | SPM12 | 50 voxels (size not stated) | | L orbitofrontal |
|                               |                               |                                             |                                             |                 |               |           |                |      | L anterior cingulate |
|                               |                               |                                             |                                             |                 |               |           |                |      | L hippocampus/MTL |
|                               |                               |                                             |                                             |                 |               |           |                |      | R superior parietal |
|                               |                               |                                             |                                             |                 |               |           |                |      | L dorsolateral prefrontal cortex |
|                               |                               |                                             |                                             |                 |               |           |                |      | R anterior temporal |
|                               |                               |                                             |                                             |                 |               |           |                |      | R cerebellum |
| Nenert et al. (2017): Vox 8   | Semantic decision vs tone decision | CAC Aphasia untreated T1 (n = 8) vs control | AM UNR VOC CA                               | Behavioral data | voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | | | SPM12 | 50 voxels (size not stated) | | L dorsolateral prefrontal cortex |
|                               |                               |                                             |                                             |                 |               |           |                |      | R dorsolateral prefrontal cortex |
|                               |                               |                                             |                                             |                 |               |           |                |      | R SMA/medial prefrontal |
|                               |                               |                                             |                                             |                 |               |           |                |      | R somato-motor |
|                               |                               |                                             |                                             |                 |               |           |                |      | L IFG pars orbitalis |
|                               |                               |                                             |                                             |                 |               |           |                |      | L dorsolateral prefrontal cortex |
|                               |                               |                                             |                                             |                 |               |           |                |      | L SMA/medial prefrontal |
|                               |                               |                                             |                                             |                 |               |           |                |      | L angular gyrus |
|                               |                               |                                             |                                             |                 |               |           |                |      | L mid temporal |
|                               |                               |                                             |                                             |                 |               |           |                |      | L anterior temporal |
|                               |                               |                                             |                                             |                 |               |           |                |      | L IFG pars orbitalis |
|                               |                               |                                             |                                             |                 |               |           |                |      | L anterior gyrus |
|                               |                               |                                             |                                             |                 |               |           |                |      | L posterior temporal |
|                               |                               |                                             |                                             |                 |               |           |                |      | L posterior inferior temporal gyrus/fusiform gyrus |
|                               |                               |                                             |                                             |                 |               |           |                |      | R dorsolateral prefrontal cortex |

**Notes:**
- CA: Categorical Analysis
- Vox: Voxel Analysis
- AM: Aphasia Model
- UNR: Unrelated
- CA: Control Analysis
| Nenert et al. (2017): Vox 10 | Semantic decision vs tone decision | CAC | Aphasia untreated T3 (n = 8) vs control | AM | UNR | Vox | CA | Behavioral data notes: patients less accurate than controls on both tasks, but not significantly for the semantic decision task, and more so on the tone decision task; search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | ↑ R orbitofrontal | ↑ R mid temporal | ↓ L IFG pars orbitalis | ↓ L SMA/medial prefrontal | ↓ L orbitofrontal | ↓ L intraparietal sulcus | ↓ L superior parietal | ↓ L anterior cingulate | ↓ L brainstem | ↓ R IFG pars orbitalis | ↓ R dorsolateral prefrontal cortex | ↓ R inferior parietal lobule | ↓ R supramarginal gyrus | ↓ R anterior temporal | ↓ R posterior inferior temporal gyrus/fusiform gyrus | ↓ R hippocampus/MTL |
|--------------------------------|----------------------------------|-----|--------------------------------------|----|-----|-----|----|---------------------------------------------|--------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Nenert et al. (2017): Vox 11 | Verb generation vs finger tapping | CAC | Aphasia CIAT T1 (n = 11) vs control | UNR | UNR | Vox | CA | Search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | ↑ L dorsolateral prefrontal cortex | ↑ R dorsolateral prefrontal cortex | ↑ R SMA/medial prefrontal | ↑ R orbitofrontal | ↑ R superior parietal | ↑ R cerebellum | ↓ L orbitofrontal | ↓ L mid temporal | ↓ L anterior temporal | ↓ L posterior cingulate | ↓ L cerebellum | ↓ L hippocampus/MTL | ↑ L angular gyrus | ↑ R anterior temporal |
| Study | Type | Condition | Control | Software | Search Volume | Results |
|---|---|---|---|---|---|---|
| Nenert et al. (2017): Vox 12 | Verb generation vs finger tapping | Aphasia CIAT T2 (n = 11) vs control | UNR UNR Vox CA | SPM12 | voxels spared in all patients; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | ↑ L dorsal precentral ↑ L anterior cingulate ↓ L IFG pars orbitalis ↓ L dorsolateral prefrontal cortex ↓ L SMA/medial prefrontal ↓ L superior parietal ↓ L posterior inferior temporal gyrus/fusiform gyrus ↓ L occipital ↓ R IFG pars orbitalis |
| Nenert et al. (2017): Vox 13 | Verb generation vs finger tapping | Aphasia CIAT T3 (n = 11) vs control | UNR UNR Vox CA | SPM12 | voxels spared in all patients; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | ↑ L somato-motor ↑ L anterior cingulate ↑ L posterior cingulate ↓ L IFG pars orbitalis ↓ L dorsolateral prefrontal cortex ↓ L superior parietal ↓ L posterior inferior temporal gyrus/fusiform gyrus ↑ R dorsolateral prefrontal cortex ↓ R mid temporal |
| Nenert et al. (2017): Vox 14 | Verb generation vs finger tapping | Aphasia untreated T1 (n = 8) vs control | UNR UNR Vox CA | SPM12 | voxels spared in all patients; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | ↑ L superior parietal ↑ L occipital ↑ L cerebellum ↑ R dorsolateral prefrontal cortex ↑ R cerebellum ↓ L IFG pars orbitalis ↓ L SMA/medial prefrontal ↓ L posterior inferior temporal gyrus/fusiform gyrus ↓ L cerebellum ↓ R superior parietal |
| Nenert et al. (2017): Vox 15 | Verb generation vs finger tapping | Aphasia untreated T2 (n = 8) vs control | UNR UNR Vox CA | SPM12 | voxels spared in all patients; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | ↑ L dorsolateral prefrontal cortex ↑ R SMA/medial prefrontal |
| Author(s) | Task Description | Category | Group 1 | Group 2 | Software | Voxels | Search Volume | Control Region(s) |
|-----------|------------------|----------|--------|---------|----------|--------|---------------|-------------------|
| Nenert et al. (2017): Vox 16 | Verb generation vs finger tapping | CAC | Aphasia untreated T3 (n = 8) vs control | UNR | UNR | Vox | Search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | ↑ R angular gyrus ↑ R posterior STG ↑ R posterior cingulate ↑ R cerebellum ↓ L dorsolateral prefrontal cortex ↓ L SMA/medial prefrontal ↓ L superior parietal ↓ L anterior temporal ↓ L posterior inferior temporal gyrus/fusiform gyrus ↓ L occipital ↓ R superior parietal ↓ R cerebellum |
| Nenert et al. (2017): Vox 17 | Semantic decision vs tone decision | LC | Aphasia T2 vs T1 Covariate: Δ BNT | UNR | UNR | Vox | Search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | ↑ L superior parietal ↑ L anterior temporal ↑ L occipital ↑ R insula ↑ R ventral precentral/inferior frontal junction ↑ R orbitofrontal ↑ R occipital ↑ R cerebellum ↓ L IFG pars orbitalis ↓ L SMA/medial prefrontal ↓ L superior parietal ↓ L occipital ↓ R insula ↓ R dorsolateral prefrontal cortex ↓ R cerebellum ↓ R basal ganglia |
| Nenert et al. (2017): Vox 18 | Semantic decision vs tone decision | LC | Aphasia T3 vs T2 Covariate: Δ BNT Somewhat valid (no treatment effect) | UNR | UNR | Vox | Search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | ↑ R somato-motor ↑ R posterior MTG ↑ R thalamus |
| Nenert et al. (2017): Vox 19 | Verb generation vs finger tapping | LC | Aphasia T2 vs T1 Covariate: Δ BNT | UNR | UNR | Vox | Search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | ↑ R orbitofrontal ↑ R mid temporal |
| Nenert et al. (2017): Vox 20 | Semantic decision vs tone decision | LC | Aphasia T3 vs T2 Covariate: Δ BNT Somewhat valid (no treatment effect) | UNR | UNR | Vox | Search volume: voxels spared in all patients; software: SPM12; voxelwise p: .01; cluster extent cutoff: 50 voxels (size not stated) | ↑ R somato-motor ↑ R posterior MTG ↑ R thalamus |

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| Study Reference | Task | Control | Group 1 | Group 2 | Group 3 | Group 4 | ROI(s) | Region of Interest | Notes |
|-----------------|------|---------|---------|---------|---------|---------|--------|-------------------|-------|
| Nenert et al. (2017): ROI 1 | Semantic decision vs tone decision | LA | Aphasia ANOVA including T1, T2, T3 | AS | UNR | ROI | LI | NC | Number of ROIs: 5; ROIs: (1) frontal LI; (2) temporo-parietal LI; (3) cerebellar LI; (4) fronto-parietal LI; (5) Broca’s LI | None |
| Nenert et al. (2017): ROI 2 | Semantic decision vs tone decision | LAA | (Aphasia CIAT (n = 11) T1 ≠ T2 ≠ T3) vs (untreated (n = 8) T1 ≠ T2 ≠ T3) | AS | UNR | ROI | LI | NC | Number of ROIs: 5; ROIs: (1) frontal LI; (2) temporo-parietal LI; (3) cerebellar LI; (4) fronto-parietal LI; (5) Broca’s LI | None |
| Nenert et al. (2017): ROI 3 | Verb generation vs finger tapping | LA | Aphasia ANOVA including T1, T2, T3 | UNR | UNR | ROI | LI | NC | Number of ROIs: 5; ROIs: (1) frontal LI; (2) temporo-parietal LI; (3) cerebellar LI; (4) fronto-parietal LI; (5) Broca’s LI | None |
| Nenert et al. (2017): ROI 4 | Verb generation vs finger tapping | LAA | (Aphasia CIAT (n = 11) T1 ≠ T2 ≠ T3) vs (untreated (n = 8) T1 ≠ T2 ≠ T3) | UNR | UNR | ROI | LI | NC | Number of ROIs: 5; ROIs: (1) frontal LI; (2) temporo-parietal LI; (3) cerebellar LI; (4) fronto-parietal LI; (5) Broca’s LI | None |
| Qiu et al. (2017): Vox 1 | Picture naming vs rest | CA | Aphasia vs control | UNR | UNR | Vox | CA | | Search volume: whole brain; software: SPM8; voxelwise p: .05; cluster extent cutoff: 10 voxels (size not stated); in the footnote to Table 2, there is a reference to FWE correction with Monte Carlo simulation, but this is not described in the text, and the values in the table appear to be inconsistent with that | |
| Skipper-Kallal et al. (2017a): Vox 1 | Picture naming (silently name, correct trials) vs rest | CAC | Aphasia vs control | YCT | UNR | Vox | CA | | Behavioral data notes: covert phase but accuracy derived from overt phase; search volume: whole brain gray matter; software: FSL 5.0.6; voxelwise p: ~.01 (z > 2.3); cluster extent cutoff: based on GRFT; threshold of z > 3.1 mentioned in results, but presume 2.3 based on methods and figure | |
| Study | Condition |search volume: whole brain gray matter; software: FSL 5.0.6; voxelwise \( p: \sim .01 \ (z > 2.3) \); cluster extent cutoff: based on GRFT; threshold of \( z > 3.1 \) mentioned in results, but presume 2.3 based on methods and figure |
|---|---|---|
| Skipper-Kallal et al. (2017a): Vox 2 | Picture naming (produce the name, correct trials) vs rest | CAC | Aphasia vs control | YCT | UNR | Vox C- |
| Skipper-Kallal et al. (2017a): Vox 3 | Picture naming (silently name, correct trials) vs rest | CC | Aphasia Covariate: PNT | YCT | UNR | Vox C- |
| Skipper-Kallal et al. (2017a): Vox 4 | Picture naming (produce the name, correct trials) vs rest | CC | Aphasia Covariate: PNT | YCT | UNR | Vox C- |

- ↑: increased activity
- ↓: decreased activity
- \( L \): left hemisphere
- \( R \): right hemisphere
- IFG: inferior frontal gyrus
- STG: superior temporal gyrus
- STS: superior temporal sulcus
- MTL: medial temporal lobe
- PNT: perceptual naming task
L dorsolateral prefrontal cortex
L angular gyrus
notes: L IFG pars orbitalis, R pSTS, and R somato-motor correlations remained significant after accounting for lesion load and other factors; note that the pars orbitalis region is described as frontal pole in the paper but the coordinates and image support pars orbitalis

| Skipper-Kallal et al. (2017a): Vox 5 | Picture naming (both phases, correct trials) vs picture naming (both phases, incorrect trials) | CB | Aphasia with naming < 80% (n = 24) | NBD | UNR | Vox | Search volume: whole brain gray matter; software: FSL 5.0.6; voxelwise p: ~.01 (z > 2.3); cluster extent cutoff: based on GRFT | None |
|--------------------------------------|---------------------------------------------------------------------|-----|---------------------------------|-----|-----|-----|---------------------------------------------------------------------------------|------|
| Skipper-Kallal et al. (2017a): ROI 1 | Picture naming (produce the name, correct trials) vs rest            | CC  | Aphasia Covariate: PNT          | YCT | UNR | ROI Func FWE | Number of ROIs: 11; ROIs: (1) right IPS; (2) left IPS; (3) left PTr; (4) left dPOp; (5) right superior motor cortex; (6) right ventral motor cortex; (7) right supramarginal sulcus; (8) left medial SMA; (9) right marginal sulcus; (10) left dorsal motor cortex; (11) right STS; how ROIs defined: regions that were activated for control > aphasia (ROIs 1-4) or aphasia > control (ROIs 5-11) |
| Skipper-Kallal et al. (2017a): ROI 2 | Picture naming (silently name, correct trials) vs rest               | CAC | Aphasia vs control              | YCT | UNR | ROI Func One | Number of ROIs: 1; ROI: L anterior temporal; how ROI defined: activity for covert naming correlated with naming ability in patients, after controlling for lesion and demographic factors |
| Skipper-Kallal et al. (2017a): ROI 3 | Picture naming (produce the name, correct trials) vs rest            | CAC | Aphasia vs control              | YCT | UNR | ROI Func NC | Number of ROIs: 3; ROIs: (1) L frontal pole; (2) R postcentral gyrus; (3) R STS; how ROIs defined: activity for overt naming correlated with naming ability in patients, after controlling for lesion and demographic factors |
| Skipper-Kallal et al.                | Picture naming (produce the name, correct trials) vs rest            | CC  | Aphasia Covariate: lesion       | YCT | UNR | Cplx   | SVR-LSM was used to identify regions of damage associated with activation of R pSTS ROI (defined based on SPM) |

↑ L IFG pars orbitalis
↑ R posterior STS
↑ R somato-motor
↑ R posterior STS
↑ R posterior STS also contributed to predicting PNT scores even when lesion load on critical areas for picture naming, and several other variables, were included in multiple regression models

None

Other:
Damage to the L IFG pars
Skipper-Kallal et al. (2017a): Cplx 1
**name, correct trials) vs rest**

patterns identified with SVR-LSM

*The results were thresholded at voxelwise p < .01 (CDT), cluster extent > 500 voxels.*

opercularis was associated with more activity in the R pSTS. Damage to the L pSTS was associated with less activity in the R pSTS.

Skipper-Kallal et al. (2017a): Cplx 2

**Picture naming (produce the name, correct trials) vs rest**

CC Aphasia without IFG POP damage (n = 26) Covariate: lesion patterns identified with SVR-LSM

YCT UNR Cplx

SVR-LSM was used to identify regions of damage associated with activation of L IFG pars opercularis ROI (defined based on SPM analysis 2). *The results were thresholded at voxelwise p < .01 (CDT), cluster extent > 500 voxels.*

Other: Damage to the L pSTG, L pSTS, and white matter underlying the L precuneus was associated with more activity in the L IFG pars opercularis. There were no regions associated with less activity.

Skipper-Kallal et al. (2017b): Vox 1

**Picture naming (prepare to name, correct trials) vs rest**

CAC Aphasia vs control

YCT UNR Vox

Behavioral data notes: covert phase but accuracy derived from overt phase; search volume: whole brain; software: FSL 5.0.6; voxelwise p: .01; cluster extent cutoff: based on GRFT

↑ L cerebellum
↑ L thalamus
↑ L basal ganglia
↑ R IFG pars opercularis
↑ R insula
↑ R cerebellum
↑ R basal ganglia
↑ L dorsolateral prefrontal cortex
↑ L orbitofrontal
↑ L intraparietal sulcus
↑ L anterior cingulate
↑ R dorsolateral prefrontal cortex

notes: based on Table 2

Skipper-Kallal et al. (2017b): Vox 2

**Picture naming (produce the name, correct trials) vs rest**

CAC Aphasia vs control

YCT UNR Vox

Search volume: whole brain; software: FSL 5.0.6; voxelwise p: .01; cluster extent cutoff: based on GRFT

↑ L somato-motor
↑ L intraparietal sulcus
↑ L anterior cingulate
↑ R insula
↑ R dorsal precentral
↑ R somato-motor
↑ R supramarginal gyrus
↑ R posterior MTG
↑ R Heschl's gyrus
↑ L ventral precentral/inferior frontal junction
↑ L somato-motor
↑ L posterior STG/STS/MTG
↑ L mid temporal
↑ L anterior
| Study                                      | Task Description                                                                 | Main Contrasts                                                                 | Behavioral Data Notes                                                                 |
|--------------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Skipper-Kallal et al. (2017b); Vox 3       | Picture naming (prepare to name, correct trials) vs rest                         | L temporal<br>L cerebellum<br>L thalamus<br>L hippocampus/MTL<br>L ventral precentral/inferior frontal junction<br>L intraparietal sulcus<br>L superior parietal<br>L occipital<br>L basal ganglia<br>R IFG<br>R insula<br>R ventral precentral/inferior frontal junction<br>R SMA/medial prefrontal<br>R somato-motor<br>R intraparietal sulcus<br>R occipital<br>R cerebellum<br>R brainstem<br>R basal ganglia | Behavioral data notes: covert phase but accuracy derived from overt phase; search volume: whole brain; software: FSL 5.0.6; voxelwise p: .01; cluster extent cutoff: based on GRFT |

| Skipper-Kallal et al. (2017b); Vox 4       | Picture naming (produce the name, correct trials) vs rest                        | L somato-motor<br>L precuneus<br>L occipital<br>L cerebellum<br>R IFG pars triangularis<br>R insula<br>R ventral precentral/inferior frontal junction<br>R SMA/medial prefrontal<br>R posterior STG/STS/MTG<br>R mid temporal<br>R occipital<br>R cerebellum<br>R basal ganglia<br>R hippocampus/MTL | Search volume: whole brain; software: FSL 5.0.6; voxelwise p: .01; cluster extent cutoff: based on GRFT |
| Skipper-Kallal et al. (2017b): Vox 5 | Picture naming (prepare to name, correct trials) vs rest | CAA Aphas with IPS damage (n not stated) vs without IPS damage (n not stated) | YCT UNR Vox | Behavioral data notes: covert phase but accuracy derived from overt phase; search volume: whole brain; software: FSL 5.0.6; voxelwise p: .01; cluster extent cutoff: based on GRFT; lesion volume covariate | None |
| Skipper-Kallal et al. (2017b): Vox 6 | Picture naming (prepare to name, correct trials) vs rest | CAA Aphas with insula damage (n = 18) vs without insula damage (n = 21) | YCT UNR Vox | Behavioral data notes: covert phase but accuracy derived from overt phase; search volume: whole brain; software: FSL 5.0.6; voxelwise p: .01; cluster extent cutoff: based on GRFT; lesion volume covariate | ↓ R IFG pars triangularis |
| Skipper-Kallal et al. (2017b): Vox 7 | Picture naming (prepare to name, correct trials) vs rest | CAA Aphas with motor cortex damage (n = 24) vs without motor cortex damage (n = 15) | YCT UNR Vox | Search volume: whole brain; software: FSL 5.0.6; voxelwise p: .01; cluster extent cutoff: based on GRFT; lesion volume covariate | None |
| Skipper-Kallal et al. (2017b): Vox 8 | Picture naming (produce the name, correct trials) vs rest | CAA Aphas with insula damage (n not stated) vs without STS damage (n not stated) | YCT UNR Vox | Search volume: whole brain; software: FSL 5.0.6; voxelwise p: .01; cluster extent cutoff: based on GRFT; lesion volume covariate | None |
| Skipper-Kallal et al. (2017b): Vox 9 | Picture naming (produce the name, correct trials) vs rest | CAA Aphas with IFG POp damage (n = 16) vs without IFG POp damage (n = 23) | YCT UNR Vox | Behavioral data notes: covert phase but accuracy derived from overt phase; number of ROIs: 1; ROI: R DLPFC; how ROI defined: peak location for decreased activation for patients with left insula and left POp lesions compared to patients without said damage; lesion volume covariate | None |
| Skipper-Kallal et al. (2017b): ROI 1 | Picture naming (prepare to name, correct trials) vs rest | CC Aphas with IFG POp damage (n = 16) Covariate: PNT | YCT UNR ROI Func One | Behavioral data notes: covert phase but accuracy derived from overt phase; number of ROIs: 1; ROI: R DLPFC; how ROI defined: peak location for decreased activation for patients with left insula and left POp lesions compared to patients without said damage; lesion volume covariate | None |
| Skipper-Kallal et al. (2017b): ROI 2 | Picture naming (prepare to name, correct trials) vs rest | CC Aphas without IFG POp damage (n = 23) Covariate: PNT | YCT UNR ROI Func One | Behavioral data notes: covert phase but accuracy derived from overt phase; number of ROIs: 1; ROI: R DLPFC; how ROI defined: peak location for decreased activation for patients with left insula and left POp lesions compared to patients without said damage; lesion volume covariate | None |
| Skipper-Kallal et al. (2017b): ROI 3 | Picture naming (prepare to name, correct trials) vs rest | CC Aphas with insula damage (n = 18) Covariate: PNT | YCT UNR ROI Func One | Behavioral data notes: covert phase but accuracy derived from overt phase; number of ROIs: 1; ROI: R DLPFC; how ROI defined: peak location for decreased activation for patients with left insula and left POp lesions compared to patients without said damage; lesion volume covariate | None |
| Skipper-Kallal et al. (2017b): ROI 4 | Picture naming (prepare to name, correct trials) vs rest | CC Aphas without insula damage (n = | YCT UNR ROI Func One | Behavioral data notes: covert phase but accuracy derived from overt phase; number of ROIs: 1; ROI: R DLPFC; how ROI defined: peak location for decreased activation for patients with left insula and left POp lesions compared to patients without said damage; lesion volume covariate | None |

are missing from the table, and were added based on the figure.
| Skipper-Kallal et al. (2017b): ROI 5 | Picture naming (prepare to name, correct trials) vs rest | CAA Aphasias with IPS damage (n not stated) vs without IPS damage (n not stated) | YCT UNR | ROI Func NC | Behavioral data notes: covert phase but accuracy derived from overt phase; number of ROIs: 5; ROIs: (1) L IPS; (2) L insula; (3) L IFG pars opercularis; (4) R IPS; (5) R insula; how ROIs defined: 5 mm spheres around control peaks; lesion volume covariate: None |
| Skipper-Kallal et al. (2017b): ROI 6 | Picture naming (prepare to name, correct trials) vs rest | CAA Aphasias with insula damage (n = 18) vs without insula damage (n = 21) | YCT UNR | ROI Func NC | Behavioral data notes: covert phase but accuracy derived from overt phase; number of ROIs: 5; ROIs: (1) L IPS; (2) L insula; (3) L IFG pars opercularis; (4) R IPS; (5) R insula; how ROIs defined: 5 mm spheres around control peaks; lesion volume covariate: None |
| Skipper-Kallal et al. (2017b): ROI 7 | Picture naming (produce the name, correct trials) vs rest | CAA Aphasias with motor cortex damage (n = 24) vs without motor cortex damage (n = 15) | YCT UNR | ROI Func NC | Number of ROIs: 4; ROIs: (1) L motor; (2) L pSTS; (3) R motor; (4) R pSTS; how ROIs defined: 5 mm spheres around control peaks; lesion volume covariate: ↑ R somato-motor |
| Skipper-Kallal et al. (2017b): ROI 8 | Picture naming (produce the name, correct trials) vs rest | CAA Aphasias with STS damage (n not stated) vs without STS damage (n not stated) | YCT UNR | ROI Func NC | Number of ROIs: 1; ROI: R motor; how ROI defined: 5 mm sphere around control peak; lesion volume covariate: ↓ R somato-motor |
| Skipper-Kallal et al. (2017b): ROI 9 | Picture naming (produce the name, correct trials) vs rest | CC Aphasias without motor cortex damage (n = 15) Covariate: PNT | YCT UNR | ROI Func One | Number of ROIs: 1; ROI: R motor; how ROI defined: 5 mm sphere around control peak; lesion volume covariate: ↑ R somato-motor |
| Skipper-Kallal et al. (2017b): ROI 10 | Picture naming (produce the name, correct trials) vs rest | CC Aphasias with motor cortex damage (n = 24) Covariate: PNT | YCT UNR | ROI Func One | Number of ROIs: 1; ROI: frontal Li; temporal Li calculated but not reported |
| Dietz et al. (2018): ROI 1 | Verb generation (overt) vs noun repetition | CAA Aphasias with AAC treatment (n = 6) T2 vs usual care T2 (n = 6) Somewhat valid (marginal treatment effect) | UNR UNR | ROI Li One | Number of ROIs: 1; ROI: frontal Li; temporal Li calculated but not reported |
| Dietz et al. (2018): ROI 2 | Verb generation (overt) vs noun repetition | LC Aphasias (both groups) T2 vs T1 Covariate: Δ WAB AQ Somewhat valid (gain in AQ not tested for significance) | UNR UNR | ROI Li One | Number of ROIs: 1; ROI: frontal Li; temporal Li calculated but not reported |
| Study          | Task Description                                                                 | ROI Type | Analysis Type | Search Volume | Notes |
|---------------|-----------------------------------------------------------------------------------|----------|---------------|---------------|-------|
| Hallam et al. (2018): ROI 1 | Listening to high or low ambiguity sentences vs listening to spectrally rotated speech | CAC      | Aphasia vs control | NANB          | Number of ROIs: 2; ROIs: (1) L vATL; (2) L pMTG; how ROIs defined: functional coordinates in literature; ANOVA revealed main effect of group (patient vs control), confirmed in follow-up tests for each ROI |
| Hallam et al. (2018): ROI 2 | Listening to high ambiguity sentences vs listening to low ambiguity sentences | CAC      | Aphasia vs control | NANB          | Number of ROIs: 2; ROIs: (1) L vATL; (2) L pMTG; how ROIs defined: functional coordinates in literature; no interaction of group by condition |
| Hallam et al. (2018): Cplx 1 | Listening to high ambiguity sentences vs listening to low ambiguity sentences | CAC      | (subset with resting state data, n = 10) vs control (subset with resting state data, n = 10) | NANB          | A whole brain analysis was carried out to identify regions where the groups differed in the extent to which the strength of functional connectivity at rest from L pMTG was associated with the difference in signal between the high ambiguity and low ambiguity conditions in the same ROI. Thresholding is not described and cluster extent is not reported. |
| Hallam et al. (2018): Cplx 2 | Listening to high ambiguity sentences vs listening to low ambiguity sentences | CAC      | (subset with resting state data, n = 10) vs control (subset with resting state data, n = 10) | NANB          | A whole brain analysis was carried out to identify regions where the groups differed in the extent to which the strength of functional connectivity at rest from L pMTG was associated with the difference in signal between the high ambiguity and low ambiguity conditions in the same ROI. Thresholding is not described. |
| Nenert et al. (2018): Vox 1 | Semantic decision vs tone decision | CAC      | Aphasia T1 vs control | AM            | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 |
| Nenert et al. (2018): Vox 2 | Semantic decision vs tone decision | CAC      | Aphasia T2 vs control | AM            | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 |
| Nenert et al. (2018): Vox 3 | Semantic decision vs tone decision | CAC      | Aphasia T3 vs control | AM            | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 |
| Nenert et al. (2018): Vox 4 | Semantic decision vs tone decision | CAC      | Aphasia T4 vs control | AM            | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; |
| Study & Participant IDs | Task 1                  | Task 2                  | Control 1 | Control 2 | Control 3 | Control 4 | Control 5 | Control 6 | Control 7 | Control 8 | Control 9 | Control 10 | Analysis Notes |
|------------------------|------------------------|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------------|
| Nenert et al. (2018); Vox 5 | Semantic decision vs tone decision | CAC | Aphasia T5 vs control | AM | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018); Vox 6 | Verb generation vs finger tapping | CAC | Aphasia T1 vs control | UNR | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018); Vox 7 | Verb generation vs finger tapping | CAC | Aphasia T2 vs control | UNR | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018); Vox 8 | Verb generation vs finger tapping | CAC | Aphasia T3 vs control | UNR | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018); Vox 9 | Verb generation vs finger tapping | CAC | Aphasia T4 vs control | UNR | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018); Vox 10 | Verb generation vs finger tapping | CAC | Aphasia T5 vs control | UNR | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018); Vox 11 | Semantic decision vs tone decision | CC | Aphasia T1 | C | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | ↑ L anterior temporal notes: unclear why this type of analysis was run only for semantic task, and only at T1 |
| Nenert et al. (2018); Vox 12 | Semantic decision vs tone decision | LC | Aphasia T4 vs aphasia T1 | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018); Vox 13 | Semantic decision vs tone decision | LC | Aphasia T4 vs aphasia T1 | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018); Vox 14 | Semantic decision vs tone decision | LC | Aphasia T4 vs aphasia T1 | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018); Vox 15 | Semantic decision vs tone decision | LC | Aphasia T4 vs aphasia T1 | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018); Vox 16 | Semantic decision vs tone decision | LC | Aphasia T4 vs aphasia T1 | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018); Vox 17 | Verb generation vs finger tapping | LC | Aphasia T4 vs aphasia T1 | UNR | UNR | UNR | VOX | VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018): Vox 18 | Verb generation vs finger tapping | LC Aphasia T4 vs aphasia T1 Covariate: Δ semantic fluency | UNR | UNR | Vox VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | ↑ L dorsolateral prefrontal cortex ↑ L SMA/medial prefrontal ↑ R somato-motor ↑ R anterior temporal |
|-------------------------------|---------------------------------|-----------------------------------------------------------|------|------|--------|--------------------------------------------------------------------------------|------------------------------------------------------------------|
| Nenert et al. (2018): Vox 19 | Verb generation vs finger tapping | LC Aphasia T4 vs aphasia T1 Covariate: Δ PPVT            | UNR | UNR | Vox VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018): Vox 20 | Verb generation vs finger tapping | LC Aphasia T4 vs aphasia T1 Covariate: Δ phonemic fluency | UNR | UNR | Vox VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | ↑ L cerebellum |
| Nenert et al. (2018): Vox 21 | Verb generation vs finger tapping | LC Aphasia T4 vs aphasia T1 Covariate: Δ BDAE complex ideation subtest | UNR | UNR | Vox VP | Search volume: whole brain; software: SPM12/SnPM13; voxelwise p: FWE p < .05 | None |
| Nenert et al. (2018): ROI 1  | Semantic decision vs tone decision | LA Aphasia (comparisons between all pairs of time points) | AS  | UNR | ROI LI NC | Number of ROIs: 4; ROIs: (1) frontal Ll; (2) tempo-parietal Ll; (3) language network Ll; (4) cerebellar Ll | None |
| Nenert et al. (2018): ROI 2  | Verb generation vs finger tapping | LA Aphasia (comparisons between all pairs of time points) | UNR | UNR | ROI LI NC | Number of ROIs: 4; ROIs: (1) frontal Ll; (2) tempo-parietal Ll; (3) language network Ll; (4) cerebellar Ll | None |
| Nenert et al. (2018): ROI 3  | Semantic decision vs tone decision | CAC Aphasia T1 vs control | AM  | UNR | ROI LI NC | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; number of ROIs: 4; ROIs: (1) frontal Ll; (2) tempo-parietal Ll; (3) language network Ll; (4) cerebellar Ll | None |
| Nenert et al. (2018): ROI 4  | Semantic decision vs tone decision | CAC Aphasia T2 vs control | AM  | UNR | ROI LI NC | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; number of ROIs: 4; ROIs: (1) frontal Ll; (2) tempo-parietal Ll; (3) language network Ll; (4) cerebellar Ll | None |
| Nenert et al. (2018): ROI 5  | Semantic decision vs tone decision | CAC Aphasia T3 vs control | AM  | UNR | ROI LI NC | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; number of ROIs: 4; ROIs: (1) frontal Ll; (2) tempo-parietal Ll; (3) language network Ll; (4) cerebellar Ll | None |
| Nenert et al. (2018): ROI 6  | Semantic decision vs tone decision | CAC Aphasia T4 vs control | AM  | UNR | ROI LI NC | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; number of ROIs: 4; ROIs: (1) frontal Ll; (2) tempo-parietal Ll; (3) language network Ll; (4) cerebellar Ll | None |
| Nenert et al. (2018): ROI 7  | Semantic decision vs tone decision | CAC Aphasia T5 vs control | AM  | UNR | ROI LI NC | Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; number of ROIs: 4; ROIs: (1) frontal Ll; (2) tempo-parietal Ll; (3) language network Ll; (4) cerebellar Ll | None |

Nenert et al. (2018): Number of ROIs: 4; ROIs: (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI

Behavioral data notes: patients less accurate than controls on both tasks, but more so on the tone decision task; number of ROIs: 4; ROIs: (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI

None

Verb generation vs CAC Aphasia T4 vs control | UNR | UNR | ROI | Number of ROIs: 4; ROIs: (1) frontal LI; | None
| Study | Task | Timepoint | ROIs | Number of ROIs | ROIs Details | CPM | Analysis Details |
|-------|------|-----------|------|----------------|--------------|-----|-----------------|
| Nenert et al. (2018): ROI 8 | Verb generation vs finger tapping | Aphasia T1 vs control | LI, NC | 4 | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI | ↓ | LI (language network) ↓ LI (frontal) |
| Nenert et al. (2018): ROI 9 | Verb generation vs finger tapping | CAC Aphasia T2 vs control | UNR, UNR | ROI LI NC | Number of ROIs: 4; ROIs: (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI | ↓ | LI (language network) ↓ LI (frontal) |
| Nenert et al. (2018): ROI 10 | Verb generation vs finger tapping | CAC Aphasia T3 vs control | UNR, UNR | ROI LI NC | Number of ROIs: 4; ROIs: (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI | None | |
| Nenert et al. (2018): ROI 11 | Verb generation vs finger tapping | CAC Aphasia T4 vs control | UNR, UNR | ROI LI NC | Number of ROIs: 4; ROIs: (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI | None | |
| Nenert et al. (2018): ROI 12 | Verb generation vs finger tapping | CAC Aphasia T5 vs control | UNR, UNR | ROI LI NC | Number of ROIs: 4; ROIs: (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI | None | |
| Nenert et al. (2018): Cplx 1 | Semantic decision vs tone decision | LA Aphasia (comparisons between all pairs of time points) | AS, UNR | Cplx | PPI analyses were carried out to investigate potential changes over time in how connectivity from L and R IFG was modulated by the semantic decision task. The resultant SPM was thresholded at FWE p < .05 using permutation testing implemented in SnPM 13. | None | |
| Nenert et al. (2018): Cplx 2 | Verb generation vs finger tapping | LA Aphasia (comparisons between all pairs of time points) | UNR, UNR | Cplx | PPI analyses were carried out to investigate potential changes over time in how connectivity from L and R IFG was modulated by the verb generation task. The resultant SPM was thresholded at FWE p < .05 using permutation testing implemented in SnPM 13. | None | |
| Pillay et al. (2018): Vox 1 | Reading nouns aloud (correct trials) vs reading nouns aloud (incorrect trials) | CB Aphasia | NBD, Y, Vox | | | | |
| Szafranski et al. (2018): Vox 1 | Semantic decision vs tone decision | LA Aphasia T2 vs T1 | UNR, UNR | Vox | Search volume: whole brain; software: SPM12; voxelwise p: .05; cluster extent cutoff: 0.928 cc | ↓ | L angular gyrus ↓ L ventral precentral/inferior frontal junction ↓ L SMA/medial prefrontal ↓ R insula ↓ R ventral precentral/inferior frontal junction ↓ L SMA/medial prefrontal notes: positive region (L AG) was part of the semantic network, while many negative regions were positively modulated by reaction time in the aphasia group |

Notes:
- ROI: Region of Interest
- LI: Language Impaired
- NC: Normal Control
- CPM: Comparison Method
- Cplx: Complex Analysis
- NbD: Nondominant
- Y: Dominant
- Vox: Voxel
- CCS: Cluster Cutoff Significance
- SPM: Statistical Parametric Mapping
- FWE: Family Wise Error
Szaflarski et al. (2018): Vox 2
Semantic decision vs tone decision
LA Aphasia T3 vs T2
↑ R supramarginal gyrus
↑ R superior parietal
↑ R precuneus
↑ R mid temporal
↑ R anterior cingulate
↓ L IFG pars opercularis
↓ L dorsolateral prefrontal cortex
↓ L ventral precentral/inferior frontal junction
↓ L dorsal precentral
↓ L SMA/medial prefrontal
↓ L somato-motor
↓ L superior parietal
↓ L occipital

Search volume: whole brain; software: SPM12; voxelwise p: .05; cluster extent cutoff: 0.928 cc

Szaflarski et al. (2018): Vox 3
Semantic decision vs tone decision
LA Aphasia T3 vs T1
↑ L dorsolateral prefrontal cortex
↑ L angular gyrus
↑ L precuneus
↑ L posterior STS
↑ L SMA/medial prefrontal
↑ L anterior temporal
↑ L anterior cingulate
↑ R IFG
↑ R dorsolateral prefrontal cortex
↑ R ventral precentral/inferior frontal junction
↑ R SMA/medial prefrontal
↑ R somato-motor
↑ R precuneus
↑ R posterior STG/STS/MTG
↑ R anterior temporal
↑ L supramarginal gyrus
↑ L angular gyrus
↑ L precuneus
↑ L posterior STG
↑ L mid temporal
↑ L anterior temporal
↑ L posterior cingulate
↑ L somato-motor
↑ R dorsolateral prefrontal cortex

Search volume: whole brain; software: SPM12; voxelwise p: .05; cluster extent cutoff: 0.928 cc
| Reference | Task 1 | Task 2 | Region of Interest 1 | Region of Interest 2 | Region of Interest 3 | Region of Interest 4 | Region of Interest 5 | Region of Interest 6 | Region of Interest 7 | Region of Interest 8 | Region of Interest 9 | Region of Interest 10 | Region of Interest 11 | Region of Interest 12 | Notes |
|-----------|--------|--------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|--------|
| Szafranski et al. (2018): Vox 4 | Semantic decision vs tone decision | LC AphasT2 vs aphasia T2 | UNR | UNR | Vox | CCB | Search volume: whole brain; software: SPM12; voxelwise p: .05; cluster extent cutoff: 0.928 cc; inclusive mask of voxels that differed between T2 and T3 | ↓ | L inferior parietal lobule |
| Szafranski et al. (2018): Vox 5 | Semantic decision vs tone decision | LC AphasT3 vs aphasia T1 | UNR | UNR | Vox | CCB | Search volume: whole brain; software: SPM12; voxelwise p: .05; cluster extent cutoff: 0.928 cc; inclusive mask of voxels that differed between T2 and T3 | ↓ | R IFG |
| van de Sandt-Koenderman et al. (2018): ROI 1 | Listening to narrative speech vs listening to reversed speech | CC AphasT1 | NANB | NANT | ROI | Li | Number of ROIs: 1; ROI: language network L1; how ROI defined: activations that were “not clearly related to known language areas” were excluded, but the basis for this determination is not clear | None |
| van de Sandt-Koenderman et al. (2018): ROI 2 | Listening to narrative speech vs listening to reversed speech | LC AphasT2 vs T1 | NANT | NANT | ROI | Li | Number of ROIs: 1; ROI: language network L1; how ROI defined: activations that were “not clearly related to known language areas” were excluded, but the basis for this determination is not clear | None |
| van de Sandt-Koenderman et al. (2018): ROI 3 | Listening to narrative speech vs listening to reversed speech | LC AphasT2 vs T1 | NANT | NANT | ROI | Li | Number of ROIs: 1; ROI: language network L1; how ROI defined: activations that were “not clearly related to known language areas” were excluded, but the basis for this determination is not clear | None |
| van de Sandt-Koenderman et al. (2018): ROI 4 | Listening to narrative speech vs listening to reversed speech | LC AphasT2 vs T1 | NANT | NANT | ROI | Li | Number of ROIs: 1; ROI: language network L1; how ROI defined: activations that were “not clearly related to known language areas” were excluded, but the basis for this determination is not clear | None |
| van Oers et al. (2018): ROI 1 | Written word-picture matching vs visual decision | CC AphasT1 | UNR | UNR | ROI | Func | Search volume: whole brain; software: SPM12; voxelwise p: .05; cluster extent cutoff: 0.928 cc; inclusive mask of voxels that differed between T2 and T3 | ↓ | L posterior inferior temporal gyrus/fusiform gyrus |
| van Oers et al. (2018): ROI 2 | Written word-picture matching vs visual decision | CC AphasT1 | UNR | UNR | ROI | Func | Search volume: whole brain; software: SPM12; voxelwise p: .05; cluster extent cutoff: 0.928 cc; inclusive mask of voxels that differed between T2 and T3 | ↓ | L posterior inferior temporal gyrus/fusiform gyrus |

Notes: activation predicted later outcome even when initial language performance was included in the model
van Oers et al. (2018): ROI 3
Written word-picture matching vs visual decision
CC Aphasia (all time points)
Covariate: average of AAT comprehension score and BNT, all time points
UNR UNR UNR Func FDR
Number of ROIs: 12; ROIs: (1) bilateral dorsal anterior cingulate; (2) L angular gyrus; (3) L IFG pars opercularis and triangularis; (4) L thalamus; (5) L MFG; (6) L posterior ITG; (7) R angular gyrus; (8) R IFG pars triangularis; (9) R thalamus; (10) R posterior ITG; (11) R IFG pars opercularis and triangularis; (12) R MFG; how ROIs defined: control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected; mixed model; minimal detail provided
↓ R IFG pars opercularis
↓ R IFG pars triangularis

van Oers et al. (2018): ROI 4
Written word-picture matching vs visual decision
CC Aphasia (all time points)
Covariate: picture-word matching accuracy, all time points
C UNR UNR UNR Func FDR
Number of ROIs: 12; ROIs: (1) bilateral dorsal anterior cingulate; (2) L angular gyrus; (3) L IFG pars opercularis and triangularis; (4) L thalamus; (5) L MFG; (6) L posterior ITG; (7) R angular gyrus; (8) R IFG pars triangularis; (9) R thalamus; (10) R posterior ITG; (11) R IFG pars opercularis and triangularis; (12) R MFG; how ROIs defined: control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected; mixed model; minimal detail provided
↑ R posterior inferior temporal gyrus/fusiform gyrus

van Oers et al. (2018): ROI 5
Written word-picture matching vs visual decision
LA Aphasia: linear effect of time
UNR UNR UNR UNR Func FDR
Number of ROIs: 6; ROIs: (1) L angular gyrus; (2) L IFG pars opercularis and triangularis; (3) L thalamus; (4) L posterior ITG; (5) L MFG; (6) R IFG pars opercularis and triangularis; (7) R angular gyrus; (8) R IFG pars triangularis; (9) R thalamus; (10) R posterior ITG; (11) R IFG pars opercularis and triangularis; (12) R MFG; how ROIs defined: control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected; mixed model; minimal detail provided
↑ L dorsolateral prefrontal cortex
↑ L anterior cingulate
duo R dorsolateral prefrontal cortex
↑ R angular gyrus
↑ R anterior cingulate
↑ R thalamus
↑ L IFG pars opercularis
duo L IFG pars triangularis

van Oers et al. (2018): ROI 6
Semantic decision vs visual decision
CC Aphasia (subset who returned for follow-up) T1 (n = 10)
Covariate: subsequent outcome
UNR UNR UNR UNR Func FDR
Number of ROIs: 6; ROIs: (1) L angular gyrus; (2) L IFG pars opercularis and triangularis; (3) L posterior ITG; (4) R angular gyrus; (5) R IFG pars opercularis and triangularis; (6) R posterior ITG; how ROIs defined: None
van Oers et al. (2018): ROI 7

| Semantic decision vs visual decision | CC Aphasia (all time points) Covariate: average of AAT comprehension score and BNT, all time points | Number of ROIs: 6; ROIs: (1) L angular gyrus; (2) L IFG pars opercularis and triangularis; (3) L posterior ITG; (4) R angular gyrus; (5) R IFG pars opercularis and triangularis; (6) R posterior ITG; how ROIs defined: control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected; mixed model; minimal detail provided | None |

van Oers et al. (2018): ROI 8

| Semantic decision vs visual decision | CC Aphasia (all time points) Covariate: average of AAT comprehension score and BNT, all time points | Number of ROIs: 6; ROIs: (1) L angular gyrus; (2) L IFG pars opercularis and triangularis; (3) L posterior ITG; (4) R angular gyrus; (5) R IFG pars opercularis and triangularis; (6) R posterior ITG; how ROIs defined: control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected; mixed model; minimal detail provided | None |

van Oers et al. (2018): ROI 9

| Semantic decision vs visual decision | CC Aphasia (all time points) Covariate: semantic decision accuracy, all time points | Number of ROIs: 6; ROIs: (1) L angular gyrus; (2) L IFG pars opercularis and triangularis; (3) L posterior ITG; (4) R angular gyrus; (5) R IFG pars opercularis and triangularis; (6) R posterior ITG; how ROIs defined: control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected; mixed model; minimal detail provided | None |

van Oers et al. (2018): ROI 10

| Semantic decision vs visual decision | LA Aphasia: linear effect of time | Number of ROIs: 6; ROIs: (1) L angular gyrus; (2) L IFG pars opercularis and triangularis; (3) L posterior ITG; (4) R angular gyrus; (5) R IFG pars opercularis and triangularis; (6) R posterior ITG; how ROIs defined: control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected; mixed model; minimal detail provided | ↑ L posterior inferior temporal gyrus/fusiform gyrus ↑ R angular gyrus ↓ L IFG pars opercularis ↓ L IFG pars triangularis notes: similar numbers of findings are reported for controls |

Barbieri et al. (2019): Vox 1

| Auditory sentence-picture verification vs listening to | LA Aphasia treated (n = 13) T2 vs T1 | Behavioral data notes: out-of-scanner performance on passive sentences improved; software: SPM8; voxelwise | ↑ L precuneus ↑ R ventral precentral/inferior |
| Study                                      | Task                                                                 | Brain Regions                                                                 | Software | p-value | Clusters | Notes |
|--------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------|----------|---------|---------|-------|
| Barbieri et al. (2019): Vox 2             | Auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures | LA Aphasia natural history (n = 5) T2 vs T1 | UNR UNR Vox CCS | p: .001; cluster extent cutoff: 37 voxels (size not stated) | | frontal junction |
|                                            |                                                                      | R somato-motor                                                              |          |         |         |       |
|                                            |                                                                      | R supramarginal gyrus                                                       |          |         |         |       |
|                                            |                                                                      | R intraparietal sulcus                                                       |          |         |         |       |
|                                            |                                                                      | R superior parietal                                                         |          |         |         |       |
|                                            |                                                                      | R precuneus                                                                  |          |         |         |       |
|                                            |                                                                      | Notes: based on Table 7 and Figure 8                                         |          |         |         |       |
|                                            |                                                                      | Software: SPM8; voxelwise p: .001; cluster extent cutoff: 37 voxels (size not stated) |          |         |         |       |
|                                            |                                                                      | None                                                                         |          |         |         |       |
|                                            |                                                                      | auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures | UNR UNR ROI Anat NC | Number of ROIs: 4; ROIs: (1) L hemisphere sentence processing network (IFGpt, pMTG, pSTG, AG); (2) R hemisphere homotopic regions; (3) L dorsal attention network (MFG, PrCG, SPL, sLOC); (4) R dorsal attention network (same regions); how ROIs defined: sentence processing network based on Walenski et al. (2019); dorsal attention network based on Corbetta et al. (2008) and Vincent et al. (2008); ROIs were defined based on Harvard-Oxford atlas which would align imperfectly with these functional networks; dependent variable was number of active voxels (p < .001, uncorrected) divided by number of intact voxels; derivation of dependent measures from ROIs difficulty to follow, but it seems that ROIs with less than 5 voxels upregulated were excluded and deactivations were not considered, meaning that estimates of change may be biased | | |
|                                            |                                                                      | L dorsolateral prefrontal cortex                                             |          |         |         |       |
|                                            |                                                                      | L ventral precentral/inferior frontal junction                               |          |         |         |       |
|                                            |                                                                      | L dorsal precentral                                                         |          |         |         |       |
|                                            |                                                                      | L angular gyrus                                                             |          |         |         |       |
|                                            |                                                                      | L intraparietal sulcus                                                       |          |         |         |       |
|                                            |                                                                      | L superior parietal                                                         |          |         |         |       |
|                                            |                                                                      | R dorsolateral prefrontal cortex                                             |          |         |         |       |
|                                            |                                                                      | R ventral precentral/inferior frontal junction                               |          |         |         |       |
|                                            |                                                                      | R dorsal precentral                                                         |          |         |         |       |
|                                            |                                                                      | R angular gyrus                                                             |          |         |         |       |
|                                            |                                                                      | R intraparietal sulcus                                                       |          |         |         |       |
|                                            |                                                                      | L superior parietal                                                         |          |         |         |       |
|                                            |                                                                      | Notes: bilateral dorsal attention network; findings were for networks as a whole; regions coded correspond to atlas ROIs |          |         |         |       |
|                                            |                                                                      | | | | | |
| Barbieri et al. (2019): ROI 1             | Auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures | LAA Aphasia treated (n=13) T2 vs T1 vs T1 (aphasia natural history (n=5) T2 vs T1) | UNR UNR ROI Anat NC | Number of ROIs: 4; ROIs: (1) L hemisphere sentence processing network (IFGpt, pMTG, pSTG, AG); (2) R hemisphere homotopic regions; (3) L dorsal attention network (MFG, PrCG, SPL, sLOC); (4) R dorsal attention network (same regions); how ROIs defined: sentence processing network based on Walenski et al. (2019); dorsal attention network based on Corbetta et al. (2008) and Vincent et al. (2008); ROIs were defined based on Harvard-Oxford atlas which would align imperfectly with these functional networks; dependent variable was number of active voxels (p < .001, uncorrected) divided by number of intact voxels; derivation of dependent measures from ROIs difficulty to follow, but it seems that ROIs with less than 5 voxels upregulated were excluded and deactivations were not considered, meaning that estimates of change may be biased | | |
|                                            |                                                                      | LVP frontal junction                                                         |          |         |         |       |
|                                            |                                                                      | LIFG pars triangularis                                                       |          |         |         |       |
|                                            |                                                                      | R dorsolateral prefrontal cortex                                             |          |         |         |       |
|                                            |                                                                      | R ventral precentral/inferior frontal junction                               |          |         |         |       |
|                                            |                                                                      | R dorsal precentral                                                         |          |         |         |       |
|                                            |                                                                      | R angular gyrus                                                             |          |         |         |       |
|                                            |                                                                      | R intraparietal sulcus                                                       |          |         |         |       |
|                                            |                                                                      | Notes: bilateral dorsal attention network; findings were for networks as a whole; regions coded correspond to atlas ROIs |          |         |         |       |
Oxford atlas which would align imperfectly with these functional networks; dependent variable was number of active voxels (p < .001, uncorrected) divided by number of intact voxels; derivation of dependent measures from ROIs difficulty to follow, but it seems that ROIs with less than 5 voxels upregulated were excluded and deactivations were not considered, meaning that estimates of change may be biased.

| Barbieri et al. (2019): ROI 3 | Auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures | UNR | UNR | ROI | Anat | Number of ROIs: 4; ROIs: (1) L hemisphere sentence processing network (IFGpt, pMTG, pSTG, AG); (2) R hemisphere homotopic regions; (3) L dorsal attention network (MFG, PrCG, SPL, sLOC); (4) R dorsal attention network (same regions); how ROIs defined: sentence processing network based on Walenski et al. (2019); dorsal attention network based on Corbetta et al. (2008) and Vincent et al. (2008); ROIs were defined based on Harvard-Oxford atlas which would align imperfectly with these functional networks; dependent variable was number of active voxels (p < .001, uncorrected) divided by number of intact voxels; derivation of dependent measures from ROIs difficulty to follow, but it seems that ROIs with less than 5 voxels upregulated were excluded and deactivations were not considered, meaning that estimates of change may be biased. |
|---|---|---|---|---|---|---|
| Barbieri et al. (2019): ROI 4 | Auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures | UNR | UNR | ROI | Anat | Number of ROIs: 4; ROIs: (1) L hemisphere sentence processing network (IFGpt, pMTG, pSTG, AG); (2) R hemisphere homotopic regions; (3) L dorsal attention network (MFG, PrCG, SPL, sLOC); (4) R dorsal attention network (same regions); how ROIs defined: sentence processing network based on Walenski et al. (2019); dorsal attention network based on Corbetta et al. (2008) and Vincent et al. (2008); ROIs were defined based on Harvard-Oxford atlas which would align imperfectly with these functional networks; dependent variable was number of active voxels (p < .001, uncorrected) divided by number of intact voxels; derivation of dependent measures from ROIs difficulty to follow, but it seems that ROIs with less than 5 voxels upregulated were excluded and deactivations were not considered, meaning that estimates of change may be biased. |
| Study                        | Task                          | Control                   | ROI | UNR | Ctr | Anat | NC | Number of ROIs | ROIs                                                                 |
|------------------------------|-------------------------------|---------------------------|-----|-----|-----|------|----|----------------|---------------------------------------------------------------------|
| Johnson et al. (2019): ROI 1 | Picture naming (trained items) vs rest | CAC                       | N   | UNR | N   | R   | NC | 16             | (1) L IFGorb; (2) L IFGtri; (3) L IFGop; (4) L MFG; (5) L PrCG; (6) L MTG; (7) L SMG; (8) L AG; (9-16) homotopic counterparts; how ROIs defined: AAL but lesioned voxels were excluded from ROIs on an individual basis |
| Johnson et al. (2019): ROI 2 | Picture naming (trained items) vs rest | CAC                       | Y   | UNR | N   | R   | NC | 16             | (1) L IFGorb; (2) L IFGtri; (3) L IFGop; (4) L MFG; (5) L PrCG; (6) L MTG; (7) L SMG; (8) L AG; (9-16) homotopic counterparts; how ROIs defined: AAL but lesioned voxels were excluded from ROIs on an individual basis |
| Johnson et al. (2019): ROI 3 | Picture naming (trained items) vs rest | LA                        | N   | UNR | N   | R   | NC | None          | None; no main effect of time or interaction of time by ROI |
| Johnson et al. (2019): Cplx 1| Picture naming (trained items) vs rest | LA                        | N   | UNR | N   | R   | NC | 16             | A linear model was constructed to examine the relationship between proportion of spared tissue in each L hemisphere ROI and changes in activation over time. The model is not described in sufficient detail. |

**Kristinsson et al. (2019): Vox 1**

| Task                          | Control                   | ROI | UNR | Ctr | Anat | NC | Software | Ctr | Notes                                                                 |
|-------------------------------|---------------------------|-----|-----|-----|------|----|----------|-----|---------------------------------------------------------------------|
| Spelling probe (training items) vs rest | LA Apathia with both timepoints (n = 20) T2 vs T1 | AM | AM | AM | AM | 5 | SPM12 | None | 1 L posterior cingulate; R angular gyrus; R posterior cingulate |

**Purcell et al. (2019): Vox 1**

| Task                          | Control                   | ROI | UNR | Ctr | Anat | NC | Software | Ctr | Notes                                                                 |
|-------------------------------|---------------------------|-----|-----|-----|------|----|----------|-----|---------------------------------------------------------------------|
| Spelling probe (training items) vs rest | LA Apathia with both timepoints (n = 20) T2 vs T1 | AM | AM | AM | AM | 5 | SPM12 | None | 1 L posterior cingulate; R angular gyrus; R posterior cingulate |
| Study (Purcell et al. 2019) | Task | Group | Condition | Design | ROIs | Functional Interpretation | Notes |
|-----------------------------|------|-------|-----------|--------|------|---------------------------|-------|
| ROI 1                       | Spelling probe (training items) vs rest | LC | Aphasia with both timepoints (n = 20) T2 vs T1 | Covariate: Δ spelling accuracy on training items | UNR UNR | ROI Func | None |
|                          |                          |               |           |        | Number of ROIs: 3; ROIs: (1) R AG; (2) L PCC; (3) R PCC; how ROIs defined: regions activated in SPM analysis 1 |
| ROI 2                       | Spelling probe (training items) vs rest | LC | Aphasia with both timepoints (n = 20) T2 vs T1 | Covariate: Δ spelling accuracy on training items | UNR UNR | ROI Func | None |
|                          |                          |               |           |        | Number of ROIs: 3; ROIs: (1) R AG; (2) L PCC; (3) R PCC; how ROIs defined: regions activated in SPM analysis 1 |
| ROI 3                       | Spelling probe (training items) vs rest | CC | Aphasia T1 | Covariate: subsequent Δ spelling accuracy on training items (T2 vs T1) **Somewhat valid** (T1 behavioral measure should be included in model) | UNR UNR | ROI Func | None |
|                          |                          |               |           |        | Number of ROIs: 1; ROI: L ventral occipitotemporal cortex; how ROI defined: the region that showed an increase in Local-Hreg from T1 to T2 |
| ROI 4                       | Spelling probe (training items) vs rest | CC | Aphasia with both timepoints T1 (n = 20) | Covariate: subsequent Δ spelling accuracy on untrained items (T2 vs T1) **Somewhat valid** (T1 behavioral measure should be included in model) | UNR UNR | ROI Func | None |
|                          |                          |               |           |        | Number of ROIs: 1; ROI: L ventral occipitotemporal cortex; how ROI defined: the region that showed an increase in Local-Hreg from T1 to T2 |
| ROI 5                       | Spelling probe (training items) vs rest | LC | Aphasia with both timepoints (n = 20) T2 vs T1 | Covariate: Δ spelling accuracy on training items | UNR UNR | ROI Func | None |
|                          |                          |               |           |        | Number of ROIs: 1; ROI: L ventral occipitotemporal cortex; how ROI defined: the region that showed an increase in Local-Hreg from T1 to T2 |
| ROI 6                       | Spelling probe (training items) vs rest | LC | Aphasia with both timepoints (n = 20) T2 vs T1 | Covariate: Δ spelling accuracy on untrained items | UNR UNR | ROI Func | None |
|                          |                          |               |           |        | Number of ROIs: 1; ROI: L ventral occipitotemporal cortex; how ROI defined: the region that showed an increase in Local-Hreg from T1 to T2 |
| Cplx 1                     | Spelling probe (training items) vs rest | LA | Aphasia with both timepoints (n = 20) T2 vs T1 | | AM AM Cplx | Behavioral data notes: see section S2, where Figures S1 and S2 appear to show differences; the main effects of time were not significant for accuracy or RT, but those analyses included known items also, which had smaller effects; Local Heterogeneity Regression Analysis (Local-Hreg) was used to identify brain regions where the heterogeneity of timecourses | Other: Only in L ventral occipitotemporal cortex, there was a significant increase in Local-Hreg from T1 to T2 (p = 0.028, corrected). |
between neighboring voxels, specifically for the trained condition, increased from T1 to T2. A voxelwise threshold of \( p < 0.05 \) was applied, followed by cluster correction based on permutation testing. The analysis appears to have been restricted to brain regions not damaged in any patients.

| Study: Purcell et al. (2019): Cplx 2 | Task: Spelling probe (known items) vs rest | Condition: LA Aphasia with both timepoints (\( n = 20 \)) T2 vs T1 | Y Y Cplx | Behavioral data notes: see section S2, main effects were not significant and effects appear smaller for known than trained; Local Heterogeneity Regression Analysis (Local-Hreg) was used to identify brain regions where the heterogeneity of timecourses between neighboring voxels, specifically for the known condition, increased from T1 to T2. A voxelwise threshold of \( p < 0.05 \) was applied, followed by cluster correction based on permutation testing. The analysis appears to have been restricted to brain regions not damaged in any patients. | None |

| Study: Purcell et al. (2019): Cplx 3 | Task: Spelling probe (training items) vs rest | Condition: CC Aphasia T1 Covariate: T1 spelling accuracy on training items Somewhat valid (training items were selected for individual patients, so training item accuracy is not an appropriate measure of spelling ability) | UNR UNR Cplx | A linear mixed effects model was used to investigate the relationship between Local-Hreg at T1 in the L ventral occipitotemporal region previously identified and T1 spelling accuracy of training items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. Other: There was a significant positive relationship between T1 Local-Hreg and T1 spelling accuracy on training items. | |

| Study: Purcell et al. (2019): Cplx 4 | Task: Spelling probe (training items) vs rest | Condition: CC Aphasia T1 Covariate: subsequent Δ spelling accuracy on training items (T2 vs T1) Somewhat valid (T1 behavioral measure should be included in model) | UNR UNR Cplx | A linear mixed effects model was used to investigate the relationship between Local-Hreg at T1 in the L ventral occipitotemporal region previously identified and subsequent improvement in spelling accuracy of training items from T1 to T2. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. Other: There was a significant positive relationship between T1 Local-Hreg and subsequent improvement in spelling accuracy on training items from T1 to T2. | |

| Study: Purcell et al. (2019): Cplx 5 | Task: Spelling probe (training items) vs rest | Condition: CC Aphasia with both timepoints T1 (\( n = 20 \)) Covariate: subsequent Δ spelling accuracy on untrained items (T2 vs T1) Somewhat valid (T1 behavioral measure should be included in model) | UNR UNR Cplx | A linear mixed effects model was used to investigate the relationship between Local-Hreg at T1 in the L ventral occipitotemporal region previously identified and subsequent improvement in spelling accuracy of untrained items from T1 to T2. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. Other: There was a significant positive relationship between T1 Local-Hreg and subsequent improvement in spelling accuracy on untrained items from T1 to T2. | |
| Purcell et al. (2019): Cplx 6 | Spelling probe (training items) vs rest | LC | Aphasia with both timepoints (n = 20) T2 vs T1 | Covariate: Δ spelling accuracy on training items | UNR | UNR | Cplx | A linear mixed effects model was used to investigate the relationship between change in Local-Hreg in the L ventral occipitotemporal region previously identified and change in spelling accuracy of training items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. | Other: There was a significant negative relationship between change in Local-Hreg and change in spelling accuracy on training items. |
|---|---|---|---|---|---|---|---|---|---|
| Purcell et al. (2019): Cplx 7 | Spelling probe (training items) vs rest | LC | Aphasia with both timepoints (n = 20) T2 vs T1 | Covariate: Δ spelling accuracy on untrained items | UNR | UNR | Cplx | A linear mixed effects model was used to investigate the relationship between change in Local-Hreg in the L ventral occipitotemporal region previously identified and change in spelling accuracy of untrained items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. | Other: There was a significant negative relationship between change in Local-Hreg and change in spelling accuracy on untrained items. |
| Purcell et al. (2019): Cplx 8 | Spelling probe (training items) vs rest | CC | Aphasia with both timepoints T2 (n = 20) | Covariate: T2 spelling accuracy on training items | UNR | UNR | Cplx | A linear mixed effects model was used to investigate the relationship between Local-Hreg at T2 in the L ventral occipitotemporal region previously identified and T2 spelling accuracy of training items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. | None |
| Purcell et al. (2019): Cplx 9 | Spelling probe (training items) vs rest | LC | Aphasia with both timepoints (n = 20) T2 vs T1 | Covariate: previous T1 Local-Hreg in L ventral occipitotemporal ROI Not valid (the ROI was defined based on change in Local-Hreg, so spurious findings could arise in the absence of a real effect) | UNR | UNR | Cplx | A linear mixed effects model was used to investigate the relationship between change in Local-Hreg in the L ventral occipitotemporal region previously identified and T1 Local-Hreg. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. | Other: There was a significant negative relationship between change in Local-Hreg and T1 Local-Hreg. |
| Purcell et al. (2019): Cplx 10 | Spelling probe (training items) vs rest | LC | Aphasia with both timepoints (n = 20) T2 vs T1 | Covariate: Δ spelling accuracy on training items | UNR | UNR | Cplx | A linear mixed effects model was used to investigate the relationship between change in Local-Hreg in the R AG, L PCC, and R PCC and change in spelling accuracy of training items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. | None |
| Purcell et al. (2019): Cplx 11 | Spelling probe (training items) vs rest | LC | Aphasia with both timepoints (n = 20) T2 vs T1 | Covariate: Δ spelling accuracy on untrained items | UNR | UNR | Cplx | A linear mixed effects model was used to investigate the relationship between change in Local-Hreg in the R AG, L PCC, and R PCC and change in spelling accuracy of untrained items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. | None |
accuracy on untrained items

complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail.

Sreedharan, Chandran, et al. (2019): ROI 1

| Neurofeedback | CAC | Aphasias with neurofeedback training (n = 4) mean of T4, T5, T6 vs no training (n = 4) T2 | NANB | NANT | ROI Func | NDC |
|---------------|-----|--------------------------------------------------------------------------------------------|------|------|----------|-----|
| Neurofeedback | CAA | Aphasias with neurofeedback training (n = 4) mean of T4, T5, T6 vs no training (n = 4) T2 | Somewhat valid (no treatment effect; second half measures rather than measures of change) |
| Neurofeedback | CAC | Aphasias mean of T1, T2, T3, T4, T5, T6 (neurofeedback patients) or T1, T2 (no training patients) vs control mean | NANB | NANT | ROI Func | NDC |
| Neurofeedback | Cplx 1 | Aphasias mean of T1, T2, T3, T4, T5, T6 (neurofeedback patients) or T1, T2 (no training patients) vs control mean | NANB | NANT | Cplx |
| Neurofeedback | CAA | Aphasias mean of T1, T2, T3, T4, T5, T6 (neurofeedback patients) or T1, T2 (no training patients) vs control mean | Somewhat valid (no treatment effect; second half measures rather than measures of change) |

Sreedharan, Chandran, et al. (2019): ROI 2

| Neurofeedback | CAA | Aphasias with neurofeedback training (n = 4) mean of T4, T5, T6 vs no training (n = 4) T2 | NANB | NANT | ROI Func | NDC |
|---------------|-----|--------------------------------------------------------------------------------------------|------|------|----------|-----|
| Neurofeedback | CAA | Aphasias with neurofeedback training (n = 4) mean of T4, T5, T6 vs no training (n = 4) T2 | Somewhat valid (no treatment effect; second half measures rather than measures of change) |
| Neurofeedback | CAA | Aphasias mean of T1, T2, T3, T4, T5, T6 (neurofeedback patients) or T1, T2 (no training patients) vs control mean | NANB | NANT | ROI Func | NDC |
| Neurofeedback | CAA | Aphasias mean of T1, T2, T3, T4, T5, T6 (neurofeedback patients) or T1, T2 (no training patients) vs control mean | Somewhat valid (no treatment effect; second half measures rather than measures of change) |

Sreedharan, Chandran, et al. (2019): Cplx 1

| Neurofeedback | CAA | Aphasias after cTBS to posterior IFG vs sham; same patients, repeated measures | Y | N | Vox C+ |
|---------------|-----|--------------------------------------------------------------------------------------------|---|---|-------|
| Neurofeedback | CAA | Aphasias after cTBS to anterior IFG; same patients, repeated measures | Y | N | Vox C+ |
| Neurofeedback | CAA | Aphasias after cTBS to anterior IFG; same patients, repeated measures | Somewhat valid (no behavioral difference) |

Hartwigsen et al. (2020): Vox 1

| Syllable count decision vs rest | CAA | Aphasias after cTBS to posterior IFG vs sham; same patients, repeated measures | Behavioral data notes: significantly slower response times when cTBS was applied over IFG relative to when sham cTBS was applied; search volume: voxels spared in all patients; software: SPM12; voxelwise p: .001; cluster extent cutoff: based on GRFT |
|-----------------------------|-----|--------------------------------------------------------------------------------------------|---|
| Syllable count decision vs rest | CAA | Aphasias after cTBS to anterior IFG; same patients, repeated measures | Behavioral data notes: significantly slower response times when cTBS was applied over IFG relative to when sham cTBS was applied; search volume: voxels spared in all patients; software: SPM12; voxelwise p: .001; cluster extent cutoff: based on GRFT |

Hartwigsen et al. (2020): Vox 3

| Semantic decision vs rest | CAA | Aphasias after cTBS to anterior IFG vs sham; same patients, repeated measures | Behavioral data notes: difference in reaction time did not survive correction; search volume: voxels spared in all patients; software: SPM12; voxelwise p: .001; cluster extent cutoff: based on GRFT |
|---------------------------|-----|--------------------------------------------------------------------------------------------|---|
| Semantic decision vs rest | CAA | Aphasias after cTBS to anterior IFG; same patients, repeated measures | Behavioral data notes: significantly slower response times when cTBS was applied over IFG relative to when sham cTBS was applied; search volume: voxels spared in all patients; software: SPM12; voxelwise p: .001; cluster extent cutoff: based on GRFT |

Other: Patients received lower neurofeedback values than controls, due to lower signal changes and lower functional connectivity.
| Authors and Year | Condition A | Condition B | ROI Function | Notes |
|------------------|-------------|-------------|---------------|-------|
| Hartwigsen et al. (2020): Vox 4 | Semantic decision vs rest | CC Aphasias after cTBS to anterior IFG vs after cTBS to posterior IFG; same patients, repeated measures | UNR C Cplx 1 | Behavioral data notes: significantly slower response times when cTBS was applied over aIFG relative to when cTBS was applied over pIFG; search volume: voxels spared in all patients; software: SPM12; voxelwise p < .001; cluster extent cutoff: based on GRFT |
| | | | | ↓ L insula |
| | | | | ↓ R insula |
| | | | | ↓ R dorsolateral prefrontal cortex |
| Hartwigsen et al. (2020): Cplx 1 | Syllable count decision vs rest | CC Aphasias after cTBS to posterior IFG vs sham; same patients, repeated measures Covariate: Δ RT for syllable decision (cTBS to posterior IFG timepoint vs sham timepoint) | UNR C Cplx 1 | Whole brain correlations were computed between the difference in functional activity after cTBS to posterior IFG versus sham stimulation, and the difference in reaction times on the syllable counting task under these two conditions. The resulting SPM was thresholded at voxelwise p < .001 (CDT) followed by correction for multiple comparisons based on cluster extent and GRFT using SPM12. |
| Stockert et al. (2020): ROI 1 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LA Aphasias T2 vs T1 | UNR UNR ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; post-hoc tests comparing 2 out of the 3 time points were corrected using the Bonferroni-Holm procedure, but there is no indication that that multiple comparisons across ROIs were accounted for |
| Stockert et al. (2020): ROI 2 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal | LA Aphasias T3 vs T1 | UNR UNR ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L | ↓ L IFG pars orbitalis |
| | | | | ↓ L insula |
| | | | | ↓ L dorsolateral prefrontal cortex |
| | | | | ↓ L SMA/medial prefrontal |
| | | | | ↓ R insula |
| | | | | Notes: based on Figure 3; several additional regions are mentioned in text and/or Table 1 |
| Stockert et al. (2020): ROI 3 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LA Aphasia T3 vs T2 | UNR UNR | ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; post-hoc tests comparing 2 out of the 3 time points were corrected using the Bonferroni-Holm procedure, but there is no indication that multiple comparisons across ROIs were accounted for | None notes: based on Figure 3; several additional regions are mentioned in text and/or Table 1 |
| --- | --- | --- | --- | --- | --- |
| Stockert et al. (2020): ROI 4 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAA Aphasia frontal mean of T1, T2, T3 (n = 17) vs temporo-parietal mean of T1, T2, T3 (n = 17) | UNR UNR | ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; post-hoc tests comparing 2 out of the 3 time points were corrected using the Bonferroni-Holm procedure, but there is no indication that multiple comparisons across ROIs were accounted for | ↑ L posterior STG/STS/MTG ↑ R IFG pars orbitalis ↑ R anterior temporal ↓ L IFG pars opercularis ↓ L IFG pars triangularis ↓ L dorsolateral prefrontal cortex notes: based on Table 1 |
| Stockert et al. (2020): ROI 5 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LAA (Aphasia frontal (n = 17) T2 vs T1) vs (temporo-parietal (n = 17) T2 vs T1) | UNR UNR | ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; interactions were significant in model with all 3 time points; post-hoc sub-interactions not reported but the patterns appear clear | ↓ L IFG pars opercularis ↓ L IFG pars triangularis ↓ R IFG pars triangularis ↓ L dorsolateral prefrontal cortex |
| Stockert et al. (2020): ROI 6 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LA (Aphasia frontal (n = 17) T3 vs T1) vs (temporo-parietal (n = 17) T3 vs T1) | UNR | UNR | ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; interactions were significant in model with all 3 time points; post-hoc sub-interactions not reported and patterns are not clear | ↓ L IFG pars opercularis ↓ L IFG pars triangularis ↓ R IFG pars triangularis ↓ R dorsolateral prefrontal cortex |
| Stockert et al. (2020): ROI 7 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LA (Aphasia frontal (n = 17) T3 vs T2) vs (temporo-parietal (n = 17) T3 vs T2) | UNR | UNR | ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; post-hoc sub-interactions not reported but there do not appear to be any T2/T3 effects | None |
| Stockert et al. (2020): ROI 8 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LA (Aphasia T2 vs T1) | UNR | UNR | ROI Oth NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 2; ROIs: (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals; how ROIs defined: (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions; test of group by time interaction not reported | Other: there was a significant increase in activation in perilesional ROIs |
| Stockert et al. (2020): ROI 9 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LA (Aphasia T3 vs T1) | UNR | UNR | ROI Oth NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 2; ROIs: (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals; how ROIs defined: (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions | Other: there was a significant increase in activation in perilesional ROIs |
| Stockert et al. (2020): ROI 10 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LA Aphasia T3 vs T2 | UNR | UNR | ROI | Oth | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 2; ROIs: (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals; how ROIs defined: (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions; test of group by time interaction not reported | None |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Stockert et al. (2020): ROI 11 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAA Aphasia frontal mean of T1, T2, T3 (n = 17) vs temporo-parietal mean of T1, T2, T3 (n = 17) | UNR | UNR | ROI | Oth | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 2; ROIs: (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals; how ROIs defined: (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions; test of group by time interaction not reported; this comparison is somewhat questionable given the differing extent to which frontal and temporal regions are activated in controls | Other: frontal patients showed relatively greater activation in regions homotopic to their lesions |
| Stockert et al. (2020): ROI 12 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAC Aphasia frontal T1 (n = 17) vs control | UNR | UNR | ROI | Func | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs | ↓ L IFG pars triangularis | ↓ L insula | ↓ L dorsolateral prefrontal cortex |
| Stockert et al. (2020): ROI 13 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAC Aphasia temporo-parietal T1 (n = 17) vs control | UNR | UNR | ROI | Func | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs | ↓ L IFG pars triangularis | ↓ L insula | ↓ L dorsolateral prefrontal cortex | ↓ L posterior STG/STS/MTG | ↓ R IFG pars triangularis |
| Stockert et al. (2020): ROI 14 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAA Aphasia frontal T1 (n = 17) vs temporo-parietal T1 (n = 17) | UNR UNR ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints | ↑ L anterior temporal ↑ R IFG pars triangularis
| Stockert et al. (2020): ROI 15 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAC Aphasia frontal T2 (n = 17) vs control | UNR UNR ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs | ↓ L IFG pars triangularis
| Stockert et al. (2020): ROI 16 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAC Aphasia temporo-parietal T2 (n = 17) vs control | UNR UNR ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs | None
| Stockert et al. (2020): ROI 17 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAA Aphasia frontal T2 (n = 17) vs temporo-parietal T2 (n = 17) | UNR UNR ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs | ↓ L IFG pars opercularis ↓ L IFG pars triangularis ↓ L dorsolateral prefrontal cortex
| Stockert et al. (2020): | Listening to normal sentences | CAC Aphasia frontal T3 (n | UNR UNR ROI Func | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints | ↓ L IFG pars triangularis |
| ROI 18 | and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | NC | presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs | ↓ L insula |
| Stockert et al. (2020): ROI 19 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | UNR | UNR | ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs | None |
| Stockert et al. (2020): ROI 20 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAC | Aphasias temporoparietal T3 (n = 17) vs control | UNR | UNR | ROI Func NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 13; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; how ROIs defined: spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs | ↓ L IFG pars opercularis ↓ L IFG pars triangularis ↓ L IFG pars orbitalis ↓ L dorsolateral prefrontal cortex |
| Stockert et al. (2020): ROI 21 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAC | Aphasias frontal T1 (n = 17) vs temporo-parietal T3 (n = 17) | UNR | UNR | ROI Oth NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 2; ROIs: (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals; how ROIs defined: (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions | Other: frontal patients showed reduced activation in perilesional tissue |
| Stockert et al. (2020): ROI 22 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal | CAC | Aphasias frontal T2 (n = 17) vs control | UNR | UNR | ROI Oth NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 2; ROIs: (1) perilesional tissue; (2) regions homotopic to lesions; each unique to | Other: frontal patients showed reduced activation in perilesional tissue |
| Study | Description | ROIs | Behavioral Data Notes | Other |
|-------|-------------|------|------------------------|-------|
| Stockert et al. (2020): ROI 23 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAC Aphasia frontal T3 (n = 17) vs control | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 2; ROIs: (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals; how ROIs defined: (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions | Frontal patients showed reduced activation in perilesional tissue |
| Stockert et al. (2020): ROI 24 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAC Aphasia temporo-parietal T1 (n = 17) vs control | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 2; ROIs: (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals; how ROIs defined: (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions | Temporal patients showed reduced activation in perilesional tissue and in regions homotopic to their lesions |
| Stockert et al. (2020): ROI 25 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAC Aphasia temporo-parietal T2 (n = 17) vs control | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 2; ROIs: (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals; how ROIs defined: (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions | None |
| Stockert et al. (2020): ROI 26 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAC Aphasia temporo-parietal T3 (n = 17) vs control | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 2; ROIs: (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals; how ROIs defined: (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions | None |
| Stockert et al. (2020): ROI 27 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC | Aphasias T1 | Covariate: comprehension composite | UNR | UNR | ROI | Mix | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | \(↑\) L IFG pars opercularis \(↑\) L IFG pars triangularis \(↑\) L IFG pars orbitalis other: L IFG pars opercularis and orbitals did not remain significant when lesion volume was included as a covariate; there was a significant correlation between perilesional activation and LRScomp; this did not remain significant when lesion volume was included as a covariate |
| Stockert et al. (2020): ROI 28 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC | Aphasias T2 | Covariate: comprehension composite | UNR | UNR | ROI | Mix | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | \(↑\) L IFG pars triangularis other: there was a significant correlation between perilesional activation and LRScomp |
| Stockert et al. (2020): ROI 29 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC | Aphasias T3 | Covariate: comprehension composite | UNR | UNR | ROI | Mix | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | \(↑\) L IFG pars triangularis notes: did not remain significant when lesion volume was included as a covariate |
analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions

| Stockert et al. (2020): ROI 30 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LC Aphasía T2 vs T1 Covariate: Δ comprehension composite | UNR UNR ROI Mix NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |

| Stockert et al. (2020): ROI 31 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LC Aphasía T3 vs T1 Covariate: Δ comprehension composite | UNR UNR ROI Mix NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |

| Stockert et al. (2020): ROI 32 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LC Aphasía T3 vs T2 Covariate: Δ comprehension composite | UNR UNR ROI Mix NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions

| Stockert et al. (2020): ROI 33 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC | Aphasia frontal T1 (n = 17) | UNR | UNR | ROI | Mix | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | None |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Stockert et al. (2020): ROI 34 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC | Aphasia frontal T2 (n = 17) | UNR | UNR | ROI | Mix | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | None |
| Stockert et al. (2020): ROI 35 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC | Aphasia frontal T3 (n = 17) | UNR | UNR | ROI | Mix | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions | None |
| Stockert et al. (2020): ROI 36 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LC Aphasia frontal (n = 17) T2 vs T1 Covariate: Δ comprehension composite | UNR UNR ROI Mix NC Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | None |
| --- | --- | --- | --- | --- |
| Stockert et al. (2020): ROI 37 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LC Aphasia frontal (n = 17) T3 vs T1 Covariate: Δ comprehension composite | UNR UNR ROI Mix NC Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | None |
| Stockert et al. (2020): ROI 38 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs | LC Aphasia frontal (n = 17) T3 vs T2 Covariate: Δ comprehension composite | UNR UNR ROI Mix NC Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional | None |
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| Stockert et al. (2020): ROI 39 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC Aphasia temporo-parietal T1 (n = 17) Covariate: comprehension composite | UNR UNR Mix NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | † R anterior temporal |
| Stockert et al. (2020): ROI 40 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC Aphasia temporo-parietal T2 (n = 17) Covariate: comprehension composite | UNR UNR Mix NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | † L IFG pars opercularis † L posterior STG/STS/MTG |
| Stockert et al. (2020): ROI 41 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC Aphasia temporo-parietal T3 (n = 17) Covariate: comprehension composite | UNR UNR Mix NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | None |
| Stockert et al. (2020): ROI 42 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LC Aphasia temporo-parietal (n = 17) T2 vs T1 Covariate: Δ comprehension composite | UNR UNR ROI Mix NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | ↑ L insula |
| Stockert et al. (2020): ROI 43 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LC Aphasia temporo-parietal (n = 17) T3 vs T1 Covariate: Δ comprehension composite | UNR UNR ROI Mix NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | None |
| Stockert et al. (2020): ROI 44 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences | LC Aphasia temporo-parietal (n = 17) T3 vs T2 Covariate: Δ comprehension composite | UNR UNR ROI Mix NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; | None |
| Stockert et al. (2020): ROI 45 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC | Aphasia T1 | Covariate: lesion volume | UNR | UNR | ROI | Mix | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | ↓ L IFG pars triangularis notes: lesion volume negatively correlated with activation |
| Stockert et al. (2020): ROI 46 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC | Aphasia T2 | Covariate: lesion volume | UNR | UNR | ROI | Mix | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | None |
| Stockert et al. (2020): ROI 47 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC | Aphasia T3 | Covariate: lesion volume | UNR | UNR | ROI | Mix | NC | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; number of ROIs: 15; ROIs: (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions; how ROIs defined: (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions | None |
| Stockert et al. (2020): ROI 48 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LC | Aphasia T2 vs T1 | UNR | UNR | ROI | Mix | NC |
| Stockert et al. (2020): ROI 49 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LC | Aphasia T3 vs T1 | UNR | UNR | ROI | Mix | NC |
| Stockert et al. (2020): ROI 50 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or | LC | Aphasia T3 vs T2 | UNR | UNR | ROI | Mix | NC |
| Stockert et al. (2020): Cplx 1 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAA Aphasia frontal T1 (n = 17) vs temporo-parietal T1 (n = 17) | UNR | UNR | Cplx | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between activity in 15 ROIs and LRScomp were compared between patients with frontal and temporal lesions, using interaction terms as well as the Fisher r-to-z transformation. **There was no correction for multiple comparisons across the 15 ROIs.** | Other: Correlations were higher in the temporal group in the R ATL. |
| Stockert et al. (2020): Cplx 2 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAA Aphasia frontal T2 (n = 17) vs temporo-parietal T2 (n = 17) | UNR | UNR | Cplx | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between activity in 15 ROIs and LRScomp were compared between patients with frontal and temporal lesions, using interaction terms as well as the Fisher r-to-z transformation. **There was no correction for multiple comparisons across the 15 ROIs.** | Other: Correlations were higher in the temporal group in L posterior temporal cortex and L IFG op. |
| Stockert et al. (2020): Cplx 3 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAA Aphasia frontal T3 (n = 17) vs temporo-parietal T3 (n = 17) | UNR | UNR | Cplx | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between activity in 15 ROIs and LRScomp were compared between patients with frontal and temporal lesions, using interaction terms. **There was no correction for multiple comparisons across the 15 ROIs.** | Other: Correlations were different between groups in the R ATL, but the correlation is not reported as significant in the temporo-parietal group alone. |
| Stockert et al. (2020): Cplx 4 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LAA (Aphasia frontal (n = 17) T2 vs T1) vs (aphasia temporo-parietal (n = 17) T2 vs T1) | UNR | UNR | Cplx | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between changes in activity in 15 ROIs and changes in LRScomp were compared between patients with frontal and temporal lesions, using interaction terms as well as the Fisher r-to-z transformation. **There was no correction for multiple comparisons across the 15 ROIs.** | Other: In the L insula, the temporo-parietal group showed a stronger correlation than the frontal group between changes in activation and changes in LRScomp. |
| Stockert et al. (2020): Cplx 5 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LAA (Aphasia frontal (n = 17) T3 vs T1) vs (temporo-parietal (n = 17) T3 vs T1) | UNR UNR Cplx | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between changes in activity in 15 ROIs and changes in LRScomp were compared between patients with frontal and temporal lesions, using interaction terms as well as the Fisher r-t-to-z transformation. **There was no correction for multiple comparisons across the 15 ROIs.** | Other: None |
| --- | --- | --- | --- | --- | --- |
| Stockert et al. (2020): Cplx 6 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LAA (Aphasia frontal (n = 17) T3 vs T2) vs (temporo-parietal (n = 17) T3 vs T2) | UNR UNR Cplx | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between changes in activity in 15 ROIs and changes in LRScomp were compared between patients with frontal and temporal lesions, using interaction terms as well as the Fisher r-t-to-z transformation. **There was no correction for multiple comparisons across the 15 ROIs.** | None |
| Stockert et al. (2020): Cplx 7 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAA Aphasia frontal T1 (n = 17) vs temporo-parietal T1 (n = 17) | UNR UNR Cplx | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. **There was no correction for multiple comparisons across the 15 ROIs.** | None |
| Stockert et al. (2020): Cplx 8 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAA Aphasia frontal T2 (n = 17) vs temporo-parietal T2 (n = 17) | UNR UNR Cplx | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. **There was no correction for multiple comparisons across the 15 ROIs.** | None |
| Stockert et al. (2020): Cplx 9 | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CAA Aphasia frontal T3 (n = 17) vs temporo-parietal T3 (n = 17) | UNR UNR Cplx | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. **There was no correction for multiple comparisons across the 15 ROIs.** | None |
| Cplx | Description | Case | Covariate | Behavioral Data Notes | Other |
|------|-------------|------|------------|-----------------------|-------|
| 10   | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LAA (Aphasia frontal (n = 17) T2 vs T1) vs (temporo-parietal (n = 17) T2 vs T1) | UNR | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between changes in activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. **There was no correction for multiple comparisons across the 15 ROIs.** | None |
| 11   | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LAA (Aphasia frontal (n = 17) T3 vs T1) vs (temporo-parietal (n = 17) T3 vs T1) | UNR | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between changes in activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. **There was no correction for multiple comparisons across the 15 ROIs.** | None |
| 12   | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LAA (Aphasia frontal (n = 17) T3 vs T2) vs (temporo-parietal (n = 17) T3 vs T2) | UNR | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; Correlations between changes in activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. **There was no correction for multiple comparisons across the 15 ROIs.** | None |
| 13   | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | CC Aphonasia T1 Covariate: interaction of comprehension composite by lesion size | UNR | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; To investigate why some activation-behavior relationships did not remain significant when lesion extent was included as a covariate, models were constructed looking at the relationship between activation and behavior in patients with larger and smaller lesions. **Other:** The three regions where this applied at T1, namely perilesional cortex, L IFG op, and L IFG orb, all showed positive correlations between activation and LRScomp in patients with larger lesions, but no correlations in patients with smaller lesions. | Other |
| 14   | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech | LC Aphonasia T2 vs T1 Covariate: interaction of & comprehension composite by lesion size | UNR | Behavioral data notes: no differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions; To investigate why some activation-behavior relationships did not remain significant when lesion extent was included as a covariate, models were constructed looking at the relationship between activation and behavior in patients with larger and smaller lesions. **Other:** This applied to the R DLPFC in the T2 vs T1 analysis. This region showed a positive correlation between activation and LRScomp in patients with larger lesions, but no correlation in... | Other |
patients with smaller lesions.

Second level contrast = Which of the 8 relevant classes of analyses is this? Which group or groups of participants are included? If there is a covariate, what is it?; Acc = Is accuracy matched across the second level contrast?; RT = Is reaction time matched across the second level contrast?; Stats = Does the analysis involve voxelwise statistics, region(s) of interest (ROI), or something else (complex)? If voxelwise, how are multiple comparisons across voxels accounted for? If ROI, were the ROI(s) anatomical, functional, laterality indices, mixed, or something else? If there was more than one ROI, how were the ROIs corrected for multiple comparisons?; Yellow underline = minor limitation; Orange underline = moderate limitation; Red underline = major limitation; CAC = Cross-sectional aphasia vs control; CAA = Cross-sectional between two groups with aphasia; CC = Cross-sectional correlation with language or other measure; CB = Cross-sectional performance-defined conditions; LA = Longitudinal change in aphasia; LAC = Longitudinal aphasia vs control; LAA = Longitudinal between two groups with aphasia; LC = Longitudinal correlation with language or other measure; Y = Yes, matched; YCT = Yes, correct trials only; NBD = No, by design; NAM = No, but attempt made; N = No, different; C = Accuracy or RT is covariate; UNT = Unknown, no test; AS = Appear similar; AM = Appear mismatched; UNR = Unknown, not reported; NANB = N/A, no behavioral measure; NANT = N/A, no timeable task; Vox = Voxelwise; VP = Voxelwise correction based on permutation testing; VFWE = Voxelwise FWE correction; C+ = Clusterwise correction with GRFT and stringent voxelwise p; VFWC = Voxelwise FWE correction and additional arbitrary cluster correction; C- = Clusterwise correction with GRFT and lenient voxelwise p; CCS = Clusterwise correction based on 3dClustSim; SVC = Small volume correction; CCTB = Clusterwise correction based on cluster_threshold_beta; CA = Clusterwise correction based on arbitrary cluster extent; NC = No correction; NDC = No direct comparison; M** = Mixed** (major limitation); U = Unclear or not stated; ROI = Region(s) of interest; Anat = Anatomical; Func = Functional; Oth = Other; LI = Laterality indices; Mix = Mixed; FWE = Familywise error (FWE); FDR = False discovery rate (FDR); NC = No correction; One = One only; NDC = No direct comparison; Cplx = Complex.
## Supplementary Table S11. Cross-sectional aphasia compared to control: Methodologically robust analyses

| Analysis | First level contrast | Second level contrast | Matched for | Stats | Notes | Findings |
|----------|---------------------|-----------------------|-------------|-------|-------|----------|
|          |                     |                       |             |       |       |          |
| Leff et al. (2002): ROI 1 | Higher word rates vs lower word rates | CAC | ROI 1 | Acc & RT | NANB | NANT | Stats: ROI defined; the peak voxel for the contrast in the R pSTS from each subject's individual analysis, but the search region is not stated; the controls and patients without pSTS damage were combined, however it is stated in the caption to Figure 2 that the patients with pSTS damage were significantly different to both | Number of ROIs: 1; ROI: R pSTS; how ROI defined: the peak voxel for the contrast in the R pSTS from each subject's individual analysis, but the search region is not stated; the controls and patients without pSTS damage were combined, however it is stated in the caption to Figure 2 that the patients with pSTS damage were significantly different to both |
|          |                     |                       |             |       |       |          |
| Blank et al. (2003): Vox 1 | Propositional speech production vs rest | CAC | IFG POp | Acc & RT | N | NANT | Stats: voxelwise p: FWE p < .05 with SVC in R pars opercularis | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis |
| Blank et al. (2003): Vox 2 | Propositional speech production vs rest | CAC | IFG POp | Acc & RT | N | NANT | Stats: voxelwise p: FWE p < .05 with SVC in R pars opercularis | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis |
| Blank et al. (2003): Vox 4 | Propositional speech production vs counting | CAC | IFG POp | Acc & RT | N | NANT | Stats: voxelwise p: FWE p < .05 with SVC in R pars opercularis | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis |
| Blank et al. (2003): Vox 5 | Propositional speech production vs counting | CAC | IFG POp | Acc & RT | N | NANT | Stats: voxelwise p: FWE p < .05 with SVC in R pars opercularis | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis |
| Sharp et al. (2004): Vox 1 | Semantic decision vs syllable count decision | CAC | Control | Acc & RT | AM | Y | Stats: voxelwise p: FWE p < .05 with SVC in fusiform gyr, temporal poles, L IFG, L orbitofrontal and L SFG | Behavioral data notes: interaction of group by task not reported for accuracy; search volume: whole brain; software: SPM99; voxelwise p: FWE p < .05 with SVC in fusiform gyr, temporal poles, L IFG, L orbitofrontal and L SFG |
| Sharp et al. (2004): ROI 1 | Semantic decision vs syllable count decision | CAC | Control | Acc & RT | AM | Y | Stats: voxelwise p: FWE p < .05 with SVC in fusiform gyr, temporal poles, L IFG, L orbitofrontal and L SFG | Behavioral data notes: interaction of group by task not reported for accuracy; number of ROIs: 1; ROI: L fusiform gyrus; how ROI defined: probabilistic brain atlas |
| Sharp et al. (2004): ROI 2 | Semantic decision vs syllable count decision | CAC | Control | Acc & RT | NAM | Y | Stats: voxelwise p: FWE p < .05 with SVC in fusiform gyr, temporal poles, L IFG, L orbitofrontal and L SFG | Behavioral data notes: interaction of group by task not reported for accuracy; number of ROIs: 1; ROI: L fusiform gyrus; how ROI defined: probabilistic brain atlas |

↑ R posterior STS
↑ R IFG pars opercularis
↑ L posterior inferior temporal gyrus/fusiform gyrus
| Study/Year | Design/ROI | Task | Condition | Control | Type | Statistics | Notes |
|------------|------------|------|-----------|---------|------|-------------|------|
| Zahn et al. (2004): ROI 1 | Semantic decision vs phonetic decision and lexical decision (conjunction) | CAC | Aphasia vs control | UNT | UNT | ROILi One | Behavioral data notes: relative performance on language and control tasks unclear; number of ROIs: 1; ROI: language network Li; conjunction analyses not clearly described; in two patients, a different conjunction was used (lexical decision vs phonetic decision & semantic decision vs phonetic decision) None notes: Li > 0 in 12 out of 14 controls and 5 out of 7 patients; no significant difference |
| Crinion & Price (2005): Vox 1 | Listening to narrative speech vs listening to reversed speech | CAC | Aphasia without temporal lobe damage (n = 9) vs control | NANB | NANT | VoxVFWC | Search volume: whole brain; software: SPM2; voxelwise p: FWE p < .05; cluster extent cutoff: 5 voxels (size not stated) ↓ L dorsal precentral |
| Crinion & Price (2005): Vox 2 | Listening to narrative speech vs listening to reversed speech | CAC | Aphasia with temporal lobe damage (n = 8) vs control | NANB | NANT | VoxVFWC | Search volume: whole brain; software: SPM2; voxelwise p: FWE p < .05; cluster extent cutoff: 5 voxels (size not stated) ↓ L posterior STS |
| Crinion et al. (2006): Vox 1 | Listening to narrative speech vs listening to reversed speech | CAC | Aphasia vs control | NANB | NANT | VoxVFWC | Search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 None |
| Crinion et al. (2006): Vox 2 | Listening to narrative speech vs listening to reversed speech | CAC | Aphasia without temporal lobe damage (n = 6) vs control | NANB | NANT | VoxVFWC | Search volume: voxels spared in all included patients; software: SPM99; voxelwise p: FWE p < .05 None |
| Crinion et al. (2006): Vox 3 | Listening to narrative speech vs listening to reversed speech | CAC | Aphasia with temporal lobe damage (n = 18) vs control | NANB | NANT | VoxVFWC | Search volume: voxels spared in all included patients; software: SPM99; voxelwise p: FWE p < .05 None |
| Warren et al. (2009): ROI 1 | Listening to narrative speech vs listening to reversed speech | CAC | Aphasia vs control | NANB | NANT | ROIAnatNC | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with None notes: L IFG pars triangularis almost reached significance (p = .053) for more |
| Study                                      | Task Description                                                                 | Condition                                                                 | Search Volume | Software | Voxelwise p | ROI Description                                                                 |
|-------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------|----------|-------------|-----------------------------------------------------------------------------|
| Warren et al. (2009): ROI 9               | Listening to narrative speech vs listening to reversed speech                     | CAC Aphasia with positive anterior temporal interconnectivity (n = 8) vs control | NANB          | NANT     | ROI Anat NC | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6); somewhat circular because ROIs were defined only in regions where controls showed significant connectivity (even though ROIs were anatomical); excluded 3 patients with L IFG damage | L IFG pars triangularis |
| Warren et al. (2009): ROI 10              | Listening to narrative speech vs listening to reversed speech                     | CAC Aphasia with negative anterior temporal interconnectivity (n = 8) vs control | NANB          | NANT     | ROI Anat NC | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6); somewhat circular because ROIs were defined only in regions where controls showed significant connectivity (even though ROIs were anatomical); excluded 1 patient with L IFG damage | None |
| Fridriksson et al. (2010): Vox 2         | Picture naming (correct trials) vs viewing abstract pictures                      | CAC Aphasia vs control                                                   | YCT           | UNR      | Vox NC      | Search volume: whole brain; software: FSL 4.1; voxelwise p: ~.02 (z > 2); cluster extent cutoff: based on GRFT | None |
| van Oers et al. (2010): ROI 3            | Verb generation vs rest                                                           | CAC Aphasia vs control                                                   | UNR           | UNR      | ROI Mix NC  | Number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal Ll; (6) temporal Ll; (7) whole network Ll; how ROIs defined: WFU pickatlas | ↓ L IFG |
| Allendorfer et al. (2012): ROI 2         | Verb generation (overt, event-related) vs noun repetition (event-related)         | CAC Aphasia vs control                                                   | N             | UNR      | ROI LI NC   | Behavioral data notes: patients less accurate and produced less responses on both conditions, but the difference between groups was greater for verb generation; number of ROIs: 2; ROIs: (1) frontal Ll; (2) temporal Ll | ↓ LI (frontal) |
| Szafarski et al. (2014): ROI 1           | Verb generation vs finger tapping                                                 | CAC Aphasia vs control                                                   | UNR           | UNR      | ROI LI NC   | Number of ROIs: 3; ROIs: (1) frontal Ll; (2) temporal Ll; (3) language network Ll | ↓ LI (language network) |

Note: L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6); somewhat circular because ROIs were defined only in regions where controls showed significant connectivity (even though ROIs were anatomical).
Gris, Nenert, Allendorfer, & Szafranski (2017): Cplx 1

Semantic decision vs tone decision  
CAC Aphasia vs control  
N UNR Cplx  

Behavioral data notes: semantic decision accuracy not matched, but tone decision accuracy not reported; Multimodal canonical correlation analysis (mCCA) and joint ICA were used to identify 3 joint ICs (structural/functional) that were differently represented in the patient and control groups. Although there was no correction for multiple comparisons when the functional maps were thresholded, the maps for the three networks each appeared to relate to coherent parts of the semantic network. 

Other: The first joint IC comprised preservation of tissue in L posterior temporo-parietal region, activity in the L AG and bilateral midline components of the canonical semantic network, and reduced activity in R frontal, temporal and parietal regions. The second joint IC comprised preservation of tissue in the L basal ganglia/insula region, and activity predominantly in the IFG pars orbitalis bilaterally. The third joint IC comprised preservation of the L IFG and activity in the L IFG and DLPFC along with bilateral midline regions. The first joint IC was considered to provide more robust evidence for structure-function relationships than the other two, because it was the only one where individual structural and functional mixing coefficients remained correlated even when lesion volume was included as a covariate.

Second level contrast = Which of the 8 relevant classes of analyses is this? Which group or groups of participants are included? If there is a covariate, what is it?; Acc = Is accuracy matched across the second level contrast?; RT = Is reaction time matched across the second level contrast?; Stats = Does the analysis involve voxelwise statistics, region(s) of interest (ROI), or something else (complex)? If voxelwise, how are multiple comparisons across
voxels accounted for? If ROI, were the ROI(s) anatomical, functional, laterality indices, mixed, or something else? If there was more than one ROI, how were the ROIs corrected for multiple comparisons?; Yellow underline = minor limitation; Orange underline = moderate limitation; Red underline = major limitation; CAC = Cross-sectional aphasia vs control; Y = Yes, matched; YCT = Yes, correct trials only; NAM = No, but attempt made; N = No, different; UNT = Unknown, no test; AM = Appear mismatched; UNR = Unknown, not reported; NANB = N/A, no behavioral measure; NANT = N/A, no timeable task; Vox = Voxelwise; VFWE = Voxelwise FWE correction; VFWC = Voxelwise FWE correction and additional arbitrary cluster correction; C- = Clusterwise correction with with GRFT and lenient voxelwise p; SVC = Small volume correction; ROI = Region(s) of interest; Anat = Anatomical; Func = Functional; LI = Laterality indices; Mix = Mixed; NC = No correction; One = One only; Cplx = Complex.
Supplementary Table S12. Cross-sectional correlation with language or other measure: Methodologically robust analyses

| Analysis | First level contrast | Second level contrast | Matched for | Stats | Notes | Findings |
|----------|---------------------|----------------------|-------------|-------|-------|----------|
| Blank et al. (2003): ROI 1 | Propositional speech production vs rest | CC Aphasia with IFG POp damage (n = 7) Covariate: speech rate during scan | UNR NANT | ROI Func One | Number of ROIs: 1; ROI: R IFG pars opercularis; how ROI defined: defined by flipping L IFG pars opercularis activation in controls | None |
| Blank et al. (2003): ROI 2 | Propositional speech production vs rest | CC Aphasia without IFG POp damage (n = 7) Covariate: speech rate during scan | UNR NANT | ROI Func One | Number of ROIs: 1; ROI: R IFG pars opercularis; how ROI defined: defined by flipping L IFG pars opercularis activation in controls | None |
| Blank et al. (2003): ROI 3 | Propositional speech production vs rest | CC Aphasia with IFG POp damage (n = 7) Covariate: four different QPA measures | UNR NANT | ROI Func One | Number of ROIs: 1; ROI: R IFG pars opercularis; how ROI defined: defined by flipping L IFG pars opercularis activation in controls | None |
| Crinion & Price (2005): Vox 4 | Listening to narrative speech vs listening to reversed speech | CC Aphasia without temporal lobe damage (n = 9) Covariate: sentence comprehension (CAT) | NANB NANT | Vox VFWC | Search volume: whole brain; software: SPM2; voxelwise p: FWE p < .05; cluster extent cutoff: 5 voxels (size not stated); conjunction with main effect of story comprehension (details hard to follow); this was a multiple regression also involving patients with temporal lobe damage | ↑ L posterior STS
↑ R mid temporal notes: patients with better sentence comprehension had more activation in the L posterior STS and R mid STS |
| Crinion & Price (2005): Vox 5 | Listening to narrative speech vs listening to reversed speech | CC Aphasia with temporal lobe damage (n = 8) Covariate: sentence comprehension (CAT) | NANB NANT | Vox VFWC | Search volume: whole brain; software: SPM2; voxelwise p: FWE p < .05; cluster extent cutoff: 5 voxels (size not stated); conjunction with main effect of story comprehension (details hard to follow); this was a multiple regression also involving patients without temporal lobe damage | ↑ R mid temporal notes: patients with better sentence comprehension had more activation in the R mid STS |
| Crinion et al. (2006): ROI 1 | Listening to narrative speech vs listening to reversed speech | CC Aphasia with no temporal damage (excluding 1 with missing behavioral data and 1 outlier) or posterior temporal damage sparing anterior temporal cortex (n = 13) Covariate: auditory sentence comprehension (CAT) | NANB NANT | ROI Func One | Number of ROIs: 1; ROI: L ATL; how ROI defined: activation in the control group; same result obtained with or without excluding one outlier; two other ROIs are described in the methods, but never used in any analyses | ↑ L anterior temporal notes: more activity in patients with better auditory sentence comprehension |
| Crinion et al. (2006): ROI 2 | Listening to narrative speech vs listening to reversed speech | CC Aphasia with no temporal damage (excluding 1 with missing behavioral data and 1 outlier) or posterior temporal damage sparing anterior temporal cortex (n = 13) Covariate: auditory sentence comprehension (CAT) | NANB NANT | ROI Func One | Number of ROIs: 1; ROI: L ATL; how ROI defined: activation in the control group; two other ROIs are described in the methods, but never used in any analyses | None |
| Study | ROI | Task Description | Covariate | ROI Definition | Number of ROIs | Notes |
|-------|-----|------------------|------------|----------------|----------------|-------|
| Crinion et al. (2006): ROI 5 | Listening to narrative speech vs listening to reversed speech | CC Aphasia with no temporal damage (excluding 1 with missing behavioral data and 1 outlier) or posterior temporal damage sparing anterior temporal cortex (n = 13) | time post onset | ROIs defined: activation in the control group; two other ROIs are described in the methods, but never used in any analyses | 1 | None notes: r = 0.39; p > 0.1; seems to be a clear trend so lack of significance may reflect only lack of power |
| Warren et al. (2009): ROI 2 | Listening to narrative speech vs listening to reversed speech | CC Aphasia Covariate: auditory sentence comprehension | | ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | 6 | ↑ L anterior temporal |
| Warren et al. (2009): ROI 3 | Listening to narrative speech vs listening to reversed speech | CC Aphasia Covariate: written sentence comprehension | | ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | 6 | None |
| Warren et al. (2009): ROI 4 | Listening to narrative speech vs listening to reversed speech | CC Aphasia Covariate: auditory single word comprehension | | ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | 6 | None notes: L anterior temporal p = .08 |
| Warren et al. (2009): ROI 5 | Listening to narrative speech vs listening to reversed speech | CC Aphasia Covariate: auditory syntactic comprehension | | ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | 6 | None notes: L anterior temporal p = .09 |
| Warren et al. (2009): ROI 6 | Listening to narrative speech | CC Aphasia Covariate: | | Number of ROIs: 2; ROIs: (1) L anterior superior temporal cortex; (2) R anterior superior temporal cortex | None |
| Study | Type | Task | Connectivity | ROIs Defined | ROIs | ROIs Description | Number of ROIs: Page 175 | Number of ROIs: Page 175 |
|-------|------|------|--------------|-------------|------|-----------------|--------------------------|--------------------------|
| Warren et al. (2009): ROI 7 | Listening to narrative speech vs listening to reversed speech | CC, Aphas | L and R ATL | ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | Nanb, NANT | ROI | Nanb, NANT | None |
| Warren et al. (2009): ROI 8 | Listening to narrative speech vs listening to reversed speech | CC, Aphas | L and R ATL | ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) | Nanb, NANT | ROI | Nanb, NANT | None |
| Fridriksson et al. (2010): Vox 1 | Picture naming (correct trials) vs viewing abstract pictures | CC, Aphas | L and R ATL | VLSM with FDR correction was used to identify any regions in which damage was predictive of L anterior temporal activation. | Nanb, NANT | Cplx | Nanb, NANT | None |
| Fridriksson et al. (2010): ROI 1 | Picture naming (correct trials) vs viewing abstract pictures | CC, Aphas | L and R ATL | Search volume: whole brain; software: FSL 4.1; voxelwise p: ~.02 (z > 2); cluster extent cutoff: based on GRFT | Nanb, NANT | Vox | Nanb, NANT | None |
| van Oers et al. (2010): ROI 4 | Written word-picture matching vs visual decision | CC, Aphas | L and R ATL | Number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal Ll; (6) temporal Ll; (7) whole network Ll; how ROIs defined: WFU pickatlas | Nanb, NANT | Mix | Nanb, NANT | None |
| van Oers et al. (2010): | Semantic decision vs visual decision | CC, Aphas | L and R ATL | Number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior | Nanb, NANT | Mix | Nanb, NANT | None |
| ROI 5 | Covariate: semantic decision accuracy | NC | language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal Lt; (6) temporal Lt; (7) whole network Lt; how ROIs defined: WFU pickatlas |
|---|---|---|---|
| van Oers et al. (2010): ROI 8 | Verb generation vs rest | CC Aphasia Covariate: overall language measure | UNR UNR ROI Mix NC | Number of ROIs: 7; ROIs: (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal Lt; (6) temporal Lt; (7) whole network Lt; how ROIs defined: WFU pickatlas |
| van Oers et al. (2010): ROI 11 | Verb generation vs rest | CC Aphasia Covariate: lesion volume | UNR UNR ROI Anat NC | Number of ROIs: 2; ROIs: (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG); how ROIs defined: WFU pickatlas |
| van Oers et al. (2010): ROI 14 | Verb generation vs rest | CC Aphasia Covariate: damage to L hemisphere language regions | UNR UNR ROI Anat NC | Number of ROIs: 2; ROIs: (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG); how ROIs defined: WFU pickatlas |
| Papoutsi et al. (2011): Vox 1 | Listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to ambiguous sentences with dominant resolution ("dominant") | CC Aphasia Covariate: difference in percent of unacceptable judgments between subordinate and dominant sentences (dominance effect) | NANB NANT Vox C- | Search volume: whole brain; software: SPM8; voxelwise p: .01; cluster extent cutoff: based on GRFT |
| † L insula | † L posterior STG/STS/MTG | † L mid temporal |
| Papoutsi et al. (2011): Cplx 1 | Listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to ambiguous sentences with dominant resolution ("dominant") | CC Aphasia Covariate: modulation of L IFG connectivity by dominance effect | NANB NANT Cplx | A PPI analysis was carried out with the L IFG as the seed region. Correlations were computed between voxelwise modulation of connectivity with this region, and a behavioral measure of syntactic processing, which was the dominance effect: the difference in percent of unacceptable judgments between subordinate and dominant sentences. The resultant SPM was thresholded at voxelwise p < .01 (CDT), then corrected for multiple corrections based on cluster extent and GRFT using SPM8. |
| Other: patients with better syntactic performance had more connectivity from the L IFG seed region to L pMTG and adjacent areas (including the insula); pMTG also significant at voxelwise p < .001 in Figure 2B, corrected for multiple comparisons with GRFT |
| Papoutsi et al. (2011): Cplx 2 | Listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to ambiguous | CC Aphasia Covariate: modulation of L pMTG connectivity by dominance effect | NANB NANT Cplx | A similar PPI analysis was carried out with the L pMTG as the seed region. Thresholding was the same as in the previous analysis. |
| None |
| Study                          | Task/Contrast                                                                 | ROIs                                                                 | PBA/Atlas/Mask | Notes                                                                 |
|--------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------|----------------------------------------------------------------------|
| Sebastian & Kiran (2011): ROI 2 | Semantic decision (correct trials) vs visual decision                        | CC                                                                 | YCT UNR        | Number of ROIs: 4; ROIs: (1) L IFG (oper/tri); (2) L posterior perisylvian (pSTG, pMTG, AG, SMG); (3) R IFG (oper/tri); (4) R posterior perisylvian (pSTG, pMTG, AG, SMG); (5) language network LI; how ROIs defined: Harvard-Oxford atlas None |
| Tyler et al. (2011): Vox 5     | Listening to ambiguous sentences (dominant and subordinate) vs unambiguous sentences | CC                                                                  | NANB NANT VOX C- | Search volume: plausible fronto-temporo-parietal language regions; software: SPM5; voxelwise p: .01; cluster extent cutoff: based on GRFT ↑ L IFG pars triangularis ↑ L IFG pars orbitalis ↑ R insula ↑ R mid temporal notes: also L pMTG but this did not reach significance None |
| Tyler et al. (2011): Vox 8     | Listening to ambiguous sentences (dominant and subordinate) vs unambiguous sentences | CC                                                                  | NANB NANT VOX C- | Search volume: plausible fronto-temporo-parietal language regions; software: SPM5; voxelwise p: .01; cluster extent cutoff: based on GRFT None |
| Tyler et al. (2011): ROI 1     | Listening to ambiguous sentences (dominant and subordinate) vs unambiguous sentences | CC                                                                  | NANB NANT ROI ANAT NC | Number of ROIs: 3; ROIs: (1) IFG opercularis; (2) IFG pars triangularis; (3) IFG pars orbitalis; how ROIs defined: AAL ↑ L IFG pars triangularis ↑ L IFG pars orbitalis None |
| Tyler et al. (2011): ROI 2     | Listening to ambiguous sentences (dominant and subordinate) vs unambiguous sentences | CC                                                                  | NANB NANT ROI ANAT NC | Number of ROIs: 3; ROIs: (1) IFG opercularis; (2) IFG pars triangularis; (3) IFG pars orbitalis; how ROIs defined: AAL None |
| Allendorfer et al. (2012): ROI 4 | Verb generation (overt, event-related) vs noun repetition (event-related)  | C                                                                 | UNR ROI Func NC | Number of ROIs: 3; ROIs: (1) L MTG; (2) L SFG/CG; (3) left MFG; how ROIs defined: regions activated by the contrast of overt verb generation vs noun repetition in patients ↑ L dorsolateral prefrontal cortex ↑ L SMA/medial prefrontal None |
| Allendorfer et al.             | Verb generation (overt, event-related) vs verb                                | C                                                                 | UNR ROI Func NC | Number of ROIs: 2; ROIs: (1) R insula/IFG; (2) R STG; how ROIs defined: prominent R hemisphere None |
| Year | Study | Task/Condition | Covariate | ROIs | Number of ROIs | ROIs Defined |
|------|-------|----------------|------------|------|---------------|--------------|
| 2012 | Griffis, Nenert, Allendorfer, & Szaflarski (2017): ROI 1 | Semantic decision vs tone decision | Covariate: average of semantic and phonemic fluency | CC Aphasia | 3 | ROIs are mixing coefficients of functional networks arising from mCCA + jICA that were differently represented in the patient and control groups |

- **Number of ROIs**: 3; ROIs: (1) L AG and bilateral midline components of the canonical semantic network, along with reduced activity in R frontal, temporal and parietal regions; (2) bilateral IFG pars orbitalis; (3) L IFG and DLPFC along with bilateral midline regions; how ROIs defined: ROIs are mixing coefficients of functional networks arising from mCCA + jICA that were differently represented in the patient and control groups.

- **Activations**:
  - **↑**: L IFG
  - **↑**: L dorsolateral prefrontal cortex
  - **↑**: L SMA/medial prefrontal
  - **↑**: L angular gyrus
  - **↑**: L precuneus
  - **↑**: L posterior cingulate
  - **↑**: R IFG pars orbitalis
  - **↑**: R IFG pars opercularis
  - **↑**: R IFG pars triangularis
  - **↑**: R insula
  - **↑**: R dorsal precentral
  - **↑**: R supramarginal gyrus
  - **↑**: R posterior STG
  - **↑**: R mid temporal gyri
  - **↓**: L insula
  - **↓**: R IFG pars opercularis
  - **↓**: R IFG pars triangularis
  - **↓**: R insula
  - **↓**: R dorsal precentral
  - **↓**: R supramarginal gyrus
  - **↓**: R posterior STG
  - **↓**: R mid temporal gyri

- **Notes**: all 3 networks were significantly correlated; analysis of networks so involvement of each individual region cannot be assured.
Griffis, Nenert, Allendorfer, & Szafarski (2017): ROI 3

| Semantic decision vs tone decision | CC Aphasia Covariate: BNT | UNR UNR | ROI Oth FWE | Number of ROIs: 3; ROIs: (1) L AG and bilateral midline components of the canonical semantic network, along with reduced activity in R frontal, temporal and parietal regions; (2) bilateral IFG pars orbitalis; (3) L IFG and DLPFC along with bilateral midline regions; how ROIs defined: ROIs are mixing coefficients of functional networks arising from mCCA + jICA that were differently represented in the patient and control groups |

Griffis, Nenert, Allendorfer, Vannest, et al. (2017): ROI 3

| Semantic decision vs tone decision | CC Aphasia Covariate: lesion volume | UNR UNR | ROI Func FWE | Number of ROIs: 5; ROIs: (1) overall canonical semantic network (CSN); (2) L CSN; (3) R CSN; (4) mirror L CSN in R; (5) out-of-network CSN in R; how ROIs defined: control data |

Griffis, Nenert, Allendorfer, Vannest, et al. (2017): ROI 3

| Semantic decision vs tone decision | CC Aphasia Covariate: semantic decision accuracy | C UNR | ROI Func One | Number of ROIs: 1; ROI: CSN; how ROI defined: control data; lesion volume covariate |

Note: networks 1 and 3 were significantly correlated; analysis of networks so involvement of each individual region cannot be assured.
| Study | Semantic decision vs tone decision | CC | UNR | UNR | ROI | Func | Number of ROIs: 1; ROI: CSN; how ROI defined: control data; lesion volume covariate |
|-------|----------------------------------|----|-----|-----|-----|------|-----------------------------------------------|
| Griffis, Nenert, Allendorfer, Vannest, et al. (2017): ROI 4 | Semantic decision vs tone decision | CC | UNR | UNR | ROI | Func | Number of ROIs: 1; ROI: CSN; how ROI defined: control data; lesion volume covariate |

- L IFG
- L dorsolateral prefrontal cortex
- L SMA/medial prefrontal
- L angular gyrus
- L precuneus
- L mid temporal
- L anterior temporal
- L posterior cingulate
- L cerebellum
- R IFG
- R dorsolateral prefrontal cortex
- R SMA/medial prefrontal
- R angular gyrus
- R precuneus
- R anterior temporal
- R posterior cingulate
- R cerebellum

Notes: correlation calculated for the whole network of regions, so correlation of individual regions cannot be assured.
| Study                                      | Task                        | CC          | UNR   | UNR   | Cplx | Notes                                                                 |
|-------------------------------------------|-----------------------------|-------------|-------|-------|------|----------------------------------------------------------------------|
| Nenert et al. (2017): Cplx 7              | Semantic decision vs tone decision | CC           | UNR   | UNR   | Cplx | For the 4 R hemisphere regions that were more activated in patients with larger lesions (SPM analysis 4), analyses were carried out to determine whether the semantic fluency or naming measures were differentially impacted by activation depending on whether lesions were larger or smaller. Other: For 1 of the 4 regions (R SMA), there were significant interactions such that in patients with larger lesions, more activation was associated with higher semantic fluency scores and higher BNT scores, while in patients with smaller lesions, more activation was associated with lower fluency and BNT scores. There was a similar relationship with semantic fluency in the R IFG pars opercularis but only at p(FDR) = 0.07. |
| Griffis, Nenert, Allendorfer, Vannest et al. (2017): Cplx 7 | Semantic decision vs tone decision | CC           | UNR   | UNR   | Cplx | For the 4 R hemisphere regions that were more activated in patients with larger lesions (SPM analysis 4), analyses were carried out to determine whether the semantic fluency or naming measures were differentially impacted by activation depending on whether lesions were larger or smaller. Other: For 1 of the 4 regions (R SMA), there were significant interactions such that in patients with larger lesions, more activation was associated with higher semantic fluency scores and higher BNT scores, while in patients with smaller lesions, more activation was associated with lower fluency and BNT scores. There was a similar relationship with semantic fluency in the R IFG pars opercularis but only at p(FDR) = 0.07. |

ROI 5

↑ L angular gyrus
↑ L precuneus
↑ L mid temporal
↑ L anterior temporal
↑ L posterior cingulate
↑ L cerebellum
↑ R IFG
↑ R dorsolateral prefrontal cortex
↑ R SMA/medial prefrontal
↑ R angular gyrus
↑ R precuneus
↑ R anterior temporal
↑ R posterior cingulate
↑ R cerebellum

Notes: correlation calculated for the whole network of regions, so correlation of individual regions cannot be assured.

↑ L anterior temporal
| Hartwigsen et al. (2020): Cplx 1 | Syllable count decision vs rest | CC | Aphasias after cTBS to posterior IFG vs sham; same patients, repeated measures | Covariate: Δ RT for syllable decision (cTBS to posterior IFG timepoint vs sham timepoint) | UNR | C | Cplx | Whole brain correlations were computed between the difference in functional activity after cTBS to posterior IFG versus sham stimulation, and the difference in reaction times on the syllable counting task under these two conditions. The resulting SPM was thresholded at voxelwise p < .001 (CDT) followed by correction for multiple comparisons based on cluster extent and GRFT using SPM12. |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hartwigsen et al. (2020): Cplx 2 | Semantic decision vs rest | CC | Aphasias after cTBS to anterior IFG vs sham; same patients, repeated measures | Covariate: Δ RT for semantic decision (cTBS to posterior IFG timepoint vs sham timepoint) | UNR | C | Cplx | Whole brain correlations were computed between the difference in functional activity after cTBS to anterior IFG versus sham stimulation, and the difference in reaction times on the semantic decision task under these two conditions. The resulting SPM was thresholded at voxelwise p < .001 (CDT) followed by correction for multiple comparisons based on cluster extent and GRFT using SPM12. |

Second level contrast = Which of the 8 relevant classes of analyses is this? Which group or groups of participants are included? If there is a covariate, what is it?; Acc = Is accuracy matched across the second level contrast?; RT = Is reaction time matched across the second level contrast?; Stats = Does the analysis involve voxelwise statistics, region(s) of interest (ROI), or something else (complex)? If voxelwise, how are multiple comparisons across voxels accounted for? If ROI, were the ROI(s) anatomical, functional, laterality indices, mixed, or something else? If there was more than one ROI, how were the ROIs corrected for multiple comparisons?; Yellow underline = minor limitation; Orange underline = moderate limitation; Red underline = major limitation; CC = Cross-sectional correlation with language or other measure; YCT = Yes, correct trials only; C = Accuracy or RT is covariate; UNR = Unknown, not reported; NANB = N/A, no behavioral measure; NANT = N/A, no timeable task; Vox = Voxelwise; VP = Voxelwise correction based on permutation testing; VFWC = Voxelwise FWE correction and additional arbitrary cluster correction; C- = Clusterwise correction with with GRFT and lenient voxelwise p; ROI = Region(s) of interest; Anat = Anatomical; Func = Functional; Oth = Other; Mix = Mixed; FWE = Familywise error (FWE); NC = No correction; One = One only; Cplx = Complex.
Supplementary Table S13. Longitudinal change in aphasia: Methodologically robust analyses

| Analysis et al. (2006): ROI 1 | First level contrast | Second level contrast | Matched for Acc | Stats | Notes | Findings |
|-------------------------------|----------------------|----------------------|-----------------|-------|-------|----------|
| Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA Aphasia T2 vs T1 | AM UNR | ROI Func FWE | Behavioral data notes: accuracy combines language and control conditions; number of ROIs: 6; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R insula; (5) R IFG pars triangularis; (6) R SMA; how ROIs defined: peak voxels of overall activation map based on all three time points in patients | ↑ R insula |

| Saur et al. (2006): ROI 2 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA Aphasia T3 vs T2 | AM UNR | ROI Func FWE | Behavioral data notes: accuracy combines language and control conditions; number of ROIs: 6; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R insula; (5) R IFG pars triangularis; (6) R SMA; how ROIs defined: peak voxels of overall activation map based on all three time points in patients | None |

| Saur et al. (2006): ROI 3 | Listening to sentences and making a plausibility judgment vs listening to reversed speech | LA Aphasia T3 vs T1 | AM UNR | ROI Func FWE | Behavioral data notes: accuracy combines language and control conditions; number of ROIs: 6; ROIs: (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R insula; (5) R IFG pars triangularis; (6) R SMA; how ROIs defined: peak voxels of overall activation map based on all three time points in patients | ↑ L posterior MTG |

| Nenert et al. (2017): ROI 1 | Semantic decision vs tone decision | LA Aphasia ANOVA including T1, T2, T3 | AS UNR | ROI Li NC | Number of ROIs: 5; ROIs: (1) frontal Li; (2) temporo-parietal Li; (3) cerebellar Li; (4) fronto-parietal Li; (5) Broca’s Li | None |

| Nenert et al. (2018): Cplx 1 | Semantic decision vs tone decision | LA Aphasia (comparisons between all pairs of time points) | AS UNR | Cplx | PPI analyses were carried out to investigate potential changes over time in how connectivity from L and R IFG was modulated by the semantic decision task. The resultant SPM was thresholded at FWE p < .05 using permutation testing implemented in SnPM 13. | None |

Second level contrast = Which of the 8 relevant classes of analyses is this? Which group or groups of participants are included? If there is a covariate, what is it?; Acc = Is accuracy matched across the second level contrast?; RT = Is reaction time matched across the second level contrast?; Stats = Does the analysis involve voxelwise statistics, region(s) of interest (ROI), or something else (complex)? If voxelwise, how are multiple comparisons across voxels accounted for? If ROI, were the ROI(s) anatomical, functional, laterality indices, mixed, or something else? If there was more than one ROI, how were the ROIs corrected for multiple comparions?; Yellow underline = minor limitation; Orange underline = moderate limitation; Red underline = major limitation; LA = Longitudinal change in aphasia; AS = Appear similar; AM = Appear mismatched; UNR = Unknown, not reported; ROI = Region(s) of interest; Func = Functional; Li = Laterality indices; FWE = Familywise error (FWE); NC = No correction; Cplx = Complex.
Supplementary Table S14. Cross-sectional between two groups with aphasia: Methodologically robust analyses

| Analysis                      | First level contrast                  | Second level contrast                   | Matched for | Stats | Notes | Findings                          |
|-------------------------------|---------------------------------------|-----------------------------------------|-------------|-------|-------|-----------------------------------|
| Leff et al. (2002): ROI 2     | Higher word rates vs lower word rates | CAA Aphasia with pSTS damage (n = 6) vs aphasia without pSTS damage (n = 9) | NANT        | ROI   | Func  | Number of ROIs: 1; ROI: R pSTS; how ROI defined: the peak voxel for the contrast in the R pSTS from each subject's individual analysis, but the search region is not stated; the controls and patients without pSTS damage were combined, however it is stated in the caption to Figure 2 that the patients with pSTS damage were significantly different to both |
| Blank et al. (2003): Vox 3    | Propositional speech production vs rest | CAA Aphasia with IFG POp damage (n = 7) vs without IFG POp damage (n = 7) | NANT        | Vox   | SVC   | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis |
| Blank et al. (2003): Vox 6    | Propositional speech production vs counting | CAA Aphasia with IFG POp damage (n = 7) vs without IFG POp damage (n = 7) | NANT        | Vox   | SVC   | Behavioral data notes: word rates not reported, but offline speech sample differed; search volume: voxels spared in all patients; software: SPM99; voxelwise p: FWE p < .05 with SVC in R pars opercularis |
| Crinion & Price (2005): Vox 3 | Listening to narrative speech vs listening to reversed speech | CAA Aphasia with temporal lobe damage (n = 8) vs without temporal lobe damage (n = 9) | NANT        | Vox   | VFWC  | Search volume: whole brain; software: SPM2; voxelwise p: FWE p < .05; cluster extent cutoff: 5 voxels (size not stated) |
| Crinion & Price (2005): Cplx 4 | Listening to narrative speech vs listening to reversed speech | CAA Aphasia with temporal damage (n = 8) vs without temporal damage (n = 9) | NANT        | Cplx  |       | Correlations were computed between activity in each voxel, and post-scan story recall, and were compared between the two aphasia groups, in regions with a main effect of story comprehension. The threshold was p < 0.05 corrected, plus a minimum cluster size of 5 voxels. |
| Crinion et al. (2006): ROI 3 | Listening to narrative speech vs listening to reversed speech | CAA Aphasia with temporal damage excluding anterior temporal cortex (n = 9) vs with no temporal lobe damage (excluding 1 with missing behavioral data and 1 outlier) (n = 4) | NANT        | ROI   | Func  | Number of ROIs: 1; ROI: L ATL; how ROI defined: activation in the control group; two other ROIs are described in the methods, but never used in any analyses |
| Warren et al. (2009): ROI 11  | Listening to narrative speech vs listening to reversed speech | CAA Aphasia with positive anterior temporal interconnectivity (n = 8) vs with negative anterior temporal | NANT        | ROI   | Anat  | Number of ROIs: 6; ROIs: (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts; how ROIs defined: ROIs were defined anatomically in regions |

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interconnectivity (n = 8) that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6); excluded 4 patients with L IFG damage

| Hartwigsen et al. (2020): Vox 1 | Syllable count decision vs rest | CAA Aphasia after cTBS to posterior IFG vs sham; same patients, repeated measures | Y | N | Vox C+ | Behavioral data notes: significantly slower response times when cTBS was applied over pIFG relative to when sham cTBS was applied; search volume: voxels spared in all patients; software: SPM12; voxelwise p: .001; cluster extent cutoff: based on GRFT ↓ L IFG pars opercularis ↓ L SMA/medial prefrontal ↓ R SMA/medial prefrontal ↓ R basal ganglia notes: based on Figure 4A and Table 3 |
| Hartwigsen et al. (2020): Vox 2 | Syllable count decision vs rest | CAA Aphasia after cTBS to posterior IFG vs after cTBS to anterior IFG; same patients, repeated measures | Y | N | Vox C+ | Behavioral data notes: significantly slower response times when cTBS was applied over pIFG relative to when cTBS was applied over aIFG; search volume: voxels spared in all patients; software: SPM12; voxelwise p: .001; cluster extent cutoff: based on GRFT ↓ L IFG pars opercularis notes: based on Table 3 |
| Hartwigsen et al. (2020): Vox 3 | Semantic decision vs rest | CAA Aphasia after cTBS to anterior IFG vs sham; same patients, repeated measures Somewhat valid (no behavioral difference) | Y | Y | Vox C+ | Behavioral data notes: difference in reaction time did not survive correction; search volume: voxels spared in all patients; software: SPM12; voxelwise p: .001; cluster extent cutoff: based on GRFT ↓ L insula ↓ R insula ↓ R dorsolateral prefrontal cortex ↓ R SMA/medial prefrontal notes: based on Figure 4B and Table 3 |
| Hartwigsen et al. (2020): Vox 4 | Semantic decision vs rest | CAA Aphasia after cTBS to anterior IFG vs after cTBS to posterior IFG ; same patients, repeated measures | Y | N | Vox C+ | Behavioral data notes: significantly slower response times when cTBS was applied over aIFG relative to when cTBS was applied over pIFG; search volume: voxels spared in all patients; software: SPM12; voxelwise p: .001; cluster extent cutoff: based on GRFT ↓ L insula ↓ R insula ↓ R dorsolateral prefrontal cortex notes: based on Table 3 |

Second level contrast = Which of the 8 relevant classes of analyses is this? Which group or groups of participants are included? If there is a covariate, what is it?; Acc = Is accuracy matched across the second level contrast?; RT = Is reaction time matched across the second level contrast?; Stats = Does the analysis involve voxelwise statistics, region(s) of interest (ROI), or something else (complex)? If voxelwise, how are multiple comparisons across voxels accounted for? If ROI, were the ROI(s) anatomical, functional, laterality indices, mixed, or something else? If there was more than one ROI, how were the ROIs corrected for multiple comparions?; Yellow underline = minor limitation; Orange underline = moderate limitation; Red underline = major limitation; CAA = Cross-sectional between two groups with aphasia; Y = Yes, matched; N = No, different; NANB = N/A, no behavioral measure; NANT = N/A, no timeable task; Vox = Voxelwise; C+ = Clusterwise correction with with GRFT and stringent voxelwise p; VFWC = Voxelwise FWE correction and additional arbitrary cluster correction; SVC = Small volume correction; ROI = Region(s) of interest; Anat = Anatomical; Func = Functional; NC = No correction; One = One only; Cplx = Complex.
## Supplementary Table S15. Cross-sectional performance-defined conditions: Methodologically robust analyses

| Analysis                      | First level contrast                                                                 | Second level contrast | Matched for | Stats | Notes | Findings                                      |
|-------------------------------|--------------------------------------------------------------------------------------|-----------------------|--------------|-------|-------|-----------------------------------------------|
| Fridriksson et al. (2009): Vox 2 | Picture naming (phonemic paraphasias) vs picture naming (correct trials)             | CB Aphasia           | NBD          | UNR   | Vox C- | Search volume: voxels spared in all patients; software: FSL (FEAT 5.4); voxelwise p: ~.01 (z > 2.3); cluster extent cutoff: based on GRFT | ↑ L superior parietal  
|                               |                                                                                      |                       |              |       |       | ↑ L posterior inferior temporal gyrus/fusiform gyrus  
|                               |                                                                                      |                       |              |       |       | ↑ R occipital                                |
| Fridriksson et al. (2009): Vox 3 | Picture naming (semantic paraphasias) vs picture naming (correct trials)             | CB Aphasia           | NBD          | UNR   | Vox C- | Search volume: voxels spared in all patients; software: FSL (FEAT 5.4); voxelwise p: ~.01 (z > 2.3); cluster extent cutoff: based on GRFT | ↑ R posterior inferior temporal gyrus/fusiform gyrus  
|                               |                                                                                      |                       |              |       |       | ↑ R occipital                                |
| Skipper-Kallal et al. (2017a): Vox 5 | Picture naming (both phases, correct trials) vs picture naming (both phases, incorrect trials) | CB Aphasia with naming < 80% (n = 24) | NBD          | UNR   | Vox C- | Search volume: whole brain gray matter; software: FSL 5.0.6; voxelwise p: ~.01 (z > 2.3); cluster extent cutoff: based on GRFT | None |
| Pillay et al. (2018): Vox 1    | Reading nouns aloud (correct trials) vs reading nouns aloud (incorrect trials)        | CB Aphasia           | NBD          | Y     | Vox CCS | Search volume: whole brain; software: AFNI; voxelwise p: .01; cluster extent cutoff: 1.609 cc; regarding correction for multiple comparisons, addition of monoeponential function reduces but does not eliminate inflation of p values (Cox et al., 2017) | ↑ L angular gyrus  
|                               |                                                                                      |                       |              |       |       | ↓ L ventral precentral/inferior frontal junction  
|                               |                                                                                      |                       |              |       |       | ↓ L SMA/medial prefrontal  
|                               |                                                                                      |                       |              |       |       | ↓ R insula                                  
|                               |                                                                                      |                       |              |       |       | ↓ R ventral precentral/inferior frontal junction  
|                               |                                                                                      |                       |              |       |       | ↓ R SMA/medial prefrontal  
|                               |                                                                                      |                       |              |       |       | notes: positive region (L AG) was part of the semantic network, while many negative regions were positively modulated by reaction time in the aphasia group |

Second level contrast = Which of the 8 relevant classes of analyses is this? Which group or groups of participants are included? If there is a covariate, what is it?; Acc = Is accuracy matched across the second level contrast?; RT = Is reaction time matched across the second level contrast?; Stats = Does the analysis involve voxelwise statistics, region(s) of interest (ROI), or something else (complex)? If voxelwise, how are multiple comparisons across voxels accounted for? If ROI, were the ROI(s) anatomical, functional, laterality indices, mixed, or something else? If there was more than one ROI, how were the ROIs corrected for multiple comparisons?; Yellow underline = minor limitation; Orange underline = moderate limitation; Red underline = major limitation; CB = Cross-sectional performance-defined conditions; Y = Yes, matched; NBD = No, by design; UNR = Unknown, not reported; Vox = Voxelwise; C- = Clusterwise correction with with GRFT and lenient voxelwise p; CCS = Clusterwise correction based on 3dClustSim.
**Supplementary Table S16: Complete coding of all included studies**

**Weiller et al. (1995)**

| Reference |  |
|-----------|--|
| **Authors** | Weiller C, Isensee C, Rijntjes M, Huber W, Müller S, Bier D, Dutschka K, Woods RP, Noth J, Diener HC |
| **Title** | Recovery from Wernicke's aphasia: a positron emission tomographic study |
| **Reference** | Ann Neurol 1995; 37: 723-732 |
| **PMID** | 7778845 |
| **DOI** | 10.1002/ana.410370605 |

| Participants |  |
|--------------|--|
| **Language** | German |
| **Inclusion criteria** | Lesion including L pSTG; moderate-to-severe Wernicke's aphasia in the subacute period; now recovered and not aphasic per formal testing; able to perform verb generation task |
| **Number of individuals with aphasia** | 6 |
| **Number of control participants** | 6 |
| **Were any of the participants included in any previous studies?** | No |
| **Is age reported for patients and controls, and matched?** | No (mean 58 years, range 50-66 years; controls were younger: mean 35 years; range 27-50 years) |
| **Is sex reported for patients and controls, and matched?** | Yes (males: 6; females: 0) |
| **Is handedness reported for patients and controls, and matched?** | Yes (right: 6; left: 0) |
| **Is time post stroke onset reported and appropriate to the study design?** | Yes (range 5-117 months) |
| **To what extent is the nature of aphasia characterized?** | Comprehensive battery |
| **Language evaluation** | AAT |
| **Aphasia severity** | Recovered; not aphasic per formal testing |
| **Aphasia type** | Recovered, but all had moderate-severe Wernicke's aphasia in the subacute period |
| **First stroke only?** | Yes |
| **Stroke type** | Ischemic only |
| **To what extent is the lesion distribution characterized?** | Individual lesions |
| **Lesion extent** | Not stated |
| **Lesion location** | Posterior L MCA infarct, lesion to the L posterior STG usually extending to MTG and AG |
| **Participants notes** | 6 patients were selected from a database of 600 carefully documented cases |

| Imaging |  |
|---------|--|
| **Modality** | PET (rCBF) |
| **Is the study cross-sectional or longitudinal?** | Cross-sectional |
| **If longitudinal, at what time point(s) were imaging data acquired?** | — |
| **If longitudinal, was there any intervention between the time points?** | — |
| **Is the scanner described?** | Yes (CTI ECAT 953/15) |
| **Is the timing of stimulus presentation and image acquisition clearly described and appropriate?** | Yes |
| **Design type** | PET |
| **Total images acquired** | 6 |
| **Are the imaging acquisition parameters, including coverage, adequately described and appropriate?** | Yes (axial; field of view = 5.4 cm; perisylvian only) |
Is preprocessing and intrasubject coregistration adequately described and appropriate?  Yes
Is first level model fitting adequately described and appropriate?  Yes
Is intersubject normalization adequately described and appropriate?  Yes
Imaging notes  —

Conditions
Are the conditions clearly described?  Yes

| Condition          | Response type         | Repetitions | All groups could do? | All individuals could do? |
|--------------------|-----------------------|-------------|----------------------|---------------------------|
| verb generation    | Multiple words (covert) | 2           | Yes                  | Yes                       |
| pseudoword repetition | Multiple words (covert) | 2           | Yes                  | Yes                       |
| rest               | None                   | 2           | N/A                  | N/A                       |

Conditions notes  Auditory presentation; pre-scan behavioral data reported

Contrasts
Are the contrasts clearly described?  Yes

Contrast 1: verb generation vs rest
Language condition  Verb generation
Control condition  Rest
Are the conditions matched for visual demands?  Yes
Are the conditions matched for auditory demands?  No
Are the conditions matched for motor demands?  Yes
Are the conditions matched for cognitive/executive demands?  No
Is accuracy matched between the language and control tasks for all relevant groups?  N/A, tasks not comparable
Is reaction time matched between the language and control tasks for all relevant groups?  N/A, tasks not comparable
Behavioral data notes  —
Are control data reported in this paper or another that is referenced?  Somewhat
Does the contrast selectively activate plausible relevant language regions in the control group?  Yes
Are activations lateralized in the control data?  Yes
Control activation notes  L posterior temporal, IFG and ventral precentral gyrus, much smaller activations in the R hemisphere
Contrast notes  —

Contrast 2: pseudoword repetition vs rest
Language condition  Pseudoword repetition
Control condition  Rest
Are the conditions matched for visual demands?  Yes
Are the conditions matched for auditory demands?  No
Are the conditions matched for motor demands?  Yes
Are the conditions matched for cognitive/executive demands?  No
Is accuracy matched between the language and control tasks for all relevant groups?  N/A, tasks not comparable
Is reaction time matched between the language and control tasks for all relevant groups?  N/A, tasks not comparable
Behavioral data notes  —
Are control data reported in this paper or another that is referenced? | **Somewhat**
---|---
Does the contrast selectively activate plausible relevant language regions in the control group? | **Somewhat**
Are activations lateralized in the control data? | **Somewhat**
Control activation notes | L posterior temporal only; similar but less extensive activation in the R hemisphere
Contrast notes | —

### Analyses

Are the analyses clearly described? | Yes
---|---

### Voxelwise analysis 1

| First level contrast | Verb generation vs rest |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Behavioral data notes | In practice trials, patients produced 1.5 words on average per prompt, not all of which were verbs, while controls 2.3 words on average per prompt, almost all of which were verbs
---|---
Type of analysis | Voxelwise |
Search volume | Perisylvian |
Correction for multiple comparisons | No direct comparison |
Software | SPM |
Voxelwise p | — |
Cluster extent | — |
Statistical details | Qualitative comparison on p. 729 (the word “significant” is used)
Findings | ↑ R IFG
↑ R posterior STG/STS/MTG
↓ L posterior STG/STS/MTG |
Findings notes | Based more on Figure 2 than the text

### Voxelwise analysis 2

| First level contrast | Pseudoword repetition vs rest |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear similar |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Behavioral data notes | All participants are reported to have had no difficulties in performing the repetition task
---|---
Type of analysis | Voxelwise |
Search volume | Perisylvian |
Correction for multiple comparisons | No direct comparison |
Software | SPM |
Voxelwise p | — |
Cluster extent | — |
Statistical details | Qualitative comparison on p. 729 (the word “significant” is used)
Findings | ↑ L ventral precentral/inferior frontal junction
| Findings notes | Based more on Figure 2 than the text |
|---------------|-------------------------------------|

**Notes**

**Excluded analyses**

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**Belin et al. (1996)**

**Reference**

| Authors | Belin P, Van Eeckhout P, Zilbovicius M, Remy P, François C, Guillaume S, Chain F, Rancurel G, Samson Y |
|---------|---------------------------------------------------------------------------------------------------|
| Title   | Recovery from nonfluent aphasia after melodic intonation therapy: a PET study |
| Reference | Neurology 1996; 47: 1504-1511 |
| PMID    | 8960735 |
| DOI     | 10.1212/wnl.47.6.1504 |

**Participants**

| Language | French |
|----------|--------|
| Inclusion criteria | MCA; persistent severe non-fluent aphasia followed by marked improvement with MIT |
| Number of individuals with aphasia | 7 |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (mean 49.7 years, range 40-58 years) |
| Is sex reported for patients and controls, and matched? | No |
| Is handedness reported for patients and controls, and matched? | Yes (right: 7; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 15-149 months; including MIT for the most recent 1-108 months) |
| To what extent is the nature of aphasia characterized? | Severity and type |
| Language evaluation | BDAE |
| Aphasia severity | Persistent severe non-fluent aphasia followed by marked improvement with MIT |
| Aphasia type | 5 global, 2 Broca's |
| First stroke only? | Not stated |
| Stroke type | Not stated |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent | Not stated, but note that hypoperfusion greatly exceeded the infarct in all but 1 patient |
| Lesion location | L MCA; 2 also had ACA |
| Participants notes | — |

**Imaging**

| Modality | PET (rCBF) |
|----------|------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Question                                                                 | Answer         |
|-------------------------------------------------------------------------|----------------|
| Is the scanner described?                                               | Yes (CEA LETI-TTV03) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes           |
| Design type                                                             | PET            |
| Total images acquired                                                   | 4              |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (7 transaxial slices 12 mm apart) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes           |
| Is first level model fitting adequately described and appropriate?      | Yes            |
| Is intersubject normalization adequately described and appropriate?     | Yes            |
| Imaging notes                                                           | —              |

### Conditions

**Are the conditions clearly described?** Yes

| Condition                                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|------------------------------------------------|---------------|-------------|-----------------------|---------------------------|
| word repetition with MIT-like intonation       | Word (overt)  | 1           | Yes                   | Unknown                   |
| word repetition                                | Word (overt)  | 1           | Yes                   | Unknown                   |
| listening to words                             | None          | 1           | N/A                   | N/A                       |
| rest                                           | None          | 1           | N/A                   | N/A                       |

**Conditions notes** —

### Contrasts

**Are the contrasts clearly described?** Yes

#### Contrast 1: word repetition with MIT-like intonation vs word repetition

| Language condition | Word repetition with MIT-like intonation | Control condition | Word repetition |
|--------------------|-----------------------------------------|-------------------|----------------|
| Are the conditions matched for visual demands? | Yes | Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands?  | Yes | Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | No, by design | Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes | More words were correctly repeated with MIT (16.3 ± 8) than without (12.4 ± 8; p < 0.03) | Are control data reported in this paper or another that is referenced? | N/A |
| Does the contrast selectively activate plausible relevant language regions in the control group? | N/A | Are activations lateralized in the control data? | N/A |
| Control activation notes | — | Contrast notes | — |

### Analyses

**Are the analyses clearly described?** Yes

#### ROI analysis 1

| First level contrast | Word repetition with MIT-like intonation vs word repetition |
|----------------------|------------------------------------------------------------|
| Analysis class       | Cross-sectional performance-defined conditions             |
| Group(s) | Aphasia |
|----------|---------|
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, by design |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | More words were correctly repeated with MIT (16.3 ± 8) than without (12.4 ± 8; p < 0.03) |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Anatomical |
| How many ROIs are there? | 18 |
| What are the ROI(s)? | (1) L Broca’s area; (2) L prefrontal; (3) L sensorimotor mouth; (4) L parietal; (5) L Wernicke’s area; (6) L Heschl’s gyrus; (7) L anterior STG; (8) L MTG; (9) L temporal pole; (10-18) homotopic counterparts |
| How are the ROI(s) defined? | Individual anatomical images; activation quantified as mean rCBF, not including any intersection of the infarct with the ROI |
| Correction for multiple comparisons | No correction |
| Statistical details | Three left hemisphere ROIs were excluded (3, 6, 9) because they were completely infarcted in 4 or more patients |
| Findings | ↑ L IFG |
| Findings notes | ↑ L dorsolateral prefrontal cortex |
| Findings notes | ↓ R posterior STG |
| Notes | Excluded analyses | Two other contrasts are also reported, but do not fall within the scope of this review |

**Ohyama et al. (1996)**

**Reference**

**Authors**

Ohyama M, Senda M, Kitamura S, Ishii K, Mishina M, Terashi A

**Title**

Role of the nondominant hemisphere and undamaged area during word repetition in poststroke aphasics: a PET activation study

**Reference**

*Stroke* 1996; 27: 897-903

**PMID**

8623110

**DOI**

10.1161/01.str.27.5.897

**Participants**

**Language**

Japanese

**Inclusion criteria**

Able to repeat single words

**Number of individuals with aphasia**

16

**Number of control participants**

6

**Were any of the participants included in any previous studies?**

No

**Is age reported for patients and controls, and matched?**

Yes (mean 56.6 ± 11.8 years, range 38-75 years)

**Is sex reported for patients and controls, and matched?**

Yes (males: 12; females: 4)

**Is handedness reported for patients and controls, and matched?**

Yes (right: 16; left: 0)

**Is time post stroke onset reported and appropriate to the study design?**

No* (moderate limitation) (mean 15.1 ± 16.7 months, range 1.1-50.3 months; a mix of subacute and chronic participants; 8 of each)
To what extent is the nature of aphasia characterized?

| Language evaluation | Comprehensive battery |
|---------------------|------------------------|
| Aphasia severity    | AQ mean 74.3 ± 12.2, range 53.8-92.4 |
| Aphasia type        | 6 anomic, 4 atypical, 4 mild Broca's, 1 mild Wernicke's, 1 transcortical sensory; alternately: 10 fluent, 6 non-fluent |

First stroke only? Yes
Stroke type Ischemic only

To what extent is the lesion distribution characterized?

| Lesion extent | Mean 33.9 ± 26.3 cc, range 8.1-113.2 cc |
| Lesion location | L perisylvian |

Imaging

| Modality | PET (rCBF) |
|----------|------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Headtome IV tomograph) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | PET |
| Total images acquired | 6 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | No (91 mm field of view; coverage limitations not stated) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed) |

Conditions

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|---------------------------|
| word repetition | Word (overt) | 2 | Yes | Yes |
| counting | Multiple words (overt) | 2 | Yes | Yes |
| rest | None | 2 | N/A | N/A |

Conditions notes Patients were able to repeat words well, with phonemic errors on no more than 4 out of 48 words; counting condition not analyzed in this paper

Contrasts

| Contrast 1: word repetition vs rest |
|------------------------------------|
| Language condition | Word repetition |
| Control condition | Rest |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Question                                                                 | Answer                                                                 |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| Are the conditions matched for cognitive/executive demands?             | No                                                                     |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                               |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                               |
| Behavioral data notes                                                   | —                                                                      |
| Are control data reported in this paper or another that is referenced?  | Somewhat                                                              |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                                                              |
| Are activations lateralized in the control data?                        | No                                                                    |
| Control activation notes                                                | Bilateral auditory and motor activations are prominent, only slightly L-lateralized |
| Contrast notes                                                          | —                                                                      |

**Analyses**

| Question                                                                 | Answer                                                                 |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| Are the analyses clearly described?                                      | No (see specific limitation(s) below)                                  |

**ROI analysis 1**

| First level contrast | Word repetition vs rest |
|----------------------|-------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia vs control |
| Covariate            | —                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Some of the patients made a few errors, so as a group they may have been less accurate than controls |
| Type of analysis      | Regions of interest (ROI) |
| ROI type              | Functional               |
| How many ROIs are there?                                             | 7                        |
| What are the ROI(s)?                                                | (1) L posterior inferior frontal; (2) R posterior inferior frontal; (3) L posterior superior temporal; (4) R posterior superior temporal; (5) L Rolandic; (6) R Rolandic; (7) SMA |
| How are the ROI(s) defined?                                          | Spheres around control peaks |
| Correction for multiple comparisons                                  | No correction            |
| Statistical details                                                | The rCBF increase in R PIF was also significant at p < 0.005 for nonfluent patients with Fisher’s protected least-significant difference |
| Findings                                                            | ↑ R IFG                  |
| Findings notes                                                      | ↑ R posterior STG/STS/MTG |

**ROI analysis 2**

| First level contrast | Word repetition vs rest |
|----------------------|-------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia fluent (n = 10) vs non-fluent (n = 6) |
| Covariate            | —                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                       |
| Type of analysis | Regions of interest (ROI) |
|------------------|---------------------------|
| ROI type         | Functional                |
| How many ROIs are there? | 7                         |
| What are the ROI(s)? | (1) L posterior inferior frontal; (2) R posterior inferior frontal; (3) L posterior superior temporal; (4) R posterior superior temporal; (5) L rolandic; (6) R rolandic; (7) SMA |
| How are the ROI(s) defined? | Spheres around control peaks |
| Correction for multiple comparisons | No correction |
| Statistical details | —                         |
| Findings | ↓ R IFG |
| Findings notes | —                         |

### ROI analysis 3

| First level contrast | Word repetition vs rest |
|----------------------|-------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                 |
| Covariate            | Spontaneous speech (WAB) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                       |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Functional               |
| How many ROIs are there? | 7                         |
| What are the ROI(s)? | (1) L posterior inferior frontal; (2) R posterior inferior frontal; (3) L posterior superior temporal; (4) R posterior superior temporal; (5) L rolandic; (6) R rolandic; (7) SMA |
| How are the ROI(s) defined? | Spheres around control peaks |
| Correction for multiple comparisons | No correction |
| Statistical details | No correction for multiple comparisons across WAB subscores |
| Findings | ↑ L IFG |
| Findings notes | —                         |

### ROI analysis 4

| First level contrast | Word repetition vs rest |
|----------------------|-------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                 |
| Covariate            | Comprehension (WAB)     |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                       |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Functional               |
| How many ROIs are there? | 7                         |
| What are the ROI(s)? | (1) L posterior inferior frontal; (2) R posterior inferior frontal; (3) L posterior superior temporal; (4) R posterior superior temporal; (5) L rolandic; (6) R rolandic; (7) SMA |
| How are the ROI(s) defined? | Spheres around control peaks |
| Correction for multiple comparisons | No correction |
| Statistical details | No correction for multiple comparisons across WAB subscores |
| Findings | None |
| Findings notes | —                         |
### ROI analysis 5

| First level contrast       | Word repetition vs rest |
|---------------------------|-------------------------|
| Analysis class            | Cross-sectional correlation with language or other measure |
| Group(s)                  | Aphasia                 |
| Covariate                 | Repetition (WAB)        |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

#### Behavioral data notes

| Type of analysis | Regions of interest (ROI) |
|------------------|---------------------------|
| ROI type         | Functional                |
| How many ROIs are there? | 7 |
| What are the ROI(s)? | (1) L posterior inferior frontal; (2) R posterior inferior frontal; (3) L posterior superior temporal; (4) R posterior superior temporal; (5) L rolandic; (6) R rolandic; (7) SMA |
| How are the ROI(s) defined? | Spheres around control peaks |
| Correction for multiple comparisons | No correction |
| Statistical details | This non-significant finding is implied but not stated explicitly |
| Findings | None |
| Findings notes | — |

### ROI analysis 6

| First level contrast       | Word repetition vs rest |
|---------------------------|-------------------------|
| Analysis class            | Cross-sectional correlation with language or other measure |
| Group(s)                  | Aphasia                 |
| Covariate                 | Naming (WAB)            |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

#### Behavioral data notes

| Type of analysis | Regions of interest (ROI) |
|------------------|---------------------------|
| ROI type         | Functional                |
| How many ROIs are there? | 7 |
| What are the ROI(s)? | (1) L posterior inferior frontal; (2) R posterior inferior frontal; (3) L posterior superior temporal; (4) R posterior superior temporal; (5) L rolandic; (6) R rolandic; (7) SMA |
| How are the ROI(s) defined? | Spheres around control peaks |
| Correction for multiple comparisons | No correction |
| Statistical details | This non-significant finding is implied but not stated explicitly |
| Findings | None |
| Findings notes | — |

### Notes

Excluded analyses: Separate analyses for fluent and non-fluent patients revealed essentially similar results

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Heiss et al. (1997)
### Reference

| Authors                  | Heiss WD, Kessler J, Karbe H, Fink GR, Pawlik G |
|--------------------------|-------------------------------------------------|
| Title                    | Speech-induced cerebral metabolic activation reflects recovery from aphasia |
| Reference                | J Neurol Sci 1997; 145: 213-217                 |
| PMID                     | 9094051                                         |
| DOI                      | 10.1016/s0022-510x(96)00252-3                   |

### Participants

| Language                  | German                                    |
|---------------------------|-------------------------------------------|
| Inclusion criteria        | —                                         |
| Number of individuals with aphasia | 6                                        |
| Number of control participants | 6    |
| Were any of the participants included in any previous studies? | No                                    |
| Is age reported for patients and controls, and matched? | Yes (range 33-66 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 4; females: 2) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 6; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (T1: ~4 weeks; T2: ~12-18 months) |
| To what extent is the nature of aphasia characterized? | Severity only |
| Language evaluation       | Verbal repetition, confrontation naming, oral and written comprehension, reading abilities, TT, phonemic fluency, clinical impression, family interview |
| Aphasia severity          | T1: TT range 37-48; T2: TT range 3-39 (1 missing) |
| Aphasia type              | T1: 5 global, 1 Wernicke’s; T2: not stated |
| First stroke only?        | Yes                                       |
| Stroke type               | Ischemic only                             |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent             | Range 27.2-133.2 cc                       |
| Lesion location           | L MCA; 5 patients had superior temporal damage and 1 had subcortical damage underlying posterior superior temporal cortex |
| Participants notes        | —                                         |

### Imaging

| Modality                  | PET (rCMRgl)                                |
|---------------------------|---------------------------------------------|
| Is the study cross-sectional or longitudinal? | Longitudinal—recovery                      |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: ~4 weeks; T2: ~12-18 months |
| If longitudinal, was there any intervention between the time points? | Not stated |
| Is the scanner described? | Yes (Siemens ECAT EXACT HR) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type               | PET                                         |
| Total images acquired     | 2                                           |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and inrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described | N/A—no intersubject normalization |
and appropriate?

Imaging notes

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**Conditions**

Are the conditions clearly described? No (no information about repetition rate, or whether repetition was overt or covert)

| Condition         | Response type | Repetitions | All groups could do? | All individuals could do? |
|-------------------|---------------|-------------|-----------------------|---------------------------|
| word repetition   | Word (overt)  | 1           | Unknown               | Unknown                   |
| rest              | None          | 1           | N/A                   | N/A                       |

Conditions notes

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**Contrasts**

Are the contrasts clearly described? Yes

**Contrast 1: word repetition vs rest**

| Language condition | Control condition | Are the conditions matched for visual demands? | Are the conditions matched for auditory demands? | Are the conditions matched for motor demands? | Are the conditions matched for cognitive/executive demands? | Is accuracy matched between the language and control tasks for all relevant groups? | Is reaction time matched between the language and control tasks for all relevant groups? | Behavioral data notes | Does the contrast selectively activate plausible relevant language regions in the control group? | Are activations lateralized in the control data? | Control activation notes | Contrast notes |
|--------------------|-------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|----------------|-------------------------------------------------|--------------------------|-------------------------------------------------|--------------|
| Word repetition    | Rest              | Yes                                           | No                                            | No                                            | No                                              | N/A, tasks not comparable                                       | N/A, tasks not comparable                                       |                | Unknown                                         | No                       | The only control data is extent of activation and mean signal increase in L and R superior temporal cortex; both of these measures were slightly L-lateralized |             |

Behavioral data notes

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Is control data reported in this paper or another that is referenced? Somewhat

Contrast notes

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**Analyses**

Are the analyses clearly described? Yes

**Voxelwise analysis 1**

| First level contrast           | Word repetition vs rest                                 |
|--------------------------------|--------------------------------------------------------|
| Analysis class                 | Longitudinal between two groups with aphasia           |
| Group(s)                       | (Aphasia with good recovery (n = 3) T2 vs T1) vs (aphasia with poor recovery (n = 3) T2 vs T1) |
| Covariate                      |                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (TT not optimal measure of overall language function) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes          |                                                         |
| Type of analysis               | Voxelwise                                              |
| Search volume                  | Whole brain                                             |
| Correction for multiple comparisons | No direct comparison                                   |
| Software                  | not stated          |
|---------------------------|---------------------|
| Voxelwise p               | —                   |
| Cluster extent            | —                   |
| Statistical details       | Qualitative generalization across individuals on pp. 214-6 |
| Findings                  | ↑ L posterior STG/STS/MTG |
|                           | ↓ R posterior STG/STS/MTG |
| Findings notes            | The consistent aspects of the findings were that there was an emergence of L posterior temporal activation in patients with better recovery, and R posterior temporal activation in patients with worse recovery |

**ROI analysis 1**

| First level contrast       | Word repetition vs rest |
|----------------------------|-------------------------|
| Analysis class             | Longitudinal between two groups with aphasia |
| Group(s)                   | (Aphasia with good recovery (n = 3) T2 vs T1) vs (aphasia with poor recovery (n = 3) T2 vs T1) |
| Covariate                  | —                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (TT not optimal measure of overall language function) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

| Type of analysis         | Regions of interest (ROI) |
|--------------------------|---------------------------|
| ROI type                 | Anatomical                |
| How many ROIs are there? | 2                         |
| What are the ROI(s)?     | (1) L superior temporal cortex; (2) R superior temporal cortex |
| How are the ROI(s) defined? | Individual anatomical images; activation quantified in terms of extent exceeding 10% signal change, and mean % increase over the activation |
| Correction for multiple comparisons | No direct comparison |
| Statistical details      | Qualitative generalization across individuals on pp. 214, 216 |
| Findings                 | ↑ L posterior STG/STS/MTG |
|                           | ↑ L Heschl's gyrus        |
| Findings notes           | —                         |

**Notes**

| Excluded analyses | —                      |

**Karbe et al. (1998)**

**Reference**

| Authors                  | Karbe H, Thiel A, Weber-Luxenburger G, Herholz K, Kessler J, Heiss WD |
|--------------------------|---------------------------------------------------------------------|
| Title                    | Brain plasticity in poststroke aphasia: what is the contribution of the right hemisphere? |
| Reference                | Brain Lang 1998; 64: 215-230                                        |
| PMID                     | 9710490                                                             |
| DOI                      | 10.1006/brln.1998.1961                                              |

**Participants**

| Language                | German                       |
|-------------------------|------------------------------|
| Inclusion criteria      | MCA; able to repeat single words |
| Number of individuals with aphasia | 12                           |
| Number of control participants | 10                           |
| Were any of the participants included in any previous studies? | No                           |
Is age reported for patients and controls, and matched? | No (mean 57 years, range 34-78 years; controls not matched for age)
---|---
Is sex reported for patients and controls, and matched? | Yes (males: 7; females: 5; stated to be not matched, but difference not significant)
Is handedness reported for patients and controls, and matched? | Yes (right: 12; left: 0)
Is time post stroke onset reported and appropriate to the study design? | Yes (T1: mean 24 ± 11 days, ~3-4 weeks; T2: mean 19 ± 2 months, > 1 year)
To what extent is the nature of aphasia characterized? | Severity and type
Language evaluation | TT
Aphasia severity | T1: 9 severe; 2 mild; 1 not stated; TT range 3-47 errors; T2: not stated
Aphasia type | T1: 8 global, 3 anomic, 1 Wernicke's; T2: not stated
First stroke only? | Yes
Stroke type | Ischemic only
To what extent is the lesion distribution characterized? | Extent and location
Lesion extent | Range 2-133 cc
Lesion location | L MCA
Participants notes | Only 7 of the 12 patients took part at T2

### Imaging

| Modality | PET (rCMRgl) |
|---|---|
| Is the study cross-sectional or longitudinal? | Longitudinal—recovery |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: mean 24 ± 11 days, ~3-4 weeks; T2: mean 19 ± 2 months, > 1 year |
| If longitudinal, was there any intervention between the time points? | Not stated |
| Is the scanner described? | Yes (CTI-Siemens ECAT EXACT HR) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (activation and control images not acquired on the same day; number of acquisitions not clearly described) |
| Design type | PET |
| Total images acquired | 8 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | N/A—no intersubject normalization |
| Imaging notes | — |

### Conditions

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|---|---|---|---|---|
| word repetition | Word (overt) | 4 (?) | Unknown | Unknown |
| rest | None | 4 (?) | N/A | N/A |

| Conditions notes | Inability to repeat single words was an exclusion criterion, but many patients had severe aphasia so it is unclear how they would have performed |

### Contrasts

| Are the contrasts clearly described? | Yes |
Contrast 1: word repetition vs rest

| Language condition | Word repetition |
|--------------------|----------------|
| Control condition  | Rest            |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes | — |
| Does the contrast selectively activate plausible relevant language regions in the control group? | No |
| Are activations lateralized in the control data? | No |

Contrast notes —

Analyses

Are the analyses clearly described? No* (moderate limitation) (see specific limitation(s) below)

ROI analysis 1

First level contrast Word repetition vs rest

Analysis class Cross-sectional aphasia vs control

Group(s) Aphasia T1 vs control

Covariate —

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes

Is accuracy matched across the second level contrast? Unknown, not reported

Is reaction time matched across the second level contrast? Unknown, not reported

Behavioral data notes —

Type of analysis Regions of interest (ROI)

ROI type Anatomical

How many ROIs are there? 8

What are the ROI(s)? (1) L IFG; (2) L STG/HG; (3) L SMA; (4) L ventral precentral; (5-8) homotopic counterparts

How are the ROI(s) defined? Individual anatomical images

Correction for multiple comparisons No direct comparison

Statistical details Qualitative comparison on p. 219, but only the L SMA comparison is explicitly quantified

Findings ↑ L SMA/medial prefrontal

↑ R SMA/medial prefrontal

↓ L posterior STG

↓ L Heschl's gyrus

Findings notes —

ROI analysis 2

First level contrast Word repetition vs rest

Analysis class Cross-sectional correlation with language or other measure

Group(s) Aphasia (subset who returned for follow-up) T1 (n = 7)

Covariate TT T1

Is the second level contrast valid in terms of the Somewhat (TT not optimal measure of overall language function)
| **ROI analysis 3** |
|-------------------|
| **First level contrast** | Word repetition vs rest |
| **Analysis class** | Cross-sectional correlation with language or other measure |
| **Group(s)** | Aphasia (subset who returned for follow-up) T2 (n = 7) |
| **Covariate** | TT T2 |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Somewhat (TT not optimal measure of overall language function) |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | Anatomical |
| **How many ROIs are there?** | 8 |
| **What are the ROI(s)?** | (1) L IFG; (2) L STG/HG; (3) L SMA; (4) L ventral precentral; (5-8) homotopic counterparts |
| **How are the ROI(s) defined?** | Individual anatomical images |
| **Correction for multiple comparisons** | No correction |
| **Statistical details** | — |
| **Findings** | ↓ L SMA/medial prefrontal |
| | ↓ R ventral precentral/inferior frontal junction |
| | ↓ R SMA/medial prefrontal |
| | ↓ R posterior STG |
| | ↓ R Heschl's gyrus |
| **Findings notes** | More activation in patients with more severe aphasia per TT |

| **ROI analysis 4** |
|-------------------|
| **First level contrast** | Word repetition vs rest |
| **Analysis class** | Longitudinal correlation with language or other measure |
| **Group(s)** | Aphasia (subset who returned for follow-up) (n = 7) T2 vs T1 |
| **Covariate** | Subsequent outcome (T2) TT |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | No (the logic behind correlating activation changes and language outcome is unclear; TT not optimal measure of overall language function) |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Region of interest (ROI) |
| **ROI type** | Anatomical |
### ROI analysis 5

| First level contrast | Word repetition vs rest |
|----------------------|-------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia (subset who returned for follow-up) T2 (n = 7) |
| Covariate            | Previous Δ (T2 vs T1) activation in L STG/HG |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | No (logically problematic because patients with less severe initial aphasia would also be expected to show little L temporal increase, but would not be expected to show R temporal recruitment) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Anatomical |
| How many ROIs are there? | 4 |
| What are the ROI(s)? | (1) R IFG; (2) R STG/HG; (3) R SMA; (4) R ventral precentral |
| How are the ROI(s) defined? | Individual anatomical images |
| Correction for multiple comparisons | No correction |
| Statistical details  | — |
| Findings             | ↓ R IFG |
|                      | ↓ R ventral precentral/inferior frontal junction |
|                      | ↓ R SMA/medial prefrontal |
|                      | ↓ R posterior STG |
|                      | ↓ R Heschl's gyrus |
| Findings notes       | Patients with more increase in L STG/HG activation showed less activation of R hemisphere regions at T2 |

### Notes

Excluded analyses: The "Initial study" columns of table 3, because they are not described in the text and it is not clear exactly what is being correlated with what.
| Number of individuals with aphasia | 6 (plus 2 excluded: 1 unable to reliably describe performance post-scan; 1 due to head motion) |
|-----------------------------------|--------------------------------------------------------------------------------------------------|
| Number of control participants    | 37                                                                                               |
| Were any of the participants included in any previous studies? | No                                                                                               |
| Is age reported for patients and controls, and matched? | Yes (range 20-56 years)                                                                            |
| Is sex reported for patients and controls, and matched? | Yes (males: 1; females: 5)                                                                         |
| Is handedness reported for patients and controls, and matched? | Yes (right: 6; left: 0)                                                                             |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 5-32 months)                                                                             |
| To what extent is the nature of aphasia characterized? | Severity and type                                                                                     |
| Language evaluation               | ADP                                                                                               |
| Aphasia severity                  | ADPASS percentile range 73-99                                                                   |
| Aphasia type                      | 3 anomic, 1 conduction, 1 recovered, 1 transcortical sensory                                          |
| First stroke only?               | Yes                                                                                               |
| Stroke type                       | Ischemic only                                                                                    |
| To what extent is the lesion distribution characterized? | Individual lesions                                                                               |
| Lesion extent                     | Extents are reported in three dimensions                                                             |
| Lesion location                   | 4 L MCA, 2 L ICA                                                                                 |
| Participants notes               | —                                                                                                 |

**Imaging**

| Modality                       | fMRI                                                                                           |
|--------------------------------|------------------------------------------------------------------------------------------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional                                                                              |
| If longitudinal, at what time point(s) were imaging data acquired? | —                                                                                           |
| If longitudinal, was there any intervention between the time points? | —                                                                                           |
| Is the scanner described?       | Yes (Magnex Scientific 3 Tesla)                                                                |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes                                                                                           |
| Design type                     | Block                                                                                          |
| Total images acquired           | 40                                                                                             |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (axial, perisylvian only)                                                                    |
| Is preprocessing and intersubject coregistration adequately described and appropriate? | Yes                                                                                           |
| Is first level model fitting adequately described and appropriate? | No (first level cross-correlation analysis unclear)                                              |
| Is intersubject normalization adequately described and appropriate? | N/A—no intersubject normalization                                                               |
| Imaging notes                   | —                                                                                               |

**Conditions**

| Condition                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|-------------------------------|---------------|-------------|-----------------------|--------------------------|
| picture naming                | Word (covert) | 4           | Yes                   | Yes                      |
| viewing nonsense drawings     | None          | 4           | N/A                   | N/A                      |

**Conditions notes**

—
### Contrasts

**Are the contrasts clearly described?** Yes

**Contrast 1: picture naming vs viewing nonsense drawings**

| Language condition | Picture naming |
|--------------------|----------------|
| Control condition  | Viewing nonsense drawings |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

**Behavioral data notes** —

**Are control data reported in this paper or another that is referenced?** Somewhat

**Does the contrast selectively activate plausible relevant language regions in the control group?** Unknown

**Are activations lateralized in the control data?** Somewhat

**Control activation notes** Insufficient data to assess the control activation pattern

### Analyses

**Are the analyses clearly described?** Yes

**ROI analysis 1**

| First level contrast | Picture naming vs viewing nonsense drawings |
|----------------------|--------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control         |
| Group(s)             | Aphasia vs control                         |
| Covariate            | —                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes** —

**Type of analysis** Regions of interest (ROI)

**ROI type** Mixed

**How many ROIs are there?** 6

**What are the ROI(s)?** (1) L IFG and MFG; (2) L pSTG, AG and SMG; (3) R IFG and MFG; (4) R pSTG, AG and SMG; (5) frontal LI; (6) temporal LI

**How are the ROI(s) defined?** (1-4) individual anatomical images; activation quantified in terms of extent

**Correction for multiple comparisons** No correction

**Statistical details** —

**Findings** ↑ R IFG; ↑ R dorsolateral prefrontal cortex; ↑ R supramarginal gyrus; ↑ R angular gyrus; ↑ R posterior STG; ↓ LI (frontal); ↓ LI (temporal)

**Findings notes** —
### ROI analysis 2

| First level contrast | Picture naming vs viewing nonsense drawings |
|----------------------|---------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                                     |
| Covariate            | Picture naming (outside scanner)            |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                           |
| Type of analysis     | Regions of interest (ROI)                   |
| ROI type             | Mixed                                       |
| How many ROIs are there? | 6                                           |
| What are the ROI(s)? | (1) L IFG and MFG; (2) L pSTG, AG and SMG; (3) R IFG and MFG; (4) R pSTG, AG and SMG; (5) frontal LI; (6) temporal LI |
| How are the ROI(s) defined? | (1-4) individual anatomical images; activation quantified in terms of extent |
| Correction for multiple comparisons | No correction |
| Statistical details  | —                                           |
| Findings             | ↑ LI (frontal)                              |
| Findings notes       | —                                           |

#### Notes

- **Excluded analyses**
  - (1) verb generation study with n = 4 patients; (2) individual patient results; (3) whole brain and whole hemisphere activation measures

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### Heiss et al. (1999)

#### Reference

- **Authors**
  - Heiss WD, Kessler J, Thiel A, Ghaemi M, Karbe H
- **Title**
  - Differential capacity of left and right hemispheric areas for compensation of poststroke aphasia
- **Reference**
  - Ann Neurol 1999; 45: 430-438
- **PMID**
  - 10211466
- **DOI**
  - 10.1002/1531-8249(199904)45:4<430::aid-ana3>3.0.co;2-p

#### Participants

- **Language**
  - German
- **Inclusion criteria**
  - AAT repetition ≥ 50
- **Number of individuals with aphasia**
  - 23
- **Number of control participants**
  - 11
- **Were any of the participants included in any previous studies?**
  - No
- **Is age reported for patients and controls, and matched?**
  - Yes (mean 56 ± 12 years, range 31-77 years; assume patient’s age of 5.6 years is a typo for 56 years)
- **Is sex reported for patients and controls, and matched?**
  - Yes (males: 15; females: 8)
- **Is handedness reported for patients and controls, and matched?**
  - Yes (right: 23; left: 0)
- **Is time post stroke onset reported and appropriate to the study design?**
  - Yes (T1: ~2 weeks; T2: ~8 weeks)
- **To what extent is the nature of aphasia**
  - Severity and type
| Question                                      | Answer                                                                 |
|----------------------------------------------|------------------------------------------------------------------------|
| Language evaluation characteristics?         | AAT, phonemic fluency                                                  |
| Aphasia severity T1: subcortical, frontal, temporal | T1: median 8 errors, range 0-17 errors; frontal: median 21 errors, range 4-40 errors; temporal: median 39 errors, range 1-47 errors; T2: subcortical: median 1 error, range 0-14 errors; frontal: median 8 errors, range 0-34; temporal: median 34 errors, range 0-44 errors |
| Aphasia severity T2: subcortical, frontal, temporal | T2: median 1 error, range 0-14 errors; frontal: median 8 errors, range 0-34; temporal: median 34 errors, range 0-44 errors |
| Aphasia type                                 | T1: 6 Wernicke's, 5 Broca's, 5 residual aphasia, 4 anomic, 2 transcortical sensory, 1 conduction; T2: not stated |
| First stroke only?                          | Yes                                                                   |
| Stroke type                                 | Ischemic only                                                          |
| To what extent is the lesion distribution characterized? | Extent and location                                                   |
| Lesion extent                               | Range 4.3-154.3 cc (probably; units not stated)                        |
| Lesion location                             | L MCA; 9 subcortical, 7 frontal, 7 temporal                           |
| Imaging                                      |                                                                          |
| Modality                                    | PET (rCBF)                                                             |
| Is the study cross-sectional or longitudinal? | Longitudinal—recovery                                                 |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: ~2 weeks; T2: ~8 weeks                                             |
| If longitudinal, was there any intervention between the time points? | Not stated                                                             |
| Is the scanner described?                   | Yes (CTI-Siemens ECAT EXACT HR)                                       |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes                                                                    |
| Design type                                 | PET                                                                    |
| Total images acquired                       | 8                                                                     |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)                                                    |
| Is preprocessing and inrasubject coregistration adequately described and appropriate? | Yes                                                                   |
| Is first level model fitting adequately described and appropriate? | Yes                                                                  |
| Is intersubject normalization adequately described and appropriate? | N/A—no intersubject normalization                                      |
| Imaging notes                               | —                                                                      |
| Conditions                                   |                                                                        |
| Are the conditions clearly described?        | Yes                                                                    |
| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |  |
| noun repetition                              | Word (overt)                                                          | 4                      | Unknown                   | Unknown               |
| rest                                           | None                                                                  | 4                      | N/A                       | N/A                   |
| Conditions notes                             | Inclusion criterion would suggest all patients could do the task, but this is not stated |
| Contrasts                                    |                                                                        |
| Are the contrasts clearly described?          | Yes                                                                   |
| Contrast 1: noun repetition vs rest | Noun repetition                                                        |
| Language condition                           | Noun repetition                                                        |
| Control condition                            | Rest                                                                   |
| Are the conditions matched for visual demands? | Yes                                                                  |
| Are the conditions matched for auditory demands? | No                                                                  |
| Are the conditions matched for motor demands? | No                                                                   |
| Question                                                                 | Answer                        |
|-------------------------------------------------------------------------|-------------------------------|
| Are the conditions matched for cognitive/executive demands?             | No                            |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable     |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable     |
| Behavioral data notes                                                   |                               |
| Are control data reported in this paper or another that is referenced?  | Somewhat                      |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                      |
| Are activations lateralized in the control data?                        | Somewhat                      |
| Control activation notes                                                | L frontal and bilateral temporal |
| Contrast notes                                                          |                               |
| Analyses                                                                |                               |
| Are the analyses clearly described?                                     | Yes                           |
| ROI analysis 1                                                          |                               |
| First level contrast                                                    | Noun repetition vs rest        |
| Analysis class                                                          | Longitudinal change in aphasia |
| Group(s)                                                                | Aphasia with subcortical damage (n = 9) T2 vs T1 |
| Covariate                                                               |                               |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                           |
| Is accuracy matched across the second level contrast?                   | Unknown, not reported          |
| Is reaction time matched across the second level contrast?              | Unknown, not reported          |
| Behavioral data notes                                                   |                               |
| Type of analysis                                                        | Regions of interest (ROI)      |
| ROI type                                                                | Anatomical                    |
| How many ROIs are there?                                                | 14                            |
| What are the ROI(s)?                                                   | (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts |
| How are the ROI(s) defined?                                             | Individual anatomical images   |
| Correction for multiple comparisons                                     | No direct comparison           |
| Statistical details                                                     | Qualitative comparison on p. 434 |
| Findings                                                                | † L mid temporal               |
|                                                                           | † R Heschl's gyrus             |
|                                                                           | † R IFG pars opercularis       |
| Findings notes                                                          |                               |
| ROI analysis 2                                                           |                               |
| First level contrast                                                    | Noun repetition vs rest        |
| Analysis class                                                          | Longitudinal change in aphasia |
| Group(s)                                                                | Aphasia with frontal damage (n = 7) T2 vs T1 |
| Covariate                                                               |                               |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                           |
| Is accuracy matched across the second level contrast?                   | Unknown, not reported          |
| Is reaction time matched across the second level contrast?              | Unknown, not reported          |
| Behavioral data notes                                                   |                               |
| Type of analysis | Regions of interest (ROI) |
|------------------|--------------------------|
| ROI type         | Anatomical               |
| How many ROIs are there? | 14                      |
| What are the ROI(s)? | (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts |
| How are the ROI(s) defined? | Individual anatomical images |
| Correction for multiple comparisons | No direct comparison |
| Statistical details | Qualitative comparison on p. 434 |
| Findings | ↑ L posterior STG  
↑ L mid temporal  
↑ R Heschl's gyrus  
↓ R IFG pars opercularis |
| Findings notes | — |

**ROI analysis 3**

| First level contrast | Noun repetition vs rest |
|----------------------|-------------------------|
| Analysis class       | Longitudinal change in aphasia |
| Group(s)             | Aphasia with temporal damage (n = 7) T2 vs T1 |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Anatomical               |
| How many ROIs are there? | 14                      |
| What are the ROI(s)? | (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts |
| How are the ROI(s) defined? | Individual anatomical images |
| Correction for multiple comparisons | No direct comparison |
| Statistical details | Qualitative comparison on p. 434 |
| Findings | ↑ L ventral precentral/inferior frontal junction  
↑ L SMA/medial prefrontal  
↑ R ventral precentral/inferior frontal junction  
↑ R mid temporal  
↓ R SMA/medial prefrontal |
| Findings notes | — |

**ROI analysis 4**

| First level contrast | Noun repetition vs rest |
|----------------------|-------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia with temporal damage T1 (n = 7) vs with subcortical damage T1 (n = 9) |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Regions of interest (ROI) |
| **ROI type** | Anatomical |
|-------------|------------|
| **How many ROIs are there?** | 14 |
| **What are the ROI(s)?** | (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts |
| **How are the ROI(s) defined?** | Individual anatomical images |
| **Correction for multiple comparisons** | No direct comparison |
| **Statistical details** | Qualitative comparison on p. 434 |
| **Findings** | ↑ L IFG pars opercularis; ↑ R SMA/medial prefrontal; ↓ L posterior STG; ↓ R IFG pars opercularis; ↓ R posterior STG; ↓ R mid temporal |
| **Findings notes** | — |

**ROI analysis 5**

| **First level contrast** | Noun repetition vs rest |
| **Analysis class** | Cross-sectional between two groups with aphasia |
| **Group(s)** | Aphasia with temporal damage T1 (n = 7) vs with frontal damage T1 (n = 7) |
| **Covariate** | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | Anatomical |
| **How many ROIs are there?** | 14 |
| **What are the ROI(s)?** | (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts |
| **How are the ROI(s) defined?** | Individual anatomical images |
| **Correction for multiple comparisons** | No direct comparison |
| **Statistical details** | Qualitative comparison on p. 434 |
| **Findings** | ↑ L IFG pars opercularis; ↑ R SMA/medial prefrontal; ↓ L posterior STG; ↓ R IFG pars opercularis; ↓ R posterior STG; ↓ R mid temporal |
| **Findings notes** | — |

**ROI analysis 6**

| **First level contrast** | Noun repetition vs rest |
| **Analysis class** | Cross-sectional between two groups with aphasia |
| **Group(s)** | Aphasia with temporal damage T2 (n = 7) vs with subcortical damage T2 (n = 9) |
| **Covariate** | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | **Anatomical** |
|---|---|
| **How many ROIs are there?** | 14 |
| **What are the ROI(s)?** | (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts |
| **How are the ROI(s) defined?** | Individual anatomical images |
| **Correction for multiple comparisons** | No direct comparison |
| **Statistical details** | Qualitative comparison on p. 434 |

**Findings**

| | |
|---|---|
| ↑ | L IFG pars opercularis |
| ↑ | L ventral precentral/inferior frontal junction |
| ↑ | L SMA/medial prefrontal |
| ↑ | R ventral precentral/inferior frontal junction |
| ↓ | L posterior STG |
| ↓ | L mid temporal |
| ↓ | R posterior STG |
| ↓ | R Heschl's gyrus |

**Findings notes**

| — |

### ROI analysis 7

**First level contrast**

Noun repetition vs rest

**Analysis class**

Cross-sectional between two groups with aphasia

**Group(s)**

Aphasia with temporal damage T2 (n = 7) vs with frontal damage T2 (n = 7)

**Covariate**

—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**

Yes

**Is accuracy matched across the second level contrast?**

Unknown, not reported

**Is reaction time matched across the second level contrast?**

Unknown, not reported

**Behavioral data notes**

—

**Type of analysis**

Regions of interest (ROI)

**ROI type**

Anatomical

**How many ROIs are there?**

14

**What are the ROI(s)?**

(1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts

**How are the ROI(s) defined?**

Individual anatomical images

**Correction for multiple comparisons**

No direct comparison

**Statistical details**

Qualitative comparison on p. 434

**Findings**

| | |
|---|---|
| ↑ | L IFG pars opercularis |
| ↑ | L ventral precentral/inferior frontal junction |
| ↑ | L SMA/medial prefrontal |
| ↑ | R ventral precentral/inferior frontal junction |
| ↓ | L posterior STG |
| ↓ | L mid temporal |
| ↓ | R posterior STG |
| ↓ | R Heschl's gyrus |

**Findings notes**

| — |

### ROI analysis 8

**First level contrast**

Noun repetition vs rest

**Analysis class**

Cross-sectional aphasia vs control

**Group(s)**

Aphasia with subcortical damage T1 (n = 9) vs control

**Covariate**

—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**

Yes

**Is accuracy matched across the second level contrast?**

Unknown, not reported
| Behavioral data notes | Unknown, not reported |
|-----------------------|-----------------------|
| Type of analysis      | Regions of interest (ROI) |
| ROI type              | Anatomical |
| How many ROIs are there? | 14 |
| What are the ROI(s)?  | (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts |
| How are the ROI(s) defined? | Individual anatomical images |
| Correction for multiple comparisons | No direct comparison |
| Statistical details   | Qualitative comparison on p. 434 |
| Findings              | ↑ R IFG pars opercularis  ↓ L IFG  ↓ L ventral precentral/inferior frontal junction  ↓ L Heschl's gyrus  ↓ L mid temporal  ↓ R Heschl's gyrus |
| Findings notes        | — |

**ROI analysis 9**

| First level contrast | Noun repetition vs rest |
|----------------------|-------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia with frontal damage T1 (n = 7) vs control |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**ROI analysis 10**

| First level contrast | Noun repetition vs rest |
|----------------------|-------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia with temporal damage T1 (n = 7) vs control |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| group(s), time point(s), and measures involved? | Unknown, not reported |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

- Type of analysis: Regions of interest (ROI)
- ROI type: Anatomical
- How many ROIs are there? 14
- What are the ROI(s)? (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts
- How are the ROI(s) defined? Individual anatomical images
- Correction for multiple comparisons: No direct comparison

**Statistical details** Qualitative comparison on p. 434; L IFG pars opercularis noted as different in text despite being significant in both groups

**Findings**

\[ \text{↑ L IFG pars opercularis} \]
\[ \text{↑ R SMA/medial prefrontal} \]
\[ \text{↓ L ventral precentral/inferior frontal junction} \]
\[ \text{↓ L posterior STG} \]
\[ \text{↓ L Heschl's gyrus} \]
\[ \text{↓ L mid temporal} \]
\[ \text{↓ R posterior STG} \]
\[ \text{↓ R Heschl's gyrus} \]
\[ \text{↓ R mid temporal} \]

**Findings notes** —

**ROI analysis 11**

**First level contrast** Noun repetition vs rest

**Analysis class** Cross-sectional aphasia vs control

**Group(s)** Aphasia with subcortical damage T2 (n = 9) vs control

**Covariate** —

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes

Is accuracy matched across the second level contrast? Unknown, not reported

Is reaction time matched across the second level contrast? Unknown, not reported

**Behavioral data notes** —

- Type of analysis: Regions of interest (ROI)
- ROI type: Anatomical
- How many ROIs are there? 14
- What are the ROI(s)? (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts
- How are the ROI(s) defined? Individual anatomical images
- Correction for multiple comparisons: No direct comparison

**Statistical details** Qualitative comparison on p. 434

**Findings**

\[ \text{↓ L IFG pars opercularis} \]
\[ \text{↓ L ventral precentral/inferior frontal junction} \]
\[ \text{↓ L Heschl's gyrus} \]

**Findings notes** —

**ROI analysis 12**

**First level contrast** Noun repetition vs rest

**Analysis class** Cross-sectional aphasia vs control

**Group(s)** Aphasia with frontal damage T2 (n = 7) vs control
### Covariate

| Question                                                                 | Answer                      |
|--------------------------------------------------------------------------|-----------------------------|
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                         |
| Is accuracy matched across the second level contrast?                    | Unknown, not reported       |
| Is reaction time matched across the second level contrast?               | Unknown, not reported       |

### Behavioral data notes

| Type of analysis | Regions of interest (ROI) |
|------------------|---------------------------|
| ROI type         | Anatomical                |
| How many ROIs are there? | 14                        |
| What are the ROI(s)? | (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts |
| How are the ROI(s) defined? | Individual anatomical images |
| Correction for multiple comparisons | No direct comparison |
| Statistical details | Qualitative comparison on p. 434 |

### Findings

| Findings | ↓ L IFG pars opercularis |
|----------|--------------------------|
|          | ↓ L ventral precentral/inferior frontal junction |
|          | ↓ L Heschl's gyrus       |

### Findings notes

| ROI analysis 13 |
|------------------|
| First level contrast | Noun repetition vs rest |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia with temporal damage T2 (n = 7) vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Anatomical                |
| How many ROIs are there? | 14                        |
| What are the ROI(s)? | (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts |
| How are the ROI(s) defined? | Individual anatomical images |
| Correction for multiple comparisons | No direct comparison |
| Statistical details | Qualitative comparison on p. 434 |
| Findings | ↑ L IFG pars opercularis |
|          | ↑ L SMA/medial prefrontal |
|          | ↑ R ventral precentral/inferior frontal junction |
|          | ↓ L posterior STG |
|          | ↓ L Heschl's gyrus |
|          | ↓ L mid temporal |
|          | ↓ R posterior STG |
|          | ↓ R Heschl's gyrus |

### Findings notes

| ROI analysis 14 |
|------------------|
| First level contrast | Noun repetition vs rest |
| Analysis class | Longitudinal change in aphasia |
| Group(s) | Aphasia with subcortical or frontal damage and good recovery (n = 11) T2 vs T1 |
Covariate

| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Behavioral data notes

| Type of analysis | Regions of interest (ROI) |
| ROI type | Anatomical |

How many ROIs are there?

| 14 |

What are the ROI(s)?

(1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts

How are the ROI(s) defined?

| Individual anatomical images |

Correction for multiple comparisons

| No direct comparison |

Statistical details

| Qualitative comparison on pp. 434-5 |

Findings

↑ L SMA/medial prefrontal
↑ L Heschl's gyrus
↑ L ventral precentral/inferior frontal junction
↑ R SMA/medial prefrontal
↑ R Heschl's gyrus
↓ R IFG pars opercularis

ROI analysis 15

First level contrast

| Noun repetition vs rest |

Analysis class

| Longitudinal change in aphasia |

Group(s)

| Aphasia with subcortical or frontal damage and poor recovery (n = 5) T2 vs T1 |

Covariate

| — |

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?

| Yes |

Is accuracy matched across the second level contrast?

| Unknown, not reported |

Is reaction time matched across the second level contrast?

| Unknown, not reported |

Behavioral data notes

| — |

Type of analysis

| Regions of interest (ROI) |

ROI type

| Anatomical |

How many ROIs are there?

| 14 |

What are the ROI(s)?

(1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts

How are the ROI(s) defined?

| Individual anatomical images |

Correction for multiple comparisons

| No direct comparison |

Statistical details

| Qualitative comparison on pp. 434-5 |

Findings

↑ L ventral precentral/inferior frontal junction
↑ R Heschl's gyrus
↓ R IFG pars opercularis

Findings notes

| — |

ROI analysis 16

First level contrast

| Noun repetition vs rest |

Analysis class

| Cross-sectional between two groups with aphasia |

Group(s)

| Aphasia with subcortical and frontal damage and good recovery T1 (n = 11) vs with subcortical and frontal damage and poor recovery T1 (n = 5) |
| Covariate | — |
| --- | --- |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

- **Type of analysis**: Regions of interest (ROI)
- **ROI type**: Anatomical
- **How many ROIs are there?**: 14
- **What are the ROI(s)?**: (1) L IFG pars opercularis; (2) L IFG pars triangularis; (3) L ventral precentral gyrus; (4) L Heschl's gyrus; (5) L temporal plane (posterior to HG, coded as posterior STG); (6) L posterior STG (coded as mid STG per Fig. 2); (7) L SMA; (8-14) homotopic counterparts
- **How are the ROI(s) defined?**: Individual anatomical images
- **Correction for multiple comparisons**: No direct comparison
- **Statistical details**: Qualitative comparison on p. 435
- **Findings**: ↑ L posterior STG; ↑ L mid temporal

**Findings notes**

- **Notes**

**Excluded analyses**

- **216**
### Kessler et al. (2000)

#### Reference

| Authors       | Kessler J, Thiel A, Karbe H, Heiss WD |
|---------------|--------------------------------------|
| Title         | Piracetam improves activated blood flow and facilitates rehabilitation of poststroke aphasic patients |
| Reference     | *Stroke* 2000; 31: 2112-2116 |
| PMID          | 10978039 |
| DOI           | 10.1161/01.str.31.9.2112 |

#### Participants

| Language       | German |
|----------------|--------|
| Inclusion criteria | Mild to moderate aphasia on TT; at least 50 out of 150 on AAT repetition |
| Number of individuals with aphasia | 24 |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (piracetam group: mean 57.4 ± 13.5 years; placebo group: mean 56.3 ± 10.0 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 13; females: 11) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 24; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (T1: ~2 weeks; T2: ~8 weeks) |
| To what extent is the nature of aphasia characterized? | Severity only |
| Language evaluation | AAT |
| Aphasia severity | T1: piracetam group: TT 17.16 ± 14.31 errors; placebo group: TT 17.91 ± 15.47 errors; T2: piracetam group: TT 9.66 ± 12.62 errors; placebo group: TT 12.50 ± 16.88 errors |
| Aphasia type | Not stated |
| First stroke only? | Yes |
| Stroke type | Ischemic only |
| To what extent is the lesion distribution characterized? | Location only |
| Lesion extent | Not stated |
| Lesion location | 10 L frontal, 6 L subcortical, 8 L temporal |
| Participants notes | — |

#### Imaging

| Modality      | PET (rCBF) |
|---------------|------------|
| Is the study cross-sectional or longitudinal? | Longitudinal—mixed |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment, ~2 weeks post onset; T2: post-treatment, ~8 weeks post onset |
| If longitudinal, was there any intervention between the time points? | SLT, 1 hour/day, 5 days/week, 6 weeks; 12 patients received piracetam and 12 received placebo; note that the two groups are not directly compared in any imaging or behavioral analyses |
| Is the scanner described? | Yes (CTI-Siemens ECAT EXACT HR) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | PET |
| Total images acquired | 8 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
Is first level model fitting adequately described and appropriate? Yes
Is intersubject normalization adequately described and appropriate? N/A—no intersubject normalization
Imaging notes —

Conditions
Are the conditions clearly described? Yes

| Condition         | Response type | Repetitions | All groups could do? | All individuals could do? |
|-------------------|---------------|-------------|----------------------|---------------------------|
| word repetition   | Word (overt)  | 4           | Yes                  | Yes                       |
| rest              | None          | 4           | N/A                  | N/A                       |

Conditions notes Inclusion criterion was applied to ensure that the task could be performed

Contrasts
Are the contrasts clearly described? Yes

Contrast 1: word repetition vs rest

| Language condition | Word repetition |
|--------------------|----------------|
| Control condition  | Rest           |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

Behavioral data notes —

Does the contrast selectively activate plausible relevant language regions in the control group? Unknown

Are activations lateralized in the control data? Unknown

Control activation notes No control data are reported or cited, however the same task was used in several previous studies by this group

Contrast notes —

Analyses
Are the analyses clearly described? Yes

ROI analysis 1

| First level contrast | Word repetition vs rest |
|----------------------|-------------------------|
| Analysis class       | Longitudinal change in aphasia |
| Group(s)             | Aphasia treated with pirecetam (n = 12) T2 vs T1 |
| Covariate            | —                        |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Behavioral data notes —

Type of analysis Regions of interest (ROI)
ROI type | Anatomical
---|---
How many ROIs are there? | 14
What are the ROI(s)? | (1) L BA 44; (2) L BA 45; (3) L ventral PrCG; (4) L HG; (5) L BA 41 and 42; (6) L BA 22; (7) L SMA; (8-14) homotopic counterparts
How are the ROI(s) defined? | Individual anatomical images
Correction for multiple comparisons | No correction
Statistical details | —
Findings | ↑ L IFG pars triangularis
         | ↑ L posterior STG
         | ↑ L Heschl's gyrus
Findings notes | —

**ROI analysis 2**

First level contrast | Word repetition vs rest
Analysis class | Longitudinal change in aphasia
Group(s) | Aphasia treated with placebo (n = 12) T2 vs T1
Covariate | —
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes
Is accuracy matched across the second level contrast? | Unknown, not reported
Is reaction time matched across the second level contrast? | Unknown, not reported
Behavioral data notes | —
Type of analysis | Regions of interest (ROI)
ROI type | Anatomical
How many ROIs are there? | 14
What are the ROI(s)? | (1) L BA 44; (2) L BA 45; (3) L ventral PrCG; (4) L HG; (5) L BA 41 and 42; (6) L BA 22; (7) L SMA; (8-14) homotopic counterparts
How are the ROI(s) defined? | Individual anatomical images
Correction for multiple comparisons | No correction
Statistical details | —
Findings | ↑ L ventral precentral/inferior frontal junction
Findings notes | —

Notes

Excluded analyses | —

**Rosen et al. (2000)**

Reference

Authors | Rosen HJ, Petersen SE, Linenweber MR, Snyder AZ, White DA, Chapman L, Dromerick AW, Fiez JA, Corbetta M
Title | Neural correlates of recovery from aphasia after damage to left inferior frontal cortex
Reference | Neurology 2000; 55: 1883-1894
PMID | 11134389
DOI | 10.1212/wnl.55.12.1883

Participants

Language | US English
Inclusion criteria | L IFG, possibly extending to neighboring regions
Number of individuals with aphasia | 6
Number of control participants | 14
| Were any of the participants included in any previous studies? | Yes (1 participant was reported in a previous case study) |
|-------------------------|---------------------------------------------------------|
| Is age reported for patients and controls, and matched? | No (mean 47 years, range 32-72 years; control participants not age-matched) |
| Is sex reported for patients and controls, and matched? | Yes (males: 3; females: 3) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 6; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 0.5-7.6 years) |
| To what extent is the nature of aphasia characterized? | Severity and type |
| Language evaluation | WAB (except BDAE in 1 patient), reading pseudowords, word stem completion, verb generation, reading single words |
| Aphasia severity | AQ range 74-97 (missing in 1 patient) |
| Aphasia type | 3 anomic, 1 Broca's, 1 not stated, 1 recovered |
| First stroke only? | Yes |
| Stroke type | Not stated |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent | Range 10.7-117.5 cc |
| Lesion location | L IFG, extending to neighboring areas in most cases |
| Participants notes | Of the 14 controls, 6 were studied with PET and 8 with fMRI |

**Imaging**

| Modality | PET and fMRI |
|-------------------------|---------------------------------------------------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Siemens 961 EXACT HR; Siemens Vision 1.5 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (fMRI timing description is inconsistent) |
| Design type | Mixed |
| Total images acquired | PET: 10; fMRI: 384-768 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | 1 patient scanned on different PET scanner, and not scanned with fMRI; controls had different fMRI sequence to patients |

**Conditions**

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-------------------------|---------------------------------------------------------|
| word stem completion (PET) | Word (overt) | 4 | Yes | Yes |
| reading pseudowords aloud (PET) | Word (overt) | 4 | Yes | No |
| rest (PET) | None | 2 | N/A | N/A |
| word stem completion (fMRI) | Word (covert) | 15-30 (?) | Yes | Yes |
| rest (fMRI) | None | 15-30 (?) | N/A | N/A |
| Conditions notes | Pseudoword reading condition not analyzed in this paper |
|------------------|--------------------------------------------------------|

### Contrasts

Are the contrasts clearly described? | Yes |

#### Contrast 1: word stem completion (PET) vs rest (PET)

| Language condition | Word stem completion (PET) |
|--------------------|--------------------------|
| Control condition  | Rest (PET)               |

Are the conditions matched for visual demands? | No |
Are the conditions matched for auditory demands? | No |
Are the conditions matched for motor demands? | No |
Are the conditions matched for cognitive/executive demands? | No |

Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

Behavioral data notes
Are control data reported in this paper or another that is referenced? | Somewhat |
Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat |
Are activations lateralized in the control data? | Yes |
Control activation notes | L IFG, L ITG, L anterior fusiform |
Contrast notes | — |

#### Contrast 2: word stem completion (fMRI) vs rest (fMRI)

| Language condition | Word stem completion (fMRI) |
|--------------------|--------------------------|
| Control condition  | Rest (fMRI)               |

Are the conditions matched for visual demands? | No |
Are the conditions matched for auditory demands? | Yes |
Are the conditions matched for motor demands? | Yes |
Are the conditions matched for cognitive/executive demands? | No |

Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

Behavioral data notes
Are control data reported in this paper or another that is referenced? | Somewhat |
Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat |
Are activations lateralized in the control data? | Yes |
Control activation notes | L IFG, L intraparietal sulcus |
Contrast notes | — |

### Analyses

Are the analyses clearly described? | No* (moderate limitation) (see specific limitation(s) below) |

#### Voxelwise analysis 1

| First level contrast | Word stem completion (PET) vs rest (PET) |
|----------------------|-----------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia vs control |
| Covariate            | — |
| Question                                                                 | Answer  |
|------------------------------------------------------------------------|---------|
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes     |
| Is accuracy matched across the second level contrast?                  | No, different |
| Is reaction time matched across the second level contrast?             | Yes, matched |

**Behavioral data notes**

- **Type of analysis**: Voxelwise
- **Search volume**: Whole brain
- **Correction for multiple comparisons**: Unclear or not stated
- **Software**: not stated
- **Voxelwise p**
- **Cluster extent**
- **Statistical details**: Correction for multiple comparisons unclear; there may be circularity in only correcting for the number of regions that seemed to show differences

**Findings**

- ↑ L SMA/medial prefrontal
- ↑ R IFG
- ↑ R Heschl's gyrus
- ↓ L IFG

**Findings notes**

- Voxelwise analysis 2

**Voxelwise analysis 2**

| First level contrast          | Word stem completion (fMRI) vs rest (fMRI) |
|-------------------------------|---------------------------------------------|
| Analysis class                | Cross-sectional aphasia vs control          |
| Group(s)                      | Aphasia (n = 5) vs control                  |
| Covariate                     |                                             |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

- **Type of analysis**: Voxelwise
- **Search volume**: Whole brain
- **Correction for multiple comparisons**: No direct comparison
- **Software**: not stated
- **Voxelwise p**
- **Cluster extent**
- **Statistical details**: Qualitative comparison on p. 1888

**Findings**

- ↑ R IFG
- ↓ L IFG

**Findings notes**

- ROI analysis 1

**ROI analysis 1**

| First level contrast          | Word stem completion (fMRI) vs rest (fMRI) |
|-------------------------------|---------------------------------------------|
| Analysis class                | Cross-sectional aphasia vs control          |
| Group(s)                      | Aphasia (n = 5) vs control                  |
| Covariate                     |                                             |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

- —
| Type of analysis | Regions of interest (ROI) |
|------------------|--------------------------|
| ROI type         | Functional               |
| How many ROIs are there? | 2 |
| What are the ROI(s)? | (1) R IFG; (2) SMA |
| How are the ROI(s) defined? | Not stated but seem to be functional |
| Correction for multiple comparisons | No correction |
| Statistical details | Possibly circular because not clear how ROIs defined |
| Findings | ↑ R IFG |
| Findings notes | — |

### Notes

**Excluded analyses**

(1) the authors also observe that the two patients with the best language outcomes retained perilesional activation in the L IFG; (2) two non-significant correlational analyses involving only 5 patients, but note that the main fMRI analyses have been included even though n = 5

### Blasi et al. (2002)

#### Reference

| Authors | Blasi V, Young AC, Tansy AP, Petersen SE, Snyder AZ, Corbetta M |
|---------|---------------------------------------------------------------|
| Title   | Word retrieval learning modulates right frontal cortex in patients with left frontal damage |
| Reference | Neuron 2002; 36: 159-170 |
| PMID    | 12367514 |
| DOI     | 10.1016/s0896-6273(02)00936-4 |

#### Participants

| Language | US English |
|----------|------------|
| Inclusion criteria | L IFG, possibly extending to neighboring regions |
| Number of individuals with aphasia | 8 |
| Number of control participants | 14 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | No (mean 48.6 years; patients and controls not closely matched for age, unclear if difference significant) |
| Is sex reported for patients and controls, and matched? | Yes (males: 2; females: 6) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 8; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | No (> 6 months; actual TPO not stated) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |
| Language evaluation | WAB or BDAE |
| Aphasia severity | AQ range 66.5-89.0 in 6 participants, BDAE aphasia severity of 4 in 1 participant, no formal evaluation in 1 participant |
| Aphasia type | 3 anomic, 3 transcortical motor, 1 Broca's, 1 not stated; most were Broca's or global acutely |
| First stroke only? | Yes |
| Stroke type | Ischemic only |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent | Not stated |
| Lesion location | L IFG and operculum, extending to adjacent cortex and white matter in several cases |
| Participants notes | — |
**Imaging**

| Question                                                                 | Answer                                                                 |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| Is the study cross-sectional or longitudinal?                           | Cross-sectional                                                       |
| If longitudinal, at what time point(s) were imaging data acquired?      | —                                                                     |
| If longitudinal, was there any intervention between the time points?    | —                                                                     |
| Is the scanner described?                                               | Yes (Siemens Vision 1.5 Tesla)                                         |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes                                                                    |
| Design type                                                             | Event-related                                                          |
| Total images acquired                                                   | 1024                                                                   |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)                                                   |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes                                                                   |
| Is first level model fitting adequately described and appropriate?      | Yes                                                                   |
| Is intersubject normalization adequately described and appropriate?     | No (not described)                                                     |
| Imaging notes                                                           | —                                                                     |

**Conditions**

| Condition                                                                 | Response type | Repetitions | All groups could do? | All individuals could do? |
|--------------------------------------------------------------------------|---------------|-------------|----------------------|--------------------------|
| word stem completion (novel items)                                       | Word (covert) | 196         | Yes                  | Unknown                  |
| word stem completion (repeated items)                                    | Word (covert) | 196         | Yes                  | Unknown                  |
| rest                                                                      | None          | implicit baseline | N/A                  | N/A                      |

Conditions notes: Novel items were presented in runs 1, 6, 7, and 8; repeated items were presented in runs 2, 3, 4, and 5; of the four repeated runs, only run 5 was analyzed.

**Contrasts**

| Contrast 1: word stem completion (novel items) vs rest | Language condition | Control condition | Are the conditions matched for visual demands? | Are the conditions matched for auditory demands? | Are the conditions matched for motor demands? | Are the conditions matched for cognitive/executive demands? | Is accuracy matched between the language and control tasks for all relevant groups? | Is reaction time matched between the language and control tasks for all relevant groups? | Behavioral data notes | Are control data reported in this paper or another that is referenced? | Does the contrast selectively activate plausible relevant language regions in the control group? | Are activations lateralized in the control data? | Control activation notes |
|-------------------------------------------------------|--------------------|------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|
|                                                       | Word stem completion (novel items) | Rest             | No                                            | Yes                                           | Yes                                           | No                                                                             | N/A, tasks not comparable                                                    | N/A, tasks not comparable                                                    | —                             | Yes                                                        | Somewhat                                                                      | Somewhat                                      | Activation of language areas but also other areas; frontal activation is somewhat lateralized |
Contrast notes

Contrast 2: word stem completion (novel items) vs word stem completion (repeated items)

| Language condition | Control condition |
|--------------------|-------------------|
| Word stem completion (novel items) | Word stem completion (repeated items) |

Are the conditions matched for visual demands? Yes
Are the conditions matched for auditory demands? Yes
Are the conditions matched for motor demands? Yes
Are the conditions matched for cognitive/executive demands? Yes

Is accuracy matched between the language and control tasks for all relevant groups? Yes, matched
Is reaction time matched between the language and control tasks for all relevant groups? No, different

Behavioral data notes
Are control data reported in this paper or another that is referenced? Somewhat

Does the contrast selectively activate plausible relevant language regions in the control group? Unknown

Are activations lateralized in the control data? Somewhat

Control activation notes
No whole brain analysis of this contrast, but somewhat lateralized in the sense that L but not R frontal areas showed a learning effect

Contrast notes

Analyses

Are the analyses clearly described? No** (major limitation) (see specific limitation(s) below)

Voxelwise analysis 1

| First level contrast | Analysis class |
|----------------------|---------------|
| Word stem completion (novel items) vs rest | Cross-sectional aphasia vs control |

Group(s) Aphasia vs control
Covariate —

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes
Is accuracy matched across the second level contrast? No, different
Is reaction time matched across the second level contrast? No, different

Behavioral data notes Covert task but overt data acquired separately; patients less accurate and slower than controls

Type of analysis Voxelwise
Search volume Whole brain
Correction for multiple comparisons Unclear or not stated
Software not stated
Voxelwise p ~.001 (z > 3)
Cluster extent 45 voxels (size not stated)

Statistical details Monte Carlo analysis not described in detail; rather than fitting a HRF, the authors looked at the shape of the signal in the 8 volumes following each stimulus

Findings ↑ R IFG pars opercularis
↑ R IFG pars triangularis
↑ R insula
↑ R ventral precentral/inferior frontal junction
↑ R dorsal precentral
↓ L IFG pars opercularis
↓ L ventral precentral/inferior frontal junction

Findings notes Labels based on coordinates reported
### ROI analysis 1

| First level contrast | Word stem completion (novel items) vs word stem completion (repeated items) |
|----------------------|--------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                       |
| Group(s)             | Aphasia vs control                                                      |
| Covariate            | —                                                                        |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Yes, matched |
| Behavioral data notes | Covert task but overt data acquired separately; no interaction of group by practice for accuracy or RT |
| Type of analysis     | Regions of interest (ROI)                                              |
| ROI type             | Functional                                                              |
| How many ROIs are there? | 14                                                                 |
| What are the ROI(s)? | (1) L dorsal IFG; (2) L ventral IFG; (3) R MFG; (4) L anterior fusiform; (5) R anterior fusiform; (6) R posterior fusiform; (7) R lateral occipital; (8) R lateral cerebellum; (9) L SMA; (10) R dorsal IFG; (11) R posterior fusiform; (12) R lateral occipital; (13) R lingual; (14) L MTG |
| How are the ROI(s) defined? | Regions that were active for the main effect of word stem completion (irrespective of practice) in either group and modulated by practice in that group |
| Correction for multiple comparisons | No correction |

#### Statistical details
Circular because ROIs defined in one group or the other; the L ROIs showed repetition suppression in controls but not in patients, and this difference is interpreted by the authors, but not supported statistically.

#### Findings
- ↑ R ventral precentral/inferior frontal junction
- ↑ R posterior inferior temporal gyrus/fusiform gyrus
- ↓ L IFG
- ↓ L ventral precentral/inferior frontal junction
- ↓ L posterior inferior temporal gyrus/fusiform gyrus

#### Findings notes
Labels based on coordinates reported

#### Notes
- (1) the ROI results were replicated in a whole brain SPM analysis, but that analysis is not reported; (2) the authors observe that patients with smaller L frontal lesions, and perilesional activation, performed better on word stem completion overall, but did not differ in rate of learning

### Leff et al. (2002)

#### Reference
- **Authors**: Leff A, Crinion J, Scott S, Turkheimer F, Howard D, Wise R
- **Title**: A physiological change in the homotopic cortex following left posterior temporal lobe infarction
- **Reference**: Ann Neurol 2002; 51: 553-558
- **PMID**: 12112100
- **DOI**: 10.1002/ana.10181

#### Participants
- **Language**: UK English
- **Inclusion criteria**: —
- **Number of individuals with aphasia**: 15
- **Number of control participants**: 8
- **Were any of the participants included in any analysis?**: No
previous studies?
Is age reported for patients and controls, and matched? Yes (range 43-76 years)
Is sex reported for patients and controls, and matched? Yes (males: 11; females: 4)
Is handedness reported for patients and controls, and matched? Yes (right: 11; left: 0)
Is time post stroke onset reported and appropriate to the study design? Yes (range 5-76 months)
To what extent is the nature of aphasia characterized? Not at all

Language evaluation
PPT (Dutch), British picture vocabulary scale, Action for Dysphasic Adults lexical decision battery, auditory maximal pairs (an offline phoneme discrimination test)

Aphasia severity
Not stated

Aphasia type
Not stated, but all 6 patients with pSTS damage had single word comprehension deficits acutely

First stroke only? Yes
Stroke type Not stated

To what extent is the lesion distribution characterized? Extent and location
Lesion extent Range 0.5-14% of total brain volume
Lesion location 9 L but sparing pSTS, 6 L including pSTS
Participants notes —

Imaging
Modality PET (rCBF)
Is the study cross-sectional or longitudinal? Cross-sectional
If longitudinal, at what time point(s) were imaging data acquired? —
If longitudinal, was there any intervention between the time points? —
Is the scanner described? Yes (CTI-Siemens ECAT EXACT HR++/966)
Is the timing of stimulus presentation and image acquisition clearly described and appropriate? Yes

Design type PET
Total images acquired 16
Are the imaging acquisition parameters, including coverage, adequately described and appropriate? Yes (whole brain)
Is preprocessing and intrasubject coregistration adequately described and appropriate? Yes
Is first level model fitting adequately described and appropriate? Yes
Is intersubject normalization adequately described and appropriate? Yes
Imaging notes —

Conditions
Are the conditions clearly described? Yes

| Condition                        | Response type | Repetitions | All groups could do? | All individuals could do? |
|---------------------------------|---------------|-------------|----------------------|---------------------------|
| listening to words at 10 wpm    | None          | 2           | N/A                  | N/A                       |
| listening to words at 35 wpm    | None          | 2           | N/A                  | N/A                       |
| listening to words at 55 wpm    | None          | 2           | N/A                  | N/A                       |
| listening to words at 70 wpm    | None          | 2           | N/A                  | N/A                       |
| listening to words at 85 wpm    | None          | 2           | N/A                  | N/A                       |
| listening to words at 95 wpm    | None          | 2           | N/A                  | N/A                       |
| Conditions notes                           | —                                        |
|-------------------------------------------|------------------------------------------|
| **Contrasts**                             |                                          |
| Are the contrasts clearly described?      | Yes                                      |
| **Contrast 1: higher word rates vs lower word rates** |                                          |
| Language condition                        | Higher word rates                        |
| Control condition                         | Lower word rates                         |
| Are the conditions matched for visual demands? | Yes                                      |
| Are the conditions matched for auditory demands? | No                                       |
| Are the conditions matched for motor demands? | Yes                                      |
| Are the conditions matched for cognitive/executive demands? | Yes                                      |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure                |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task                    |
| Behavioral data notes                     |                                          |
| Are control data reported in this paper or another that is referenced? | Somewhat                                 |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                                 |
| Are activations lateralized in the control data? | Somewhat                                 |
| Control activation notes                  | Control activation is bilateral in primary auditory cortex and the lateral STG (Fig. 1, labels 1 and 2), but there is a left-lateralized activation in the pSTS (label 3); the scatter plots in Fig. 1 show activity-word rate curves for peak pSTS voxels in individual subjects; slopes were steeper in the left hemisphere (p < 0.05), however, the identification of these voxels is not described in sufficient detail (i.e. what was the search region?) |
| **Contrast notes**                         | —                                        |
| **Analyses**                              |                                          |
| Are the analyses clearly described?       | No* (moderate limitation) (see specific limitation(s) below) |
| **Voxelwise analysis 1**                  |                                          |
| First level contrast                      | Higher word rates vs lower word rates    |
| Analysis class                            | Cross-sectional aphasia vs control       |
| Group(s)                                  | Aphasia with pSTS damage (n = 6) vs control |
| Covariate                                 | —                                        |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                      |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure              |
| Is reaction time matched across the second level contrast? | N/A, no timeable task                    |
| Behavioral data notes                     | —                                        |
| Type of analysis                          | Voxelwise                                |
| Search volume                             | Whole brain                              |
| Correction for multiple comparisons       | No direct comparison                     |
| Software                                  | SPM99                                    |
| Voxelwise p                               | —                                        |
| Cluster extent                            | —                                        |
| Statistical details                       | Qualitative comparison on p. 555; a FWE-corrected SPM is reported of the relationship in the 6 patients with L pSTS damage (Fig. 2), however it is masked in a way that is not explained (see... |
figure caption), and there is no direct comparison between patients with L pSTS damage and controls.

| Findings notes | ↑ R posterior STS |
|----------------|------------------|

Voxelwise analysis 2

| First level contrast | Higher word rates vs lower word rates |
|----------------------|---------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia with pSTS (n = 6) damage vs without pSTS damage (n = 9) |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Search volume        | Whole brain |
| Correction for multiple comparisons | No direct comparison |
| Software             | SPM99 |
| Voxelwise p          | — |
| Cluster extent       | — |
| Statistical details  | Qualitative comparison on p. 555; a FWE-corrected SPM is reported of the relationship in the 6 patients with L pSTS damage (Fig. 2), however it is masked in a way that is not explained (see figure caption), and there is no direct comparison between patients with L pSTS damage and patients with R pSTS damage |

Findings

Findings notes | — |

ROI analysis 1

| First level contrast | Higher word rates vs lower word rates |
|----------------------|---------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia with pSTS damage (n = 6) vs control (n = 8) |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | R pSTS |
| How are the ROI(s) defined? | The peak voxel for the contrast in the R pSTS from each subject’s individual analysis, but the search region is not stated |
| Correction for multiple comparisons | One only |
| Statistical details  | The controls and patients without pSTS damage were combined, however it is stated in the caption to Figure 2 that the patients with pSTS damage were significantly different to both |

Findings

Findings notes | — |

ROI analysis 2

| First level contrast | Higher word rates vs lower word rates |
|----------------------|---------------------------------------|
| Analysis class | Cross-sectional between two groups with aphasia |
|---------------|-----------------------------------------------|
| Group(s)      | Aphasia with pSTS damage (n = 6) vs aphasia without pSTS damage (n = 9) |
| Covariate     | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Region of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | R pSTS |
| How are the ROI(s) defined? | The peak voxel for the contrast in the R pSTS from each subject's individual analysis, but the search region is not stated |
| Correction for multiple comparisons | One only |
| Statistical details | The controls and patients without pSTS damage were combined, however it is stated in the caption to Figure 2 that the patients with pSTS damage were significantly different to both |
| Findings | ↑ R posterior STS |
| Findings notes | — |

**Notes**

**Excluded analyses** —

### Blank et al. (2003)

**Reference**

| Authors | Blank SC, Bird H, Turkheimer F, Wise RJ |
|---------|---------------------------------------|
| Title   | Speech production after stroke: the role of the right pars opercularis |
| Reference | Ann Neurol 2003; 54: 310-320 |
| PMID    | 12953263 |
| DOI     | 10.1002/ana.10656 |

**Participants**

| Language | UK English |
|----------|------------|
| Inclusion criteria | Initial non-fluent aphasia due to anterior perisylvian lesion; subsequently recovered the ability to speak in sentences; patients were divided into those with and without damage to the IFG pars opercularis (POp+: n = 7; POp-: n = 7) |
| Number of individuals with aphasia | 14 |
| Number of control participants | 12 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (POp+: median 50 years, range 36-72 years; POp-: median 61 years, range 39-70 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 8; females: 6) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 14; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (POp+: median 39 months, range 19-134 months; POp-: median 17 months, range 6-240 months) |
| To what extent is the nature of aphasia characterized? | Type only |
| Language evaluation          | CAT, QPA |
|-----------------------------|---------|
| Aphasia severity            | Not stated |
| Aphasia type                | POP+: 4 non-fluent but not agrammatic, 2 agrammatic, 1 recovered; POP-: 4 non-fluent but not agrammatic, 3 recovered |
| First stroke only?          | No |
| Stroke type                 | Not stated |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent               | Not stated |
| Lesion location             | L frontal, occasionally extending into temporal |
| Participants notes          | 8 of 12 controls included in Blank et al. (2002) |

### Imaging

| Modality                  | PET (rCBF) |
|---------------------------|------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (CTI-Siemens ECAT EXACT HR++ (966)) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type               | PET |
| Total images acquired     | 15 (patients); 12 (controls) |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes             | — |

### Conditions

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|-----------------------|---------------------------|
| propositional speech production | Sentence (overt) | aphasia: 5; control: 4 | Yes | Yes |
| counting | Multiple words (overt) | aphasia: 5; control: 4 | Yes | Yes |
| rest     | None          | aphasia: 5; control: 4 | N/A | N/A |

**Conditions notes**: Alertness maintained in rest by asking participants to listen to environmental sounds that were presented before and after data acquisition; speech was recorded and rate was measured, also QPA was done of a separate speech sample outside the scanner.

### Contrasts

| Contrast 1: propositional speech production vs rest |
|---------------------------------------------------|
| Language condition                               | Propositional speech production |
| Control condition                                | Rest |
| Are the conditions matched for visual demands?   | Yes |

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| Question                                                                 | Answer                                                                 |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| Are the conditions matched for auditory demands?                        | No                                                                     |
| Are the conditions matched for motor demands?                           | No                                                                     |
| Are the conditions matched for cognitive/executive demands?             | No                                                                     |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                             |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                             |
| Behavioral data notes                                                   | —                                                                     |
| Are control data reported in this paper or another that is referenced?  | Yes                                                                    |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                                                              |
| Are activations lateralized in the control data?                        | Somewhat                                                              |

**Control activation notes**

- Much bilateral activation due to overt speech but pars opercularis and supratemporal plane L-lateralized

**Contrast notes**

- Analyses

| Language condition | Propositional speech production |
|--------------------|---------------------------------|
| Control condition  | Counting                        |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat |
| Are activations lateralized in the control data? | Somewhat |
| Control activation notes | Extrasylvian; somewhat L-lateralized |
| Contrast notes | — |

**Analyses**

| Are the analyses clearly described? | Yes |

**Voxelwise analysis 1**

| First level contrast | Propositional speech production vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control     |
| Group(s)             | Aphasia with IFG POp damage (n = 7) vs control |
| Covariate            | —                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | Word rates not reported, but offline speech sample differed |
| Type of analysis     | Voxelwise                              |
| Search volume        | Voxel spared in all patients           |
| Correction for multiple comparisons | Small volume correction |
|------------------------------------|------------------------|
| Software                           | SPM99                  |
| Voxelwise p                        | FWE p < .05 with SVC in R pars opercularis |
| Cluster extent                     | —                      |
| Statistical details                | —                      |
| Findings                           | ↑ R IFG pars opercularis |
| Findings notes                     | No voxels survived FWE correction without SVC |

**Voxelwise analysis 2**

| First level contrast               | Propositional speech production vs rest |
| Analysis class                     | Cross-sectional aphasia vs control     |
| Group(s)                           | Aphasia without IFG POp damage (n = 7) vs control |
| Covariate                          | —                                     |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes              | Word rates not reported, but offline speech sample differed |
| Type of analysis                   | Voxelwise                           |
| Search volume                      | Voxels spared in all patients       |
| Correction for multiple comparisons | Small volume correction             |
| Software                           | SPM99                                |
| Voxelwise p                        | FWE p < .05 with SVC in R pars opercularis |
| Cluster extent                     | —                                    |
| Statistical details                | —                                    |
| Findings                           | ↑ R IFG pars opercularis             |
| Findings notes                     |                                       |

**Voxelwise analysis 3**

| First level contrast               | Propositional speech production vs rest |
| Analysis class                     | Cross-sectional between two groups with aphasia |
| Group(s)                           | Aphasia with IFG POp damage (n = 7) vs without IFG POp damage (n = 7) |
| Covariate                          | —                                     |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes              | Word rates not reported, but offline speech sample differed |
| Type of analysis                   | Voxelwise                           |
| Search volume                      | Voxels spared in all patients       |
| Correction for multiple comparisons | Small volume correction             |
| Software                           | SPM99                                |
| Voxelwise p                        | FWE p < .05 with SVC in R pars opercularis |
| Cluster extent                     | —                                    |
| Statistical details                | —                                    |
| Findings                           | ↑ R IFG pars opercularis             |
| Findings notes                     |                                       |

**Voxelwise analysis 4**

| First level contrast               | Propositional speech production vs counting |
| Analysis class                     | Cross-sectional aphasia vs control       |
### Voxelwise analysis 5

| Group(s)                                | Aphasia without IFG POp damage (n = 7) vs control |
|-----------------------------------------|--------------------------------------------------|
| **Covariate**                           | ---                                              |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes                                             |
| **Is accuracy matched across the second level contrast?** | No, different                                    |
| **Is reaction time matched across the second level contrast?** | N/A, no timeable task                             |
| **Behavioral data notes**               | Word rates not reported, but offline speech sample differed |
| **Type of analysis**                    | Voxelwise                                        |
| **Search volume**                       | Voxels spared in all patients                    |
| **Correction for multiple comparisons** | Small volume correction                          |
| **Software**                            | SPM99                                            |
| **Voxelwise p**                         | FWE p < .05 with SVC in R pars opercularis       |
| **Cluster extent**                      | ---                                              |
| **Statistical details**                 | ---                                              |
| **Findings**                            | None                                             |
| **Findings notes**                      | ---                                              |

### Voxelwise analysis 6

| Group(s)                                | Aphasia with IFG POp damage (n = 7) vs without IFG POp damage (n = 7) |
|-----------------------------------------|-----------------------------------------------------------------------|
| **Covariate**                           | ---                                                                  |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes                                                                  |
| **Is accuracy matched across the second level contrast?** | No, different                                                        |
| **Is reaction time matched across the second level contrast?** | N/A, no timeable task                                                |
| **Behavioral data notes**               | Word rates not reported, but offline speech sample differed          |
| **Type of analysis**                    | Voxelwise                                                            |
| **Search volume**                       | Voxels spared in all patients                                       |

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| Correction for multiple comparisons | Small volume correction |
|-----------------------------------|--------------------------|
| Software                          | SPM99                    |
| Voxelwise p                       | FWE p < .05 with SVC in R pars opercularis |
| Cluster extent                    | —                        |
| Statistical details               | —                        |
| Findings                          | None                     |
| Findings notes                    | —                        |

### ROI analysis 1

| First level contrast               | Propositional speech production vs rest |
|-----------------------------------|-----------------------------------------|
| Analysis class                    | Cross-sectional correlation with language or other measure |
| Group(s)                          | Aphasia with IFG POp damage (n = 7) |
| Covariate                         | Speech rate during scan |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes             | —                        |
| Type of analysis                  | Region of interest (ROI) |
| ROI type                          | Functional |
| How many ROIs are there?          | 1                        |
| What are the ROI(s)?              | R IFG pars opercularis |
| How are the ROI(s) defined?       | Defined by flipping L IFG pars opercularis activation in controls |
| Correction for multiple comparisons | One only |
| Statistical details               | —                        |
| Findings                          | None                     |
| Findings notes                    | —                        |

### ROI analysis 2

| First level contrast               | Propositional speech production vs rest |
|-----------------------------------|-----------------------------------------|
| Analysis class                    | Cross-sectional correlation with language or other measure |
| Group(s)                          | Aphasia without IFG POp damage (n = 7) |
| Covariate                         | Speech rate during scan |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes             | —                        |
| Type of analysis                  | Region of interest (ROI) |
| ROI type                          | Functional |
| How many ROIs are there?          | 1                        |
| What are the ROI(s)?              | R IFG pars opercularis |
| How are the ROI(s) defined?       | Defined by flipping L IFG pars opercularis activation in controls |
| Correction for multiple comparisons | One only |
| Statistical details               | —                        |
| Findings                          | None                     |
| Findings notes                    | —                        |

### ROI analysis 3

| First level contrast               | Propositional speech production vs rest |
|-----------------------------------|-----------------------------------------|
| Analysis class                    | Cross-sectional correlation with language or other measure |

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| Group(s) | Aphasia with IFG POp damage (n = 7) |
|----------|------------------------------------|
| Covariate | Four different QPA measures |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Unknown, not reported** |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Region of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | R IFG pars opercularis |
| How are the ROI(s) defined? | Defined by flipping L IFG pars opercularis activation in controls |
| Correction for multiple comparisons | One only |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

**Notes**

**Excluded analyses**
ROI analyses may have been carried out for both contrasts, but this is not stated

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**Cardebat et al. (2003)**

**Reference**

**Authors**
Cardebat D, Démonet JF, De Boissezon X, Marie N, Marié RM, Lambert J, Baron JC, Puel M

**Title**
Behavioral and neurofunctional changes over time in healthy and aphasic subjects: a PET language activation study

**Reference**
*Stroke* 2003; 34: 2900-2906

**PMID**
14615626

**DOI**
10.1161/01.str.0000099965.99393.83

**Participants**

| Language | French |
|----------|--------|
| Inclusion criteria | No severe aphasia; no leukoaraiosis |
| Number of individuals with aphasia | 8 |
| Number of control participants | 6 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (mean 58.4 ± 11.9 years, range 37-73 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 7; females: 1) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 8; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | **No***(moderate limitation) (T1: 58 ± 35 days, range 11-113 days; T2: 11.7 ± 1.6 months, range 320-460 days; T1 varies considerably from early to late subacute) |
| To what extent is the nature of aphasia characterized? | **Not at all** |
| Language evaluation | Not stated |
| Aphasia severity | Not stated |
| Aphasia type | T1: some prominent symptoms are listed for each patient; T2: not stated |
| First stroke only? | Yes |
| **Stroke type** | Mixed etiologies |
|-----------------|------------------|
| **To what extent is the lesion distribution characterized?** | Individual lesions |
| **Lesion extent** | Not stated |
| **Lesion location** | 4 L subcortical, 2 L prerolandic, 2 L postrolandic |
| **Participants notes** | — |

### Imaging

| **Modality** | PET (rCBF) |
|---------------|-------------|
| **Is the study cross-sectional or longitudinal?** | Longitudinal—recovery |
| **If longitudinal, at what time point(s) were imaging data acquired?** | T1: 58 ± 35 days, range 11-113 days; T2: 11.7 ± 1.6 months, range 320-460 days; T1 varies considerably from early to late subacute |
| **If longitudinal, was there any intervention between the time points?** | Not stated |
| **Is the scanner described?** | Yes (Siemens ECAT HR+) |
| **Is the timing of stimulus presentation and image acquisition clearly described and appropriate?** | Yes |
| **Design type** | PET |
| **Total images acquired** | 6 |
| **Are the imaging acquisition parameters, including coverage, adequately described and appropriate?** | Yes (whole brain) |
| **Is preprocessing and intrasubject coregistration adequately described and appropriate?** | Yes |
| **Is first level model fitting adequately described and appropriate?** | Yes |
| **Is intersubject normalization adequately described and appropriate?** | No (lesion impact not addressed) |
| **Imaging notes** | — |

### Conditions

| **Are the conditions clearly described?** | Yes |
| **Condition** | **Response type** | **Repetitions** | **All groups could do?** | **All individuals could do?** |
|-----------------|------------------|----------------|-------------------------|-----------------------------|
| word generation | Word (overt) | 4 | Yes | Unknown |
| rest | None | 2 | N/A | N/A |

**Conditions notes**

Participants were asked to generate words that were semantically related to binaurally presented stimuli; 2 runs involved nouns and 2 involved verbs

### Contrasts

| **Are the contrasts clearly described?** | Yes |

**Contrast 1: word generation vs rest**

| **Language condition** | Word generation |
| **Control condition** | Rest |
| **Are the conditions matched for visual demands?** | Yes |
| **Are the conditions matched for auditory demands?** | No |
| **Are the conditions matched for motor demands?** | No |
| **Are the conditions matched for cognitive/executive demands?** | No |
| **Is accuracy matched between the language and control tasks for all relevant groups?** | N/A, tasks not comparable |
| **Is reaction time matched between the language and control tasks for all relevant groups?** | N/A, tasks not comparable |
| **Behavioral data notes** | — |
| **Are control data reported in this paper or another** | Somewhat |
that is referenced?

Does the contrast selectively activate plausible relevant language regions in the control group? **Somewhat**

Are activations lateralized in the control data? **No**

Control activation notes Bilateral fronto-temporal and some other regions per text

Contrast notes —

**Analyses**

Are the analyses clearly described? **No** *(moderate limitation) (see specific limitation(s) below)*

**Voxelwise analysis 1**

First level contrast Word generation vs rest

Analysis class Longitudinal change in aphasia

Group(s) Aphasia T2 vs T1

Covariate —

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? **Yes**

Is accuracy matched across the second level contrast? **No, different**

Is reaction time matched across the second level contrast? **Unknown, not reported**

Behavioral data notes —

Type of analysis Voxelwise

Search volume Whole brain

Correction for multiple comparisons **Clusterwise correction based on arbitrary cluster extent**

Software SPM99

Voxelwise p .05

Cluster extent 50 voxels (size not stated)

Statistical details **Nature of inclusive masks unclear**

Findings ↓ L dorsolateral prefrontal cortex

↑ L SMA/medial prefrontal

↑ L somato-motor

↑ L posterior STG/STS/MTG

↑ L cerebellum

↑ R IFG pars opercularis

↑ R dorsolateral prefrontal cortex

↑ R SMA/medial prefrontal

↑ R somato-motor

↑ R posterior STG/STS/MTG

↑ R cerebellum

Findings notes Based on Figure 2

**Voxelwise analysis 2**

First level contrast Word generation vs rest

Analysis class Longitudinal correlation with language or other measure

Group(s) Aphasia T2 vs T1

Covariate Δ word generation accuracy

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? **Yes**

Is accuracy matched across the second level contrast? **Accuracy is covariate**

Is reaction time matched across the second level contrast? **Unknown, not reported**

Behavioral data notes —

Type of analysis Voxelwise

Search volume Whole brain
### Correction for multiple comparisons
Clusterwise correction based on arbitrary cluster extent

### Software
SPM99

### Voxelwise p
.001

### Cluster extent
100 voxels (size not stated)

### Statistical details
Nature of inclusive masks unclear

### Findings
- ↑ L posterior STG/STS/MTG
- ↑ R posterior STG/STS/MTG
- ↑ R cerebellum
- ↓ L occipital
- ↓ L hippocampus/MTL
- ↓ R dorsolateral prefrontal cortex
- ↓ R occipital

### Findings notes
—

### Notes
Excluded analyses
Aphasia vs control SPM analyses at each time point, because they are not reported in sufficient detail to determine activated regions

### Sharp et al. (2004)

#### Reference
Authors
Sharp DJ, Scott SK, Wise RJ

Title
Retrieving meaning after temporal lobe infarction: the role of the basal language area

Reference
Ann Neurol 2004; 56: 836-846

PMID
15514975

DOI
10.1002/ana.20294

#### Participants
Language
UK English

Inclusion criteria
Lesion in vicinity of L STG; no extensive frontal damage; no inferior temporal damage; able to perform tasks

Number of individuals with aphasia
9

Number of control participants
18

Were any of the participants included in any previous studies?
No

Is age reported for patients and controls, and matched?
Yes (median 58 years, range 39-72 years)

Is sex reported for patients and controls, and matched?
Yes (males: 8; females: 1)

Is handedness reported for patients and controls, and matched?
Yes (right: 9; left: 0)

Is time post stroke onset reported and appropriate to the study design?
Yes (mean 45 months, range 14-145 months)

To what extent is the nature of aphasia characterized?
Severity only

Language evaluation
Subtests from CAT, subtests from PALPA, Action for dysphasic adults, TROG, PPT

Aphasia severity
Mild

Aphasia type
Not stated

First stroke only?
Yes

Stroke type
Not stated

To what extent is the lesion distribution characterized?
Lesion overlay

Lesion extent
Not stated

Lesion location
Lesion in vicinity of L STG; no extensive frontal damage; no inferior temporal damage
## Participants notes

---

## Imaging

| Modality                  | PET (rCBF) |
|---------------------------|------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Siemens HR++ 966) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |

### Design type

| Total images acquired | 16 |
|-----------------------|----|
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |

## Imaging notes

---

## Conditions

| Condition                                | Response type | Repetitions | All groups could do? | All individuals could do? |
|------------------------------------------|---------------|-------------|----------------------|----------------------------|
| semantic decision                        | Word (overt)  | aphasia: 8; control: 4 | Yes                  | Yes                        |
| syllable count decision                  | Word (overt)  | aphasia: 8; control: 4 | Yes                  | Yes                        |
| semantic decision (noise vocoded) (control only) | Word (overt)  | 4 (control)       | Yes                  | Yes                        |
| syllable count decision (noise vocoded) (control only) | Word (overt)  | 4 (control)       | Yes                  | Yes                        |

### Conditions notes

Seems the response was a spoken word, but this is not stated explicitly; assuming all individuals could do the tasks because this was an inclusion criterion and behavioral data supports

## Contrasts

| Contrast 1: semantic decision vs syllable count decision |
|--------------------------------------------------------|

### Language condition

Semantic decision

### Control condition

Syllable count decision

### Are the conditions matched for visual demands? Yes

### Are the conditions matched for auditory demands? Yes

### Are the conditions matched for motor demands? Yes

### Are the conditions matched for cognitive/executive demands?

### Is accuracy matched between the language and control tasks for all relevant groups? No, different

### Is reaction time matched between the language and control tasks for all relevant groups? No, different

## Behavioral data notes

---
| Question                                                                 | Answer                          |
|------------------------------------------------------------------------|---------------------------------|
| Are control data reported in this paper or another that is referenced? | Somewhat                        |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                        |
| Are activations lateralized in the control data?                       | Yes                             |
| Control activation notes                                               | The control data provided also include the noise vocoded conditions; only ventral temporal activations are shown, which are L-lateralized |
| Contrasts notes                                                        | —                               |

**Analyses**

| Question                                                                 | Answer                          |
|------------------------------------------------------------------------|---------------------------------|
| Are the analyses clearly described?                                     | No* (moderate limitation) (see specific limitation(s) below) |

**Voxelwise analysis 1**

| First level contrast                                                   | Semantic decision vs syllable count decision |
|------------------------------------------------------------------------|---------------------------------------------|
| Analysis class                                                        | Cross-sectional aphasia vs control          |
| Group(s)                                                              | Aphasia vs control (clear speech)           |
| Covariate                                                             | —                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                         |
| Is accuracy matched across the second level contrast?                  | Appear mismatched                          |
| Is reaction time matched across the second level contrast?             | Yes, matched                                |

**Behavioral data notes**

Interaction of group by task not reported for accuracy

**Type of analysis**

Voxelwise

**Search volume**

Whole brain

**Correction for multiple comparisons**

Small volume correction

**Software**

SPM99

**Voxelwise p**

FWE p < .05 with SVC in fusiform gyri, temporal poles, L IFG, L orbitofrontal and L SFG

**Cluster extent**

—

**Statistical details**

Fixed effects; this analysis is not clearly described

**Findings**

↓ L posterior inferior temporal gyrus/fusiform gyrus

**Findings notes**

Patients who were more accurate had more activity in R anterior fusiform gyrus

**Voxelwise analysis 2**

| First level contrast                                                   | Semantic decision vs syllable count decision |
|------------------------------------------------------------------------|---------------------------------------------|
| Analysis class                                                        | Cross-sectional correlation with language or other measure |
| Group(s)                                                              | Aphasia                                     |
| Covariate                                                             | Semantic decision accuracy                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                         |
| Is accuracy matched across the second level contrast?                  | Accuracy is covariate                       |
| Is reaction time matched across the second level contrast?             | Unknown, not reported                        |

**Behavioral data notes**

—

**Type of analysis**

Voxelwise

**Search volume**

Whole brain

**Correction for multiple comparisons**

Small volume correction

**Software**

SPM99

**Voxelwise p**

FWE p < .05 with SVC in fusiform gyri, temporal poles, L IFG, L orbitofrontal and L SFG

**Cluster extent**

—

**Statistical details**

Fixed effects; this analysis is not clearly described

**Findings**

↑ R posterior inferior temporal gyrus/fusiform gyrus

**Findings notes**

Patients who were more accurate had more activity in R anterior fusiform gyrus
### ROI analysis 1

| First level contrast | Semantic decision vs syllable count decision |
|----------------------|---------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control          |
| Group(s)             | Aphasia vs control (clear speech)           |
| Covariate            | —                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appears mismatched |
| Is reaction time matched across the second level contrast? | Yes, matched |
| Behavioral data notes | Interaction of group by task not reported for accuracy |
| Type of analysis     | Region of interest (ROI)                    |
| ROI type             | Anatomical                                  |
| How many ROIs are there? | 1                             |
| What are the ROI(s)? | L fusiform gyrus                           |
| How are the ROI(s) defined? | Probabilistic brain atlas |
| Correction for multiple comparisons | One only |
| Statistical details  | —                                           |
| Findings             | L posterior inferior temporal gyrus/fusiform gyrus |
| Findings notes       | —                                           |

### ROI analysis 2

| First level contrast | Semantic decision vs syllable count decision |
|----------------------|---------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control          |
| Group(s)             | Aphasia vs control (noise vocoded)          |
| Covariate            | —                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, but attempt made |
| Is reaction time matched across the second level contrast? | Yes, matched |
| Behavioral data notes | Patients were more accurate on semantic decisions than syllable decisions, whereas controls were less accurate on noise vocoded semantic decisions than clear syllable decisions (which were the baseline for this analysis) |
| Type of analysis     | Region of interest (ROI)                    |
| ROI type             | Anatomical                                  |
| How many ROIs are there? | 1                             |
| What are the ROI(s)? | L fusiform gyrus                           |
| How are the ROI(s) defined? | Probabilistic brain atlas |
| Correction for multiple comparisons | One only |
| Statistical details  | —                                           |
| Findings             | None                                        |
| Findings notes       | This analysis suggests that the difference between groups in the L fusiform gyrus disappears when the controls perform a semantic task that is similarly challenging |

### Notes

- Excluded analyses: (1) combined analysis of patients and controls (Figure 4); (2) correlation with syllable decision making not described in sufficient detail

Zahn et al. (2004)
**Reference**

| Authors          | Zahn R, Drews E, Specht K, Kemeny S, Reith W, Willmes K, Schwarz M, Huber W |
|------------------|--------------------------------------------------------------------------|
| Title            | Recovery of semantic word processing in global aphasia: a functional MRI study |
| Reference        | Cogn Brain Res 2004; 18: 322-336                                         |
| PMID             | 14741318                                                                 |
| DOI              | 10.1016/j.cogbrainres.2003.10.021                                        |

**Participants**

| Language     | German                                                      |
|--------------|-------------------------------------------------------------|
| Inclusion criteria |                                                                 |
| Number of individuals with aphasia | 7                                                          |
| Number of control participants | 14                                                         |
| Were any of the participants included in any previous studies? | No                                                         |
| Is age reported for patients and controls, and matched? | Yes (range 29-67 years)                                   |
| Is sex reported for patients and controls, and matched? | Yes (males: 6; females: 1)                                 |
| Is handedness reported for patients and controls, and matched? | Yes (right: 7; left: 0)                                  |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 6 months-4 years)                             |
| To what extent is the nature of aphasia characterized? | Comprehensive battery                                    |

**Language evaluation**

| AABT, AAT |                                                                 |
| Aphasia severity | TT percentile range 28-63                                   |
| Aphasia type | 3 global, 2 Broca's, 2 unclassifiable; all had been global initially |
| First stroke only? | Yes                                                      |
| Stroke type | Not stated                                                  |

**Imaging**

| Modality | fMRI                                                      |
| Design type | Block                                                  |
| Total images acquired | 198                                                      |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)                                   |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes                                                      |
| Is first level model fitting adequately described and appropriate? | Yes                                                      |
| Is intersubject normalization adequately described and appropriate? | N/A—no intersubject normalization                           |
### Conditions

Are the conditions clearly described? | Yes
--- | ---

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
| --- | --- | --- | --- | --- |
| phonetic decision (reversed words vs sounds) | Button press | 3 | Yes | No |
| lexical decision (words vs reversed words) | Button press | 3 | Yes | Yes |
| semantic decision | Button press | 3 | Yes | No |
| rest | None | 9 | N/A | N/A |

### Contrasts

Are the contrasts clearly described? | No (see specific limitation(s) below)
--- | ---

**Contrast 1: semantic decision vs phonetic decision and lexical decision (conjunction)**

| Language condition | Semantic decision |
| --- | --- |
| Control condition | Phonetic decision and lexical decision (conjunction) |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | Appear similar |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes | Tasks were matched in controls, but no statistics reported for patients |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes |
| Are activations lateralized in the control data? | Yes |
| Control activation notes | L-lateralized frontal activation, as well as temporal and parietal to a lesser extent |
| Contrast notes | Conjunction of baseline conditions not described in sufficient detail |

### Analyses

Are the analyses clearly described? | No* (moderate limitation) (see specific limitation(s) below)
--- | ---

**ROI analysis 1**

| First level contrast | Semantic decision vs phonetic decision and lexical decision (conjunction) |
| --- | --- |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, no test |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Relative performance on language and control tasks unclear |
| Type of analysis | Region of interest (ROI) |
| ROI type | Laterality indices |
| How many ROIs are there? | 1 |
| Question                                      | Answer                                                                 |
|----------------------------------------------|------------------------------------------------------------------------|
| What are the ROI(s)?                         | Language network LI                                                   |
| How are the ROI(s) defined?                  | One only                                                              |
| Correction for multiple comparisons          | Conjunction analyses not clearly described; in two patients, a different conjunction was used (lexical decision vs phonetic decision & semantic decision vs phonetic decision) |
| Statistical details                          |                                                                       |
| Findings                                      | None                                                                  |
| Findings notes                               | LI > 0 in 12 out of 14 controls and 5 out of 7 patients; no significant difference |

**Notes**

- Excluded analyses: Individual patient analyses

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**Crinion & Price (2005)**

**Reference**

| Authors          | Crinion J, Price CJ |
|------------------|---------------------|
| Title            | Right anterior superior temporal activation predicts auditory sentence comprehension following aphasic stroke |
| Reference        | Brain 2005; 128: 2858-2871 |
| PMID             | 16234297            |
| DOI              | 10.1093/brain/awh659|

**Participants**

| Language         | UK English |
|------------------|------------|
| Inclusion criteria| —          |
| Number of individuals with aphasia | 17 |
| Number of control participants | 18 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (mean 62 ± 2.7 SEM years, range 34-75 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 12; females: 5) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 17; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 4-125 months; aphasia with temporal damage (n=8) mean 41 months; aphasia without temporal damage (n=9) mean 48 months) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |

**Language evaluation**

| CAT           | Not stated |
| Aphasida severity | Not stated |
| Aphasida type    | Not stated |
| First stroke only? | Yes |
| Stroke type      | Not stated |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent    | Not stated |
| Lesion location  | L MCA      |
| Participants notes | —         |

**Imaging**

| Modality         | fMRI       |
|------------------|------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging | — |
**Conditions**

| Condition                          | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------------------------|---------------|-------------|----------------------|---------------------------|
| listening to narrative speech     | None          | 32          | N/A                  | N/A                       |
| listening to reversed speech      | None          | 8           | N/A                  | N/A                       |

**Conditions notes**

A post-scan surprise recognition test asked whether or not 38 phrases had occurred in any story; patients answered 12-33 of these questions correctly; controls answered 24-37 correctly; also note that all patients performed above chance on CAT auditory sentence comprehension (73%+ accuracy)

**Contrasts**

| Contrast 1: listening to narrative speech vs listening to reversed speech |
|-----------------------------------------------------------------------------|
| Language condition | Listening to narrative speech | Listening to reversed speech |
| Control condition    |                               |                             |
| Are the conditions matched for visual demands?                             | Yes                         |                             |
| Are the conditions matched for auditory demands?                           | Yes                         |                             |
| Are the conditions matched for motor demands?                              | Yes                         |                             |
| Are the conditions matched for cognitive/executive demands?                | Yes                         |                             |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure |                             |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task |                             |
| Behavioral data notes                                                     | —                           |                             |
| Are control data reported in this paper or another that is referenced?     | Yes                         |                             |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes |                             |
| Are activations lateralized in the control data?                           | Somewhat                    |                             |
| Control activation notes                                                   | Bilateral (L > R) temporal, L IFG and L dorsal precentral |                             |
| Contrast notes                                                             | —                           |                             |

**Analyses**

| Are the analyses clearly described? | Yes |

---

**data acquired?**

If longitudinal, was there any intervention between the time points? —

**Is the scanner described?**

No (Siemens 1.5 Tesla; model not stated)

**Is the timing of stimulus presentation and image acquisition clearly described and appropriate?**

No (the calculated duration of the stimuli, the calculated duration of the acquisitions, and the stated duration of the acquisitions yield three different numbers)

**Design type**

Block

**Total images acquired**

460

**Are the imaging acquisition parameters, including coverage, adequately described and appropriate?**

Yes (whole brain)

**Is preprocessing and intrasubject coregistration adequately described and appropriate?**

Yes

**Is first level model fitting adequately described and appropriate?**

Yes

**Is intersubject normalization adequately described and appropriate?**

Yes

**Imaging notes**

—

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**Conditions**

Are the conditions clearly described? Yes

**Contrasts**

Are the contrasts clearly described? Yes

---

**Analyses**

Are the analyses clearly described? Yes
| Voxelwise analysis 1 | Listening to narrative speech vs. listening to reversed speech |
|----------------------|---------------------------------------------------------------|
| **First level contrast** | Cross-sectional aphasia vs control |
| **Group(s)** | Aphasia without temporal lobe damage (n = 9) vs control |
| **Covariate** | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | N/A, no behavioral measure |
| **Is reaction time matched across the second level contrast?** | N/A, no timeable task |
| **Behavioral data notes** | — |
| **Type of analysis** | Voxelwise |
| **Search volume** | Whole brain |
| **Correction for multiple comparisons** | Voxelwise FWE correction and additional arbitrary cluster correction |
| **Software** | SPM2 |
| **Voxelwise p** | FWE p < .05 |
| **Cluster extent** | 5 voxels (size not stated) |
| **Statistical details** | — |
| **Findings** | ↓ L dorsal precentral ↓ R somato-motor |
| **Findings notes** | — |

| Voxelwise analysis 2 | Listening to narrative speech vs. listening to reversed speech |
|----------------------|---------------------------------------------------------------|
| **First level contrast** | Cross-sectional aphasia vs control |
| **Group(s)** | Aphasia with temporal lobe damage (n = 8) vs control |
| **Covariate** | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | N/A, no behavioral measure |
| **Is reaction time matched across the second level contrast?** | N/A, no timeable task |
| **Behavioral data notes** | — |
| **Type of analysis** | Voxelwise |
| **Search volume** | Whole brain |
| **Correction for multiple comparisons** | Voxelwise FWE correction and additional arbitrary cluster correction |
| **Software** | SPM2 |
| **Voxelwise p** | FWE p < .05 |
| **Cluster extent** | 5 voxels (size not stated) |
| **Statistical details** | — |
| **Findings** | ↓ L posterior STS ↓ L mid temporal |
| **Findings notes** | — |

| Voxelwise analysis 3 | Listening to narrative speech vs. listening to reversed speech |
|----------------------|---------------------------------------------------------------|
| **First level contrast** | Cross-sectional between two groups with aphasia |
| **Group(s)** | Aphasia with temporal lobe damage (n = 8) vs without temporal lobe damage (n = 9) |
| **Covariate** | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | N/A, no behavioral measure |
| Question                                                                 | Answer                                                                                     |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Is reaction time matched across the second level contrast?            | N/A, no timeable task                                                                      |
| Behavioral data notes                                                  | —                                                                          |
| Type of analysis                                                      | Voxelwise                                                                             |
| Search volume                                                         | Whole brain                                                                            |
| Correction for multiple comparisons                                   | Voxelwise FWE correction and additional arbitrary cluster correction  |
| Software                                                               | SPM2                                                                                   |
| Voxelwise p                                                           | FWE p < .05                                                                             |
| Cluster extent                                                        | 5 voxels (size not stated)                                                              |
| Statistical details                                                   | —                                                                          |
| Findings                                                              | ↓ L posterior STG/STS/MTG                                                                  |
|                                                                     | ↓ L mid temporal                                                                        |
| Findings notes                                                        | —                                                                          |

**Voxelwise analysis 4**

| First level contrast         | Listening to narrative speech vs listening to reversed speech                              |
|-----------------------------|-------------------------------------------------------------------------------------------|
| Analysis class              | Cross-sectional correlation with language or other measure                                 |
| Group(s)                    | Aphasia without temporal lobe damage (n = 9)                                              |
| Covariate                   | Sentence comprehension (CAT)                                                               |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                     |
| Is accuracy matched across the second level contrast?                 | N/A, no behavioral measure                                                               |
| Is reaction time matched across the second level contrast?            | N/A, no timeable task                                                                      |
| Behavioral data notes      | —                                                                          |
| Type of analysis                                                      | Voxelwise                                                                             |
| Search volume                                                         | Whole brain                                                                            |
| Correction for multiple comparisons                                   | Voxelwise FWE correction and additional arbitrary cluster correction  |
| Software                                                               | SPM2                                                                                   |
| Voxelwise p                                                           | FWE p < .05                                                                             |
| Cluster extent                                                        | 5 voxels (size not stated)                                                              |
| Statistical details        | Conjunction with main effect of story comprehension (details hard to follow); this was a multiple regression also involving patients with temporal lobe damage |
| Findings                   | ↑ L posterior STS                                                                       |
|                           | ↑ R mid temporal                                                                        |
| Findings notes             | Patients with better sentence comprehension had more activation in the L posterior STS and R mid STS |

**Voxelwise analysis 5**

| First level contrast         | Listening to narrative speech vs listening to reversed speech                              |
|-----------------------------|-------------------------------------------------------------------------------------------|
| Analysis class              | Cross-sectional correlation with language or other measure                                 |
| Group(s)                    | Aphasia with temporal lobe damage (n = 8)                                                 |
| Covariate                   | Sentence comprehension (CAT)                                                               |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                     |
| Is accuracy matched across the second level contrast?                 | N/A, no behavioral measure                                                               |
| Is reaction time matched across the second level contrast?            | N/A, no timeable task                                                                      |
| Behavioral data notes      | —                                                                          |
| Type of analysis                                                      | Voxelwise                                                                             |
| Search volume                                                         | Whole brain                                                                            |
| Correction for multiple comparisons                                   | Voxelwise FWE correction and additional arbitrary cluster correction  |
| Software                                                               | SPM2                                                                                   |
| Voxelwise p                                                           | FWE p < .05                                                                             |
### Complex analysis 1

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|-------------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia             |
| Group(s)             | Aphasia with temporal damage (n = 8) vs without temporal damage (n = 9) |
| Covariate            | —                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | —                                                           |
| Type of analysis     | Complex                                                     |
| Statistical details  | Correlations were computed between activity in each voxel, and the sentence comprehension measure from the CAT, and were compared between the two aphasia groups, in regions with a main effect of story comprehension. The voxelwise threshold was p < .001, uncorrected for multiple comparisons. |
| Findings             | Other                                                       |
| Findings notes       | Activity in the L posterior STS was positively correlated with sentence comprehension in patients without temporal lobe damage, but not in patients with temporal lobe damage |

### Complex analysis 2

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|-------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                           |
| Group(s)             | Aphasia without temporal damage (n = 9) vs control           |
| Covariate            | —                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | —                                                           |
| Type of analysis     | Complex                                                     |
| Statistical details  | Correlations were computed between activity in each voxel, and post-scan story recall, and were compared between patients without temporal damage and controls, in regions with a main effect of story comprehension. The threshold was p < 0.05 corrected, plus a minimum cluster size of 5 voxels. |
| Findings             | None                                                        |
| Findings notes       | —                                                           |

### Complex analysis 3

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|-------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                           |
| Group(s)             | Aphasia with temporal damage (n = 8) vs control              |
| Covariate            | —                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Behavioral data notes | —                                                           |
| Type of analysis     | Complex                                                     |
| Statistical details  | Correlations were computed between activity in each voxel, and the sentence comprehension measure from the CAT, and were compared between the two aphasia groups, in regions with a main effect of story comprehension. The voxelwise threshold was p < .001, uncorrected for multiple comparisons. |
| Findings             | Other                                                       |
| Findings notes       | —                                                           |
| **Is reaction time matched across the second level contrast?** | N/A, no timeable task |
|---|---|
| **Behavioral data notes** | — |
| **Type of analysis** | Complex |
| **Statistical details** | Correlations were computed between activity in each voxel, and post-scan story recall, and were compared between patients with temporal damage and controls, in regions with a main effect of story comprehension. The threshold was p < 0.05 corrected, plus a minimum cluster size of 5 voxels. |
| **Findings** | None |
| **Findings notes** | — |

**Complex analysis 4**

| **First level contrast** | Listening to narrative speech vs listening to reversed speech |
| --- | --- |
| **Analysis class** | Cross-sectional between two groups with aphasia |
| **Group(s)** | Aphasia with temporal damage (n = 8) vs without temporal damage (n = 9) |
| **Covariate** | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | N/A, no behavioral measure |
| **Is reaction time matched across the second level contrast?** | N/A, no timeable task |
| **Behavioral data notes** | — |
| **Type of analysis** | Complex |
| **Statistical details** | Correlations were computed between activity in each voxel, and post-scan story recall, and were compared between the two aphasia groups, in regions with a main effect of story comprehension. The threshold was p < 0.05 corrected, plus a minimum cluster size of 5 voxels. |
| **Findings** | None |
| **Findings notes** | — |

**Notes**

**Excluded analyses**
An analysis involving associations between activations and story recognition memory because it included both controls and patients

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**de Boissezon et al. (2005)**

**Reference**

| **Authors** | de Boissezon X, Démonet JF, Puel M, Marie N, Raboyeau G, Albucher JF, Chollet F, Cardebat D |
| --- | --- |
| **Title** | Subcortical aphasia: a longitudinal PET study |
| **Reference** | Stroke 2005; 36: 1467-1473 |
| **PMID** | 15933252 |
| **DOI** | 10.1161/01.str.0000169947.08972.4f |

**Participants**

| **Language** | French |
| --- | --- |
| **Inclusion criteria** | Subcortical stroke; no severe aphasia |
| **Number of individuals with aphasia** | 7 |
| **Number of control participants** | 0 |
| **Were any of the participants included in any previous studies?** | No |
| **Is age reported for patients and controls, and matched?** | Yes (mean 52.4 ± 13 years, range 31-69 years) |
| Question | Answer |
|----------|--------|
| Is sex reported for patients and controls, and matched? | Yes (males: 7; females: 0) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 7; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | No* (moderate limitation) (T1: mean 53 ± 35 days, range 11-108 days; T2: mean 12.2 ± 1.4 months; T1 varies considerably from early to late subacute) |
| To what extent is the nature of aphasia characterized? | Type only |
| Language evaluation | Montreal-Toulouse Aphasia Battery |
| Aphasia severity | Not stated |
| Aphasia type | T1: 2 Broca's, 2 transcortical sensory, 1 anomic, 1 transcortical motor, 1 Wernicke's; T2: 4 recovered, 1 anomic, 1 transcortical motor; 1 transcortical sensory |
| First stroke only? | Yes |
| Stroke type | Mixed etiologies |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent | Not stated |
| Lesion location | 5 L non-thalamic subcortical, 2 L thalamic |
| Participants notes | — |

### Imaging

| Modality | PET (rCBF) |
|----------|------------|
| Is the study cross-sectional or longitudinal? | Longitudinal—recovery |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: mean 53 ± 35 days, range 11-108 days; T2: mean 12.2 ± 1.4 months; T1 varies considerably from early to late subacute |
| If longitudinal, was there any intervention between the time points? | Not stated |
| Is the scanner described? | Yes (CTI-Siemens ECAT EXACT HR+) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | PET |
| Total images acquired | 6 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and inrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed; minimal due to lesions being small and subcortical) |
| Imaging notes | — |

### Conditions

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|--------------|-------------|----------------------|--------------------------|
| word generation | Word (overt) | 4 | Yes | Yes |
| rest | None | 2 | N/A | N/A |

**Conditions notes:** Nouns in two runs, verbs in two runs, combined here because they were combined in analysis

### Contrasts

Are the contrasts clearly described? | Yes

#### Contrast 1: word generation vs rest

| Language condition | Word generation |
### Control condition

| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Are the conditions matched for visual demands?                         | Yes                                                                    |
| Are the conditions matched for auditory demands?                       | No                                                                    |
| Are the conditions matched for motor demands?                          | No                                                                    |
| Are the conditions matched for cognitive/executive demands?            | No                                                                    |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                              |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                              |
| Behavioral data notes                                                  | —                                                                     |
| Are control data reported in this paper or another that is referenced? | No                                                                    |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                                                              |
| Are activations lateralized in the control data?                       | Unknown                                                              |
| Control activation notes                                               | —                                                                     |
| Contrast notes                                                         | —                                                                     |

### Analyses

| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Are the analyses clearly described?                                    | No* (moderate limitation) (see specific limitation(s) below)           |

#### Voxelwise analysis 1

| First level contrast | Word generation vs rest |
|----------------------|-------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia T1              |
| Covariate            | Time post onset         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast?                  | Yes, matched |
| Is reaction time matched across the second level contrast?              | Unknown, not reported |
| Behavioral data notes                                              | No significant correlation between time post onset and accuracy   |
| Type of analysis                                                  | Voxelwise                        |
| Search volume                                                      | Whole brain                      |
| Correction for multiple comparisons                                | Clusterwise correction based on arbitrary cluster extent          |
| Software                                                           | SPM2                                |
| Voxelwise p                                                       | .01                                  |
| Cluster extent                                                    | 50 voxels (size not stated)  |
| Statistical details                                               | —                                   |
| Findings                                                          | ↑ L orbitofrontal                 |
|                                                                 | ↑ L anterior temporal             |
|                                                                 | ↑ L occipital                     |
|                                                                 | ↑ L anterior cingulate            |
|                                                                 | ↑ L cerebellum                    |
|                                                                 | ↑ R anterior temporal             |
|                                                                 | ↑ R occipital                     |

#### Voxelwise analysis 2

| First level contrast | Word generation vs rest |
|----------------------|-------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia T1              |
| Covariate            | Word generation accuracy T1 |
| Is the second level contrast valid in terms of the                  | Yes |

Findings notes: More activity with longer time post onset; based on coordinates in Table 3a
| group(s), time point(s), and measures involved? | Accuracy is covariate |
| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Voxelwise |
| Search volume | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software | SPM2 |
| Voxelwise p | .01 |
| Cluster extent | 50 voxels (size not stated) |
| Statistical details | — |
| Findings | ↑ L IFG pars triangularis  
↑ L dorsolateral prefrontal cortex  
↑ L precuneus  
↑ L Heschl's gyrus  
↑ L anterior temporal  
↑ R insula  
↑ R posterior STG |
| Findings notes | Based on coordinates in Table 3b |

**Voxelwise analysis 3**

| First level contrast | Word generation vs rest |
| Analysis class | Longitudinal change in aphasia |
| Group(s) | Aphasia T2 vs T1 |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Voxelwise |
| Search volume | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software | SPM2 |
| Voxelwise p | .001 |
| Cluster extent | 100 voxels (size not stated) |
| Statistical details | Description of masking unclear, but seems to be inclusively masked with T1, which seems inappropriate |
| Findings | ↑ L insula  
↑ L posterior STG  
↑ R orbitofrontal  
↑ R posterior STG  
↑ R cerebellum |
| Findings notes | Based on coordinates in Table 2 |

**Voxelwise analysis 4**

| First level contrast | Word generation vs rest |
| Analysis class | Longitudinal correlation with language or other measure |
| Group(s) | Aphasia T2 vs T1 |
| Covariate | Δ word generation accuracy |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Question                                                                 | Answer                                                                                     |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Is accuracy matched across the second level contrast?                  | Accuracy is covariate                                                                      |
| Is reaction time matched across the second level contrast?             | Unknown, not reported                                                                      |
| Behavioral data notes                                                 | —                                                                                         |
| Type of analysis                                                       | Voxelwise                                                                                 |
| Search volume                                                          | Whole brain                                                                               |
| Correction for multiple comparisons                                    | Clusterwise correction based on arbitrary cluster extent                                  |
| Software                                                               | SPM2                                                                                      |
| Voxelwise p                                                           | .01                                                                                        |
| Cluster extent                                                        | 20 voxels (size not stated)                                                               |
| Statistical details                                                    | —                                                                                         |
| Findings                                                              | ↑ L mid temporal                                                                          |
|                                                                     | ↑ R anterior temporal                                                                      |
|                                                                     | ↑ R cerebellum                                                                            |
| Findings notes                                                        | Based on coordinates in Table 3c                                                          |

**Notes**

**Excluded analyses**  
—

**Connor et al. (2006)**

**Reference**

| Authors                        | Connor LT, DeShazo Braby T, Snyder AZ, Lewis C, Blasi V, Corbetta M |
|--------------------------------|---------------------------------------------------------------------|
| Title                          | Cerebellar activity switches hemispheres with cerebral recovery in aphasia |
| Reference                      | *Neuropsychologia* 2006; 44: 171-177                                 |
| PMID                           | 16019040                                                            |
| DOI                            | 10.1016/j.neuropsychologia.2005.05.019                               |

**Participants**

| Language                        | US English                                                          |
|---------------------------------|                                                                    |
| Inclusion criteria              | L IFG, possibly extending to neighboring regions                   |
| Number of individuals with aphasia | 8                                                                 |
| Number of control participants  | 14                                                                  |
| Were any of the participants included in any previous studies? | Yes (re-analysis of data from Blasi et al. (2002))                |
| Is age reported for patients and controls, and matched? | No (mean 48.6 years; patients and controls not closely matched for age, unclear if difference significant) |
| Is sex reported for patients and controls, and matched? | Yes (males: 2; females: 6)                                         |
| Is handedness reported for patients and controls, and matched? | Yes (right: 8; left: 0)                                           |
| Is time post stroke onset reported and appropriate to the study design? | No (> 6 months; actual TPO not stated)                             |
| To what extent is the nature of aphasia characterized? | Comprehensive battery                                           |
| Language evaluation            | WAB or BDAE                                                         |
| Aphasia severity               | AQ range 66.5-89.0 in 6 participants, BDAE aphasia severity of 4 in 1 participant, no formal evaluation in 1 participant |
| Aphasia type                   | 3 anomic, 3 transcortical motor, 1 Broca's, 1 not stated; most were Broca's or global acutely |
| First stroke only?             | Yes                                                                 |
| Stroke type                    | Ischemic only                                                      |
| To what extent is the lesion distribution | Individual lesions                                             |
Lesion extent: Not stated
Lesion location: L IFG and operculum, extending to adjacent cortex and white matter in several cases

**Imaging**

| Modality          | fMRI          |
|-------------------|---------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Siemens Vision 1.5 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type       | Event-related |
| Total images acquired | 1024 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |

**Conditions**

| Condition                                           | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------------------------------------------|---------------|-------------|-----------------------|----------------------------|
| word stem completion (novel items)                  | Word (covert) | 196         | Yes                   | Unknown                    |
| word stem completion (repeated items)               | Word (covert) | 196         | Yes                   | Unknown                    |
| rest                                                | None          | implicit    | N/A                   | N/A                         |

**Conditions notes**: Novel items were presented in runs 1, 6, 7, and 8; repeated items were presented in runs 2, 3, 4, and 5; of the four repeated runs, only run 5 was analyzed.

**Contrasts**

| Contrast 1: word stem completion (novel items) vs word stem completion (repeated items) |
|------------------------------------------------------------------------------------------------|
| Language condition                                                                         | Word stem completion (novel items) |
| Control condition                                                                          | Word stem completion (repeated items) |
| Are the conditions matched for visual demands?                                            | Yes |
| Are the conditions matched for auditory demands?                                          | Yes |
| Are the conditions matched for motor demands?                                             | Yes |
| Are the conditions matched for cognitive/executive demands?                               | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups?       | Yes, matched |
| Is reaction time matched between the language and control tasks for all relevant groups?  | No, different |
| Behavioral data notes                                                                      | — |
| Are control data reported in this paper or another                                        | Somewhat |
| Question                                                                 | Answer                                                                                       |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                                                                                     |
| Are activations lateralized in the control data?                       | Somewhat                                                                                    |
| Control activation notes                                               | No whole brain analysis of this contrast, but somewhat lateralized in the sense that L but not R frontal areas showed a learning effect |
| Contrast notes                                                         | The only contrast analyzed in this paper is the "learning" contrast which corresponds to contrast 2 in Blasi et al. (2002) |

**Analyses**

| Are the analyses clearly described?                                     | No* (moderate limitation) (see specific limitation(s) below)                                |

**Voxelwise analysis 1**

| First level contrast                                               | Word stem completion (novel items) vs word stem completion (repeated items) |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Analysis class                                                      | Cross-sectional aphasia vs control                                             |
| Group(s)                                                            | Aphasia vs control                                                            |
| Covariate                                                           | —                                                                            |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                          |
| Is accuracy matched across the second level contrast?                | Yes, matched                                                                  |
| Is reaction time matched across the second level contrast?           | Yes, matched                                                                  |
| Behavioral data notes                                               | Covert task but overt data acquired separately; no interaction of group by practice for accuracy or RT |
| Type of analysis                                                    | Voxelwise                                                                    |
| Search volume                                                       | Cerebellum                                                                    |
| Correction for multiple comparisons                                 | No direct comparison                                                          |
| Software                                                            | not stated                                                                    |
| Voxelwise p                                                         | —                                                                            |
| Cluster extent                                                      | —                                                                            |
| Statistical details                                                 | Qualitative comparison on p. 174; Monte Carlo-based thresholding not described; rather than fitting a HRF, the authors looked at the shape of the signal in the 8 volumes following each stimulus |
| Findings                                                            | ↑ L cerebellum                                                               |
| Findings notes                                                      | ↓ R cerebellum                                                               |

**ROI analysis 1**

| First level contrast                                               | Word stem completion (novel items) vs word stem completion (repeated items) |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Analysis class                                                      | Cross-sectional aphasia vs control                                             |
| Group(s)                                                            | Aphasia vs control                                                            |
| Covariate                                                           | —                                                                            |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                          |
| Is accuracy matched across the second level contrast?                | Yes, matched                                                                  |
| Is reaction time matched across the second level contrast?           | Yes, matched                                                                  |
| Behavioral data notes                                               | Covert task but overt data acquired separately; no interaction of group by practice for accuracy or RT |
| Type of analysis                                                    | Region of interest (ROI)                                                      |
| ROI type                                                            | Functional                                                                   |
| How many ROIs are there?                                            | 1                                                                            |
| What are the ROI(s)?                                                | L cerebellum                                                                 |
| How are the ROI(s) defined?                                         | L cerebellar region with a learning effect in the patients                   |
| Correction for multiple comparisons | One only |
|------------------------------------|----------|
| Statistical details               | Circular because ROIs defined in one group; rather than fitting a HRF, the authors looked at the shape of the signal in the 8 volumes following each stimulus |
| Findings                           | ↑ L cerebellum |
| Findings notes                     | — |

**Notes**

**Excluded analyses**

1. analysis of frontal changes is excluded since it appears to be identical to Blasi et al. (2002);
2. the analyses involving mirrored cerebellar regions are excluded since the groups were not compared directly

### Crinion et al. (2006)

**Reference**

**Authors**

Crinion JT, Warburton EA, Lambon-Ralph MA, Howard D, Wise RJ

**Title**

Listening to narrative speech after aphasic stroke: the role of the left anterior temporal lobe

**Reference**

Cereb Cortex 2006; 16: 1116-1125

**PMID**

16251507

**DOI**

10.1093/cercor/bhj053

**Participants**

**Language**

UK English

**Inclusion criteria**

—

**Number of individuals with aphasia**

24

**Number of control participants**

11

**Were any of the participants included in any previous studies?**

No

**Is age reported for patients and controls, and matched?**

Yes (range 32-85 years)

**Is sex reported for patients and controls, and matched?**

Yes (males: 18; females: 6)

**Is handedness reported for patients and controls, and matched?**

Yes (right: 24; left: 0)

**Is time post stroke onset reported and appropriate to the study design?**

No (mean 32 months, range 2-204 months; combines subacute and chronic patients)

**To what extent is the nature of aphasia characterized?**

Comprehensive battery

**Language evaluation**

CAT (missing in two participants)

**Aphasia severity**

Not stated

**Aphasia type**

Not stated

**First stroke only?**

Yes

**Stroke type**

Not stated

**To what extent is the lesion distribution characterized?**

Lesion overlay

**Lesion extent**

Not stated

**Lesion location**

6 L but no temporal damage, 9 L temporal damage excluding anterior temporal cortex, 9 L temporal damage including anterior temporal cortex

**Participants notes**

Results of control participants previously reported in Crinion et al. (2003)

**Imaging**

**Modality**

PET (rCBF)

**Is the study cross-sectional or longitudinal?**

Cross-sectional

**If longitudinal, at what time point(s) were imaging**

—
**data acquired?**

- If longitudinal, was there any intervention between the time points? —

**Is the scanner described?**

- Yes (CTI-Siemens ECAT EXACT HR++/966 (16 patients and all controls) or GE Advance (8 patients))

**Is the timing of stimulus presentation and image acquisition clearly described and appropriate?**

- Yes

**Design type**

- PET

**Total images acquired**

- 12-16

**Are the imaging acquisition parameters, including coverage, adequately described and appropriate?**

- Yes (whole brain)

**Is preprocessing and intrasubject coregistration adequately described and appropriate?**

- Yes

**Is first level model fitting adequately described and appropriate?**

- Yes

**Is intersubject normalization adequately described and appropriate?**

- Yes

**Imaging notes**

- two different scanners used for patients, but not for controls

**Conditions**

- Are the conditions clearly described? Yes

| Condition                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|-------------------------------|---------------|-------------|-----------------------|---------------------------|
| Listening to narrative speech | None          | 6-8         | N/A                   | N/A                       |
| Listening to reversed speech  | None          | 6-8         | N/A                   | N/A                       |

**Conditions notes**

- —

**Contrasts**

- Are the contrasts clearly described? Yes

**Contrast 1: listening to narrative speech vs listening to reversed speech**

| Language condition            | Listening to narrative speech |
|-------------------------------|-------------------------------|
| Control condition             | Listening to reversed speech  |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |

**Is accuracy matched between the language and control tasks for all relevant groups?**

- N/A, no behavioral measure

**Is reaction time matched between the language and control tasks for all relevant groups?**

- N/A, no timeable task

**Behavioral data notes**

- —

**Are control data reported in this paper or another that is referenced?**

- Somewhat

**Does the contrast selectively activate plausible relevant language regions in the control group?**

- Yes

**Are activations lateralized in the control data?**

- Somewhat

**Control activation notes**

- 11 participants; L-lateralized posterior temporal, bilateral anterior temporal, no frontal

**Contrast notes**

- —

**Analyses**

- Are the analyses clearly described? Yes

**Voxelwise analysis 1**
| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|---------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                           |
| Group(s)             | Aphasia vs control                                           |
| Covariate            | —                                                             |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | —                                                             |
| Type of analysis     | Voxelwise                                                    |
| Search volume        | Voxelwise spared in all patients                             |
| Correction for multiple comparisons | Voxelwise FWE correction |
| Software             | SPM99                                                        |
| Voxelwise p          | FWE p < .05                                                  |
| Cluster extent       | —                                                             |
| Statistical details  | —                                                             |
| Findings             | None                                                          |
| Findings notes       | —                                                             |

**Voxelwise analysis 2**

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|---------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia without temporal lobe damage (n = 6) vs control |
| Group(s)             | Aphasia without temporal lobe damage (n = 6) vs control       |
| Covariate            | —                                                             |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | —                                                             |
| Type of analysis     | Voxelwise                                                    |
| Search volume        | Voxelwise spared in all included patients                     |
| Correction for multiple comparisons | Voxelwise FWE correction |
| Software             | SPM99                                                        |
| Voxelwise p          | FWE p < .05                                                  |
| Cluster extent       | —                                                             |
| Statistical details  | —                                                             |
| Findings             | None                                                          |
| Findings notes       | —                                                             |

**Voxelwise analysis 3**

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|---------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia with temporal lobe damage (n = 18) vs control |
| Group(s)             | Aphasia with temporal lobe damage (n = 18) vs control         |
| Covariate            | —                                                             |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | —                                                             |
| Type of analysis          | Voxelwise                  |
|--------------------------|----------------------------|
| Search volume            | Voxelwise FWE correction   |
| Correction for multiple comparisons |                      |
| Software                 | SPM99                      |
| Voxelwise p              | FWE p < .05                |
| Cluster extent           | —                          |
| Statistical details      | —                          |
| Findings                 | None                       |
| Findings notes           | —                          |

**ROI analysis 1**

- **First level contrast**: Listening to narrative speech vs listening to reversed speech
- **Analysis class**: Cross-sectional correlation with language or other measure
- **Group(s)**: Aphasia with no temporal damage (excluding 1 with missing behavioral data and 1 outlier) or posterior temporal damage sparing anterior temporal cortex (n = 13)
- **Covariate**: Auditory sentence comprehension (CAT)
- **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**: Yes
- **Is accuracy matched across the second level contrast?**: N/A, no behavioral measure
- **Is reaction time matched across the second level contrast?**: N/A, no timeable task
- **Behavioral data notes**: —
- **Type of analysis**: Region of interest (ROI)
- **ROI type**: Functional
- **How many ROIs are there?**: 1
- **What are the ROI(s)?**: L ATL
- **How are the ROI(s) defined?**: Activation in the control group
- **Correction for multiple comparisons**: One only
- **Statistical details**: Same result obtained with or without excluding one outlier; two other ROIs are described in the methods, but never used in any analyses
- **Findings**: ↑ L anterior temporal
- **Findings notes**: More activity in patients with better auditory sentence comprehension

**ROI analysis 2**

- **First level contrast**: Listening to narrative speech vs listening to reversed speech
- **Analysis class**: Cross-sectional correlation with language or other measure
- **Group(s)**: Aphasia with no temporal damage (excluding 1 with missing behavioral data and 1 outlier) or posterior temporal damage sparing anterior temporal cortex (n = 13)
- **Covariate**: Time post onset
- **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**: Yes
- **Is accuracy matched across the second level contrast?**: N/A, no behavioral measure
- **Is reaction time matched across the second level contrast?**: N/A, no timeable task
- **Behavioral data notes**: —
- **Type of analysis**: Region of interest (ROI)
- **ROI type**: Functional
- **How many ROIs are there?**: 1
- **What are the ROI(s)?**: L ATL
- **How are the ROI(s) defined?**: Activation in the control group
- **Correction for multiple comparisons**: One only
- **Statistical details**: Two other ROIs are described in the methods, but never used in any analyses
- **Findings**: None
- **Findings notes**: —
### ROI analysis 3

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|---------------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia              |
| Group(s)             | Aphasia with temporal damage excluding anterior temporal cortex (n = 9) vs with no temporal lobe damage (excluding 1 with missing behavioral data and 1 outlier) (n = 4) |
| Covariate            |                                                               |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

### Behavioral data notes

| Type of analysis | Region of interest (ROI) |
|------------------|--------------------------|
| ROI type         | Functional               |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L ATL |
| How are the ROI(s) defined? | Activation in the control group |
| Correction for multiple comparisons | One only |
| Statistical details | Two other ROIs are described in the methods, but never used in any analyses |
| Findings | ↓ L anterior temporal |
| Findings notes | Patients with posterior temporal damage had less signal change |

### ROI analysis 4

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|---------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                            |
| Group(s)             | Aphasia with temporal damage excluding anterior temporal cortex (n = 9) vs control |
| Covariate            |                                                               |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

### Behavioral data notes

| Type of analysis | Region of interest (ROI) |
|------------------|--------------------------|
| ROI type         | Functional               |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L ATL |
| How are the ROI(s) defined? | Activation in the control group |
| Correction for multiple comparisons | One only |
| Statistical details | Circular because ROI defined in one group; two other ROIs are described in the methods, but never used in any analyses |
| Findings | ↓ L anterior temporal |
| Findings notes | Large difference 2.7 ± 0.8 (patients) vs 6.3 ± 1.4 (controls) makes finding suggestive even in light of the circularity |

### ROI analysis 5

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|---------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure   |
| Group(s)             | Aphasia with no temporal damage (excluding 1 with missing behavioral data and 1 outlier) or posterior temporal damage sparing anterior temporal cortex (n = 13) |
| Covariate            | Auditory single word comprehension (CAT)                      |
| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                    |
| Is accuracy matched across the second level contrast?                  | N/A, no behavioral measure                                              |
| Is reaction time matched across the second level contrast?             | N/A, no timeable task                                                   |
| Behavioral data notes                                                  | —                                                                      |
| Type of analysis                                                       | Region of interest (ROI)                                                |
| ROI type                                                               | Functional                                                             |
| How many ROIs are there?                                               | 1                                                                     |
| What are the ROI(s)?                                                   | L ATL                                                                 |
| How are the ROI(s) defined?                                            | Activation in the control group                                        |
| Correction for multiple comparisons                                    | One only                                                              |
| Statistical details                                                    | Two other ROIs are described in the methods, but never used in any analyses |
| Findings                                                               | None                                                                  |
| Findings notes                                                         | R = 0.39; p > 0.1; seems to be a clear trend so lack of significance may reflect only lack of power |

### Notes

#### Excluded analyses

| Reference | Authors | Title | Reference | PMID | DOI |
|-----------|---------|-------|-----------|------|-----|
| Saur et al. (2006) | Saur D, Lange R, Baumgaertner A, Schraknepper V, Willmes K, Rijntjes M, Weiller C | Dynamics of language reorganization after stroke | Brain 2006; 129: 1371-1384 | 16638796 | 10.1093/brain/awl090 |

### Participants

| Language | German |
|----------|--------|
| Inclusion criteria | MCA; age < 70 years; able to distinguish forward vs backward speech outside the scanner; no pronounced small vessel disease |
| Number of individuals with aphasia | 14 (plus 4 excluded: 1 health problems; 1 scanner noise; 2 did not tolerate fMRI) |
| Number of control participants | 14 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (mean 51.9 ± 14.2 years, range 16-68 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 11; females: 3) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 12; left: 1; other: 1) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (T1 acute: mean 1.8 days, range 0-4 days; T2 subacute: mean 12.1 days, range 3-16 days; T3 chronic: mean 321 days, range 102-513 days) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |
| Language evaluation | AABT, AAT including TT, analysis of spontaneous speech, CETI, Language Recovery Score (LRS) derived from all these measures plus in-scanner task performance |
| Aphasia severity | T1: LRS mean 0.44, range 0.11-0.81; 1 mild, 1 mild-moderate, 7 moderate, 3 moderate-severe, 2 severe per AAT; T2: LRS mean 0.71, range 0.33-0.92; 2 recovered, 2 recovered-mild, 2 mild, 3 mild-moderate, 3 moderate, 2 severe per AAT; T3: LRS mean 0.91, range 0.66-1.00; 8 recovered, 2 recovered-mild, 3 mild, 1 moderate per AAT |
Aphasia type

| T1: 9 non-fluent, 5 fluent; T2: not stated; T3: 6 recovered, 4 minimal language impairment, 3 anomic, 1 global |

First stroke only?

| Yes |

Stroke type

| Ischemic only |

To what extent is the lesion distribution characterized?

| Individual lesions |

Lesion extent

| Not stated |

Lesion location

| L MCA; 4 frontal (2 extending to temporoparietal); 5 temporoparietal (2 extending to subcortical); 4 striatocapsular (2 extending to cortical); 1 frontoparietal |

Participants notes

| 198 patients with aphasia were screened |

Imaging

Modality

| fMRI |

Is the study cross-sectional or longitudinal?

| Longitudinal—recovery |

If longitudinal, at what time point(s) were imaging data acquired?

| T1 acute: mean 1.8 days, range 0-4 days; T2 subacute: mean 12.1 days, range 3-16 days; T3 chronic: mean 321 days, range 102-513 days |

If longitudinal, was there any intervention between the time points?

| Standard SLT throughout the observation period including at least 3 weeks inpatient |

Is the scanner described?

| Yes (Siemens Trio 3 Tesla) |

Is the timing of stimulus presentation and image acquisition clearly described and appropriate?

| Yes |

Design type

| Event-related |

Total images acquired

| 660 |

Are the imaging acquisition parameters, including coverage, adequately described and appropriate?

| Yes (whole brain) |

Is preprocessing and intrasubject coregistration adequately described and appropriate?

| Yes |

Is first level model fitting adequately described and appropriate?

| Yes |

Is intersubject normalization adequately described and appropriate?

| Yes |

Imaging notes

| — |

Conditions

Are the conditions clearly described?

| Yes |

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|--------------------------|
| listening to sentences and making a plausibility judgment | Button press | 92 | Unknown | No |
| listening to reversed speech rest | Button press | 92 | Yes | Unknown |
| | None | implicit baseline | N/A | N/A |

Conditions notes

In the auditory sentence comprehension condition, participants had to press a button to semantically anomalous sentences; in the reversed speech condition, they had to always press the button; the behavioral scores provided are not explained in the paper, but per a personal communication cited by Geranmayeh et al. (2014), 10% of the score reflects discrimination between intelligible and reversed speech, while 90% reflects semantic anomaly judgment; our coding of behavior is based on this limited information

Contrasts

Are the contrasts clearly described?

| Yes |

Contrast 1: listening to sentences and making a plausibility judgment vs listening to reversed speech

| Language condition | Listening to sentences and making a plausibility judgment |
|--------------------|----------------------------------------------------------|
| Control condition  | Listening to reversed speech                             |
| Question                                                                 | Answer         |
|------------------------------------------------------------------------|----------------|
| Are the conditions matched for visual demands?                         | Yes            |
| Are the conditions matched for auditory demands?                       | Yes            |
| Are the conditions matched for motor demands?                          | No             |
| Are the conditions matched for cognitive/executive demands?            | No             |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes                                                  | Reported accuracy combines the two conditions in a way that is not explained |
| Are control data reported in this paper or another that is referenced? | Yes            |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes |
| Are activations lateralized in the control data?                       | Yes            |

**Behavioral data notes**

Are control data reported in this paper or another that is referenced? Yes

Does the contrast selectively activate plausible relevant language regions in the control group? Yes

Are activations lateralized in the control data? Yes

Control activation notes L temporal and L > R frontal

Contrast notes —

**Analyses**

Are the analyses clearly described? Yes

**Voxelwise analysis 1**

First level contrast

Analysis class

Group(s)

Covariate

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes

Is accuracy matched across the second level contrast? Appear mismatched

Is reaction time matched across the second level contrast? Unknown, not reported

Behavioral data notes Accuracy combines language and control conditions

Type of analysis Voxelwise

Search volume Whole brain

Correction for multiple comparisons No correction

Software SPM2

Voxelwise p .001

Cluster extent None

Statistical details —

Findings ↑ L insula

↑ R IFG pars orbitalis

↑ R insula

↑ R SMA/medial prefrontal

Findings notes R IFG/insula activation noted to survive FWE correction at p < .05

**Voxelwise analysis 2**

First level contrast

Analysis class

Group(s)

Covariate

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes

Is accuracy matched across the second level contrast? Appear mismatched

Is reaction time matched across the second level contrast? Unknown, not reported
| **Behavioral data notes** | Accuracy combines language and control conditions |
|---------------------------|--------------------------------------------------|
| **Type of analysis**      | Voxelwise                                        |
| **Search volume**         | Whole brain                                      |
| **Correction for multiple comparisons** | No correction                                   |
| **Software**              | SPM2                                             |
| **Voxelwise p**           | .005                                             |
| **Cluster extent**        | None                                             |
| **Statistical details**   | Threshold was lowered to reveal the R frontal change in activation |
| **Findings**              | ↓ R IFG pars orbitalis                           |
|                           | ↓ R occipital                                    |
| **Findings notes**        | —                                                |

### Voxelwise analysis 3

| **First level contrast** | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|--------------------------|-----------------------------------------------------------------------------------------|
| **Analysis class**       | Longitudinal change in aphasia                                                          |
| **Group(s)**             | Aphasia T3 vs T1                                                                       |
| **Covariate**            | —                                                                                       |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes                                                                 |
| **Is accuracy matched across the second level contrast?** | **Appear mismatched**                                                                  |
| **Is reaction time matched across the second level contrast?** | **Unknown, not reported**                                                              |
| **Behavioral data notes** | Accuracy combines language and control conditions                                      |
| **Type of analysis**      | Voxelwise                                                                              |
| **Search volume**        | Whole brain                                                                            |
| **Correction for multiple comparisons** | No correction                         |
| **Software**             | SPM2                                                                                   |
| **Voxelwise p**          | .001                                                                                   |
| **Cluster extent**       | None                                                                                   |
| **Statistical details**  | —                                                                                       |
| **Findings**             | ↑ L IFG pars orbitalis                                                                 |
|                           | ↑ L SMA/medial prefrontal                                                              |
|                           | ↑ L posterior inferior temporal gyrus/fusiform gyrus                                    |
|                           | ↑ R IFG pars orbitalis                                                                  |
|                           | ↑ R insula                                                                             |
| **Findings notes**       | —                                                                                       |

### Voxelwise analysis 4

| **First level contrast** | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|--------------------------|-----------------------------------------------------------------------------------------|
| **Analysis class**       | Cross-sectional aphasia vs control                                                      |
| **Group(s)**             | Aphasia T1 vs control                                                                  |
| **Covariate**            | —                                                                                       |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes                                                                 |
| **Is accuracy matched across the second level contrast?** | **Appear mismatched**                                                                  |
| **Is reaction time matched across the second level contrast?** | **Unknown, not reported**                                                              |
| **Behavioral data notes** | Accuracy combines language and control conditions                                      |
| **Type of analysis**      | Voxelwise                                                                              |
| **Search volume**        | Whole brain                                                                            |
| **Correction for multiple comparisons** | No correction                         |
| **Software**             | SPM2                                                                                   |
| **Voxelwise p**          | .001                                                                                   |
### Voxelwise analysis 5

**First level contrast**
Listening to sentences and making a plausibility judgment vs listening to reversed speech

**Analysis class**
Cross-sectional aphasia vs control

**Group(s)**
Aphasia T2 vs control

**Covariate**
—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**
Yes

**Is accuracy matched across the second level contrast?**
Appear mismatched

**Is reaction time matched across the second level contrast?**
Unknown, not reported

**Behavioral data notes**
Accuracy combines language and control conditions

**Type of analysis**
Voxelwise

**Search volume**
Whole brain

**Correction for multiple comparisons**
No correction

**Software**
SPM2

**Voxelwise p**
.005

**Cluster extent**
None

**Statistical details**
Threshold was lowered to reveal L IFG

**Findings**

- ↑ L IFG pars triangularis
- ↑ L IFG pars orbitalis
- ↑ L insula
- ↑ L posterior MTG
- ↑ L posterior inferior temporal gyrus/fusiform gyrus
- ↑ R IFG pars orbitalis
- ↑ R insula

**Findings notes**
L STG in table is actually MTG based on coordinates

---

### Voxelwise analysis 6

**First level contrast**
Listening to sentences and making a plausibility judgment vs listening to reversed speech

**Analysis class**
Cross-sectional aphasia vs control

**Group(s)**
Aphasia T3 vs control

**Covariate**
—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**
Yes

**Is accuracy matched across the second level contrast?**
Appear similar

**Is reaction time matched across the second level contrast?**
Unknown, not reported

**Behavioral data notes**
Accuracy combines language and control conditions

**Type of analysis**
Voxelwise

**Search volume**
Whole brain

**Correction for multiple comparisons**
No correction

**Software**
SPM2

**Voxelwise p**
.001

**Cluster extent**
None

**Statistical details**
—

**Findings**

- ↑ L IFG pars orbitalis
- ↑ L insula
- ↑ L SMA/medial prefrontal
- ↑ R IFG

**Findings notes**
—
### Voxelwise analysis 7

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|--------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                  |
| Group(s)             | Aphasia T1                                                                                   |
| Covariate            | Language recovery score T1                                                                   |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                           |
| Is accuracy matched across the second level contrast? | **Appear mismatched**                                                                         |
| Is reaction time matched across the second level contrast? | **Unknown, not reported**                                                                     |
| Behavioral data notes | Accuracy combines language and control conditions                                            |
| Type of analysis      | Voxelwise                                                                                     |
| Search volume         | Whole brain                                                                                   |
| Correction for multiple comparisons | **No correction**                                                                                  |
| Software              | SPM2                                                                                          |
| Voxelwise p           | .001                                                                                          |
| Cluster extent        | None                                                                                          |
| Statistical details   | —                                                                                             |
| Findings              | ↑ L IFG, ↑ L SMA/medial prefrontal, ↑ R IFG pars triangularis                                    |
| Findings notes        | —                                                                                             |

### Voxelwise analysis 8

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|--------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                  |
| Group(s)             | Aphasia T2                                                                                   |
| Covariate            | Language recovery score T2                                                                   |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                           |
| Is accuracy matched across the second level contrast? | **Unknown, no test**                                                                         |
| Is reaction time matched across the second level contrast? | **Unknown, not reported**                                                                     |
| Behavioral data notes | Accuracy combines language and control conditions                                            |
| Type of analysis      | Voxelwise                                                                                     |
| Search volume         | Whole brain                                                                                   |
| Correction for multiple comparisons | **No correction**                                                                                  |
| Software              | SPM2                                                                                          |
| Voxelwise p           | .001                                                                                          |
| Cluster extent        | None                                                                                          |
| Statistical details   | —                                                                                             |
| Findings              | None                                                                                          |
| Findings notes        | —                                                                                             |

### Voxelwise analysis 9

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|--------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                  |
| Group(s)             | Aphasia T3                                                                                   |
| Covariate            | Language recovery score T3                                                                   |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                           |
| Question                                                                 | Answer                                      |
|-------------------------------------------------------------------------|---------------------------------------------|
| Is accuracy matched across the second level contrast?                    | Unknown, no test                            |
| Is reaction time matched across the second level contrast?               | Unknown, not reported                        |
| Behavioral data notes                                                   | Accuracy combines language and control conditions |
| Type of analysis                                                        | Voxelwise                                   |
| Search volume                                                           | Whole brain                                 |
| Correction for multiple comparisons                                      | No correction                               |
| Software                                                                 | SPM2                                        |
| Voxelwise p                                                             | .001                                        |
| Cluster extent                                                          | None                                        |
| Statistical details                                                     | —                                           |
| Findings                                                                | None                                        |
| Findings notes                                                          | —                                           |

**Voxelwise analysis 10**

| First level contrast                                                                 | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
| Analysis class                                                                    | Longitudinal correlation with language or other measure |
| Group(s)                                                                            | Aphasia T2 vs T1 |
| Covariate                                                                           | % change in language recovery score |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast?                               | Unknown, no test |
| Is reaction time matched across the second level contrast?                          | Unknown, not reported |
| Behavioral data notes                                                              | Accuracy combines language and control conditions |
| Type of analysis                                                                    | Voxelwise                                   |
| Search volume                                                                      | Whole brain                                 |
| Correction for multiple comparisons                                                | No correction                               |
| Software                                                                            | SPM2                                        |
| Voxelwise p                                                                         | .001                                        |
| Cluster extent                                                                      | None                                        |
| Statistical details                                                                 | —                                           |
| Findings                                                                            | ↓ L SMA/medial prefrontal                    |
| Findings notes                                                                      | ↓ R insula                                  |
|                                                                                     | ↑ R SMA/medial prefrontal                    |

**Voxelwise analysis 11**

| First level contrast                                                                 | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
| Analysis class                                                                    | Longitudinal correlation with language or other measure |
| Group(s)                                                                            | Aphasia T3 vs T2 |
| Covariate                                                                           | % change in language recovery score |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast?                               | Unknown, no test |
| Is reaction time matched across the second level contrast?                          | Unknown, not reported |
| Behavioral data notes                                                              | Accuracy combines language and control conditions |
| Type of analysis                                                                    | Voxelwise                                   |
| Search volume                                                                      | Whole brain                                 |
| Correction for multiple comparisons                                                | No correction                               |
| Software                                                                            | SPM2                                        |

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### Voxelwise analysis 12

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|-----------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                  |
| Group(s)             | Aphasia T3 vs T1                                                                         |
| Covariate            | % change in language recovery score                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, no test |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Accuracy combines language and control conditions                                          |
| Type of analysis     | Voxelwise                                                                                |
| Search volume        | Whole brain                                                                              |
| Correction for multiple comparisons | No correction |
| Software             | SPM2                                                                                    |
| Voxelwise p          | .001                                                                                    |
| Cluster extent       | None                                                                                     |
| Statistical details  | —                                                                                       |
| Findings             | None                                                                                     |
| Findings notes       | —                                                                                       |

### ROI analysis 1

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|-----------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                                          |
| Group(s)             | Aphasia T2 vs T1                                                                         |
| Covariate            | —                                                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Accuracy combines language and control conditions                                          |
| Type of analysis     | Regions of interest (ROI)                                                                |
| ROI type             | Functional                                                                               |
| How many ROIs are there? | 6                                                                                      |
| What are the ROI(s)? | (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R insula; (5) R IFG pars triangularis; (6) R SMA |
| How are the ROI(s) defined? | Peak voxels of overall activation map based on all three time points in patients |
| Correction for multiple comparisons | Familywise error (FWE) |
| Statistical details  | —                                                                                       |
| Findings             | ↑ R insula                                                                               |
| Findings notes       | ↑ R SMA/medial prefrontal                                                                 |

### ROI analysis 2

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|-----------------------------------------------------------------------------------------|
| Analysis class       | —                                                                                       |
| Group(s)             | —                                                                                       |
| Covariate            | —                                                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | — |
| Is accuracy matched across the second level contrast? | — |
| Is reaction time matched across the second level contrast? | — |
| Behavioral data notes | —                                                                                       |
| Type of analysis     | —                                                                                       |
| ROI type             | —                                                                                       |
| How many ROIs are there? | —                                                                                      |
| What are the ROI(s)? | —                                                                                       |
| How are the ROI(s) defined? | —                                                                                      |
| Correction for multiple comparisons | —                                                                                      |
| Statistical details  | —                                                                                       |
| Findings             | Some other ROIs also significant prior to correction for multiple comparisons; n.b. performance confound |
| Findings notes       | —                                                                                       |
| Analysis class | Longitudinal change in aphasia |
|----------------|-------------------------------|
| **Group(s)** | Aphasia T3 vs T2 |
| **Covariate** | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| **Behavioral data notes** | Accuracy combines language and control conditions |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | Functional |
| How many ROIs are there? | 6 |
| What are the ROI(s)? | (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R Insula; (5) R IFG pars triangularis; (6) R SMA |
| How are the ROI(s) defined? | Peak voxels of overall activation map based on all three time points in patients |
| Correction for multiple comparisons | Familywise error (FWE) |
| **Statistical details** | — |
| **Findings** | — |
| **Findings notes** | Some other ROIs also significant prior to correction for multiple comparisons; n.b. performance confound |

**ROI analysis 3**

| **First level contrast** | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
| **Analysis class** | Longitudinal change in aphasia |
| **Group(s)** | Aphasia T3 vs T1 |
| **Covariate** | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| **Behavioral data notes** | Accuracy combines language and control conditions |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | Functional |
| How many ROIs are there? | 6 |
| What are the ROI(s)? | (1) L IFG pars orbitalis; (2) L IFG pars triangularis; (3) L MTG; (4) R Insula; (5) R IFG pars triangularis; (6) R SMA |
| How are the ROI(s) defined? | Peak voxels of overall activation map based on all three time points in patients |
| Correction for multiple comparisons | Familywise error (FWE) |
| **Statistical details** | — |
| **Findings** | — |
| **Findings notes** | Some other ROIs also significant prior to correction for multiple comparisons; n.b. performance confound |

**ROI analysis 4**

| **First level contrast** | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
| **Analysis class** | Cross-sectional aphasia vs control |
| **Group(s)** | Aphasia T1 vs control |
| **Covariate** | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
## Behavioral data notes
Accuracy combines language and control conditions

## Type of analysis
Regions of interest (ROI)

## ROI type
Functional

### How many ROIs are there?
6

### What are the ROI(s)?
1. L IFG pars orbitalis; 2. L IFG pars triangularis; 3. L MTG; 4. R insula; 5. R IFG pars triangularis; 6. R SMA

### How are the ROI(s) defined?
Peak voxels of overall activation map based on all three time points in patients

### Correction for multiple comparisons
No correction

## Statistical details
Circular because ROIs defined in one group

### Findings
1. L posterior MTG
2. R IFG pars triangularis

### Findings notes
R IFG difference described in text but not table

### ROI analysis 5

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                                        |
| Group(s)             | Aphasia T2 vs control                                                                     |
| Covariate            | —                                                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes
Accuracy combines language and control conditions

### Type of analysis
Regions of interest (ROI)

### ROI type
Functional

### How many ROIs are there?
6

### What are the ROI(s)?
1. L IFG pars orbitalis; 2. L IFG pars triangularis; 3. L MTG; 4. R insula; 5. R IFG pars triangularis; 6. R SMA

### How are the ROI(s) defined?
Peak voxels of overall activation map based on all three time points in patients

### Correction for multiple comparisons
No correction

### Statistical details
Circular because ROIs defined in one group

### Findings
None

### Findings notes
—

### ROI analysis 6

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                                        |
| Group(s)             | Aphasia T3 vs control                                                                     |
| Covariate            | —                                                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear similar |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes
Accuracy combines language and control conditions

### Type of analysis
Regions of interest (ROI)

### ROI type
Functional

### How many ROIs are there?
6

### What are the ROI(s)?
1. L IFG pars orbitalis; 2. L IFG pars triangularis; 3. L MTG; 4. R insula; 5. R IFG pars triangularis; 6. R SMA

### How are the ROI(s) defined?
Peak voxels of overall activation map based on all three time points in patients

### Correction for multiple comparisons
No correction

### Statistical details
Circular because ROIs defined in one group

### Findings
None

### Findings notes
—
### Correction for multiple comparisons
No correction

### Statistical details
Circular because ROIs defined in one group

### Findings
None

### Findings notes
—

### Notes
Excluded analyses
Additional analyses using absolute improvements in LRS instead of proportional improvements

### Meinzer et al. (2008)

#### Reference
**Authors**
Meinzer M, Flaisch T, Breitenstein C, Wienbruch C, Elbert T, Rockstroh B

**Title**
Functional re-recruitment of dysfunctional brain areas predicts language recovery in chronic aphasia

**Reference**
*NeuroImage* 2008; 39: 2038-2046

**PMID**
18096407

**DOI**
10.1016/j.neuroimage.2007.10.008

#### Participants
**Language**
German

**Inclusion criteria**
—

**Number of individuals with aphasia**
11

**Number of control participants**
0

**Were any of the participants included in any previous studies?**
No

**Is age reported for patients and controls, and matched?**
Yes (median 51.0 years, range 19-66 years)

**Is sex reported for patients and controls, and matched?**
Yes (males: 7; females: 4)

**Is handedness reported for patients and controls, and matched?**
Yes (right: 11; left: 0)

**Is time post stroke onset reported and appropriate to the study design?**
Yes (median 32 months; range 6-480 months)

**To what extent is the nature of aphasia characterized?**
Comprehensive battery

**Language evaluation**
AAT, study-specific picture naming test with 150 items

**Aphasia severity**
6 moderate, 4 mild, 1 severe

**Aphasia type**
7 Broca’s, 2 Wernicke’s, 1 global, 1 unclassified

**First stroke only?**
Not stated

**Stroke type**
Mixed etiologies

**To what extent is the lesion distribution characterized?**
Lesion overlay

**Lesion extent**
Range 31.0-236.0 cc

**Lesion location**
L

**Participants notes**
—

#### Imaging
**Modality**
fMRI

**Is the study cross-sectional or longitudinal?**
Longitudinal—chronic treatment

**If longitudinal, at what time point(s) were imaging data acquired?**
T1: pre-treatment/chronic; T2: post-treatment, ~2 weeks later

**If longitudinal, was there any intervention between imaging time points?**
CIAT, 3 hours/day, 5 days/week, 2 weeks
| question                                                                 | answer                                                                 |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| Is the scanner described?                                                | Yes (Philips Intera 1.5 Tesla)                                         |
| Is the timing of stimulus presentation and image acquisition clearly    | Yes                                                                    |
| described and appropriate?                                              |                                                                        |
| Design type                                                             | Block                                                                  |
| Total images acquired                                                   | 160                                                                   |
| Are the imaging acquisition parameters, including coverage, adequately  | Yes (whole brain)                                                      |
| described and appropriate?                                              |                                                                        |
| Is preprocessing and intrasubject coregistration adequately described   | Yes                                                                    |
| and appropriate?                                                        |                                                                        |
| Is first level model fitting adequately described and appropriate?       | Yes                                                                    |
| Is intersubject normalization adequately described and appropriate?      | Yes                                                                    |
| Imaging notes                                                           | —                                                                     |
| Conditions                                                               |                                                                        |
| Are the conditions clearly described?                                    | Yes                                                                    |
| Condition                                                               | Response type             | Repetitions | All groups could do? | All individuals could do? |
| picture naming (trained items)                                          | Word (overt)              | 8           | Yes                  | No                      |
| picture naming (untrained items)                                        | Word (overt)              | 8           | Yes                  | No                      |
| rest                                                                    | None                     | 16          | N/A                  | N/A                     |
| Conditions notes                                                        | One participant was < 10% on trained and untrained items at T1          |
| Contrasts                                                                |                                                                        |
| Are the contrasts clearly described?                                     | Yes                                                                    |
| Contrast 1: picture naming (trained items) vs rest                       |                                                                        |
| Language condition                                                      | Picture naming (trained items)                                        |
| Control condition                                                       | Rest                                                                   |
| Are the conditions matched for visual demands?                          | No                                                                    |
| Are the conditions matched for auditory demands?                        | No                                                                    |
| Are the conditions matched for motor demands?                           | No                                                                    |
| Are the conditions matched for cognitive/executive demands?             | No                                                                    |
| Is accuracy matched between the language and control tasks for all      | N/A, tasks not comparable                                             |
| relevant groups?                                                        |                                                                        |
| Is reaction time matched between the language and control tasks for all| N/A, tasks not comparable                                             |
| relevant groups?                                                        |                                                                        |
| Behavioral data notes                                                   | —                                                                     |
| Are control data reported in this paper or another that is referenced?  | No                                                                    |
| Does the contrast selectively activate plausible relevant language      | Unknown                                                               |
| regions in the control group?                                           |                                                                        |
| Are activations lateralized in the control data?                        | Unknown                                                               |
| Control activation notes                                                | —                                                                     |
| Contrast notes                                                          | —                                                                     |
| Contrast 2: picture naming (untrained items) vs rest                    |                                                                        |
| Language condition                                                      | Picture naming (untrained items)                                      |
| Control condition                                                       | Rest                                                                   |
| Are the conditions matched for visual demands?                          | No                                                                    |
| Are the conditions matched for auditory demands?                        | No                                                                    |
| Question                                                                 | Answer |
|-------------------------------------------------------------------------|--------|
| Are the conditions matched for motor demands?                          | No     |
| Are the conditions matched for cognitive/executive demands?            | No     |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes                                                  | —      |
| Are control data reported in this paper or another that is referenced? | No     |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data?                       | Unknown |
| Control activation notes                                               | —      |
| Contrast notes                                                         | —      |

**Analyses**

| Question                                                                 | Answer |
|-------------------------------------------------------------------------|--------|
| Are the analyses clearly described?                                      | No* (moderate limitation) (see specific limitation(s) below) |

**ROI analysis 1**

| First level contrast          | Picture naming (trained items) vs rest |
| Analysis class                | Longitudinal correlation with language or other measure |
| Group(s)                     | Aphasia T2 vs T1 |
| Covariate                    | Δ picture naming (trained items) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast?                   | Accuracy is covariate |
| Is reaction time matched across the second level contrast?              | Unknown, not reported |
| Behavioral data notes        | Picture naming score (trained items) increased from 51.7 ± 24.8 to 78.8 ± 22.1, which was statistically significant (p < 0.0001) |
| Type of analysis             | Regions of interest (ROI) |
| ROI type                     | Other |
| How many ROIs are there?     | 4 |
| What are the ROI(s)?         | (1) perilesional area of slow wave activity determined with MEG; (2) right hemisphere homotopic to lesion; (3) right hemisphere homotopic to slow wave area; (4) remainder of left hemisphere; for one patient, maximal slow wave activity was in the right hemisphere and it is not clear how this was handled |
| How are the ROI(s) defined?  | The dependent measure was the number of voxels in each ROI exceeding certain thresholds that differed across subjects depending on their strength of activation; it appears that increases and decreases may have been summed, though the description is hard to follow |
| Correction for multiple comparisons | No correction |
| Statistical details          | 2 of the 11 patients were classified as outliers and excluded from analyses, however no plots are provided to justify their status as outliers |
| Findings                     | Other |
| Findings notes               | Improved picture naming of trained items was correlated with increased signal in 3 of the 4 ROIs, the exception being the right hemisphere ROI homotopic to the slow wave area; after removing the two outliers, only the correlation in the left hemisphere area of slow wave activity remained significant |

**ROI analysis 2**

| First level contrast          | Picture naming (untrained items) vs rest |
| Analysis class                | Longitudinal correlation with language or other measure |
| Group(s)                     | Aphasia T2 vs T1 |
| Covariate                    | Δ picture naming (untrained items) |
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes
---|---
Is accuracy matched across the second level contrast? | Accuracy is covariate
Is reaction time matched across the second level contrast? | Unknown, not reported

Behavioral data notes
Picture naming score (untrained items) increased from 54.0 ± 24.3 to 70.5 ± 26.7, which was statistically significant (p= 0.002)

Type of analysis | Regions of interest (ROI)
ROI type | Other
How many ROIs are there? | 4

What are the ROI(s)?
(1) perilesional area of slow wave activity determined with MEG; (2) right hemisphere homotopic to lesion; (3) right hemisphere homotopic to slow wave area; (4) remainder of left hemisphere; for one patient, maximal slow wave activity was in the right hemisphere and it is not clear how this was handled

How are the ROI(s) defined?
The dependent measure was the number of voxels in each ROI exceeding certain thresholds that differed across subjects depending on their strength of activation; it appears that increases and decreases may have been summed, though the description is hard to follow

Correction for multiple comparisons | No correction
Statistical details
2 of the 11 patients were classified as outliers and excluded from analyses, however no plots are provided to justify their status as outliers
Findings | Other
Findings notes
Improved picture naming of untrained items was correlated with increased signal in all 4 ROIs; after removing the two outliers, none of the correlations remained significant

Notes
Excluded analyses
Additional analyses correlating functional changes in the “delta ROI” with ROI extent, initial severity, duration of aphasia, overall speech activity, since limited detail is provided and only one ROI is reported

Raboyeau et al. (2008)

Reference
Raboyeau G, De Boissezon X, Marie N, Balduyck S, Puel M, Bézy C, Démonet JF, Cardebat D

Title
Right hemisphere activation in recovery from aphasia: lesion effect or function recruitment?

Reference
Neurology 2008; 70: 2900-298

PMID
18209203

DOI
10.1212/01.wnl.0000287115.85956.87

Participants
Language | French
Inclusion criteria | Naming deficit; good comprehension
Number of individuals with aphasia | 10
Number of control participants | 20
Were any of the participants included in any previous studies? | No
Is age reported for patients and controls, and matched? | No (mean 53.8 ± 14.7 years; controls were younger)
Is sex reported for patients and controls, and matched? | Yes (males: 6; females: 4)
Is handedness reported for patients and controls, and matched? | Yes (right: 10; left: 0)
Is time post stroke onset reported and appropriate to the study design? | Yes (range 7-102 months)
To what extent is the nature of aphasia characterized?

**Severity and type**

| Language evaluation | Montreal-Toulouse Aphasia Battery |
|---------------------|-----------------------------------|
| Aphasia severity    | Mild (but had initially been severe) |
| Aphasia type        | 4 anomic, 3 conduction, 2 Broca's, 1 AoS |
| First stroke only?  | Yes |
| Stroke type         | Not stated |

To what extent is the lesion distribution characterized?

**Individual lesions**

| Lesion extent       | Range 29.9-195.2 cc |
|---------------------|---------------------|
| Lesion location     | L MCA               |
| Participants notes  | —                   |

**Imaging**

| Modality          | PET (rCBF)       |
|-------------------|------------------|
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment, ~4 weeks later |
| If longitudinal, was there any intervention between the time points? | Lexical training, 15 minutes/day, 5 days/week, 4 weeks; the control group were trained to relearn foreign words that they had learned in school but since mostly forgotten |
| Is the scanner described? | Yes (Siemens ECAT HR+) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type        | PET               |
| Total images acquired | 6                 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and inrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed) |
| Imaging notes      | —                 |

**Conditions**

| Condition                                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|------------------------------------------------|---------------|-------------|----------------------|--------------------------|
| picture naming (native language)              | Word (overt)  | aphasia: 4; control: 2 | Yes                   | Unknown                  |
| picture naming (relearned foreign language) (controls only) | Word (overt)  | 2           | Yes                  | Unknown                  |
| rest                                           | None          | 2           | N/A                  | N/A                      |

**Conditions notes**

Picture naming in native language in controls not analyzed in this paper

**Contrasts**

Are the contrasts clearly described?

No (see specific limitation(s) below)

**Contrast 1: picture naming (native in patients; relearned foreign in controls) vs rest**

| Language condition | Picture naming (native in patients; relearned foreign in controls) |
|--------------------|------------------------------------------------------------------|
| Control condition  | Rest                                                             |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
### Are the conditions matched for cognitive/executive demands?
- **No**

### Is accuracy matched between the language and control tasks for all relevant groups?
- **N/A, tasks not comparable**

### Is reaction time matched between the language and control tasks for all relevant groups?
- **N/A, tasks not comparable**

### Behavioral data notes
- **—**

### Are control data reported in this paper or another that is referenced?
- **No**

### Does the contrast selectively activate plausible relevant language regions in the control group?
- **Unknown**

### Are activations lateralized in the control data?
- **Unknown**

### Control activation notes
- **—**

### Contrast notes
- Presumably only the relearned foreign condition was used in controls (not the native condition), but this is not stated explicitly.

## Analyses

### Are the analyses clearly described?
- **No (see specific limitation(s) below)**

### Voxelwise analysis 1

| First level contrast | Picture naming (native in patients; relearned foreign in controls) vs rest |
|----------------------|-------------------------------------------------------------------|
| Analysis class       | Longitudinal aphasia vs control                                    |
| Group(s)             | (Aphasia T2 vs T1) vs (control T2 vs T1)                          |
| Covariate            | —                                                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **No, but attempt made** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |

### Behavioral data notes
- Relearned foreign language was an attempt to equate to recovery in patients; still, patients improved less than controls, as shown by a significant interaction of group by time (p < .0001)

### Type of analysis
- **Voxelwise**

### Search volume
- **Whole brain**

### Correction for multiple comparisons
- **Clusterwise correction based on arbitrary cluster extent**

### Software
- **SPM2**

### Voxelwise p
- **.01**

### Cluster extent
- **30 voxels (size not stated)**

### Statistical details
- **Nature of control contrast not clear; negative tail of contrast was masked to exclude lesioned areas, but the mask may have been more extensive than that**

### Findings
- ↑ L orbitofrontal

### Findings notes
- **—**

### Voxelwise analysis 2

| First level contrast | Picture naming (native in patients; relearned foreign in controls) vs rest |
|----------------------|-------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure            |
| Group(s)             | Aphasia T2 vs T1                                                   |
| Covariate            | Δ picture naming accuracy                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Accuracy is covariate** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |

### Behavioral data notes
- **—**

### Type of analysis
- **Voxelwise**
### Search volume
Whole brain

### Correction for multiple comparisons
Clusterwise correction based on arbitrary cluster extent

### Software
SPM2

### Voxelwise p
.01

### Cluster extent
30 voxels (size not stated)

### Statistical details
Nature of control contrast not clear

### Findings
- ↑ R insula
- ↑ R SMA/medial prefrontal
- ↑ R orbitofrontal
- ↑ R anterior cingulate
- ↓ L intraparietal sulcus
- ↓ L precuneus
- ↓ L posterior cingulate
- ↓ R dorsal precentral
- ↓ R precuneus

### Findings notes
—

### Notes
Excluded analyses
Conjunction analysis, because it collapsed across patients and controls

### Richter et al. (2008)

#### Reference
**Authors**
Richter M, Miltner WH, Straube T

**Title**
Association between therapy outcome and right-hemispheric activation in chronic aphasia

**Reference**
*Brain* 2008; 131: 1391-1401

**PMID**
18349055

**DOI**
10.1093/brain/awn043

#### Participants
**Language**
German

**Inclusion criteria**
Main deficits in production rather than comprehension

**Number of individuals with aphasia**
16 (plus 8 excluded: 5 completed only one of the two sessions; 3 unable to perform the tasks)

**Number of control participants**
8

**Were any of the participants included in any previous studies?**
No

**Is age reported for patients and controls, and matched?**
Yes (mean 58.3 years; range 42-73 years)

**Is sex reported for patients and controls, and matched?**
Yes (males: 12; females: 4)

**Is handedness reported for patients and controls, and matched?**
Yes (right: 16; left: 0)

**Is time post stroke onset reported and appropriate to the study design?**
No (> 12 months; actual TPO not stated)

**To what extent is the nature of aphasia characterized?**
Comprehensive battery

**Language evaluation**
AAT, two subtests of ANELT

**Aphasia severity**
TT range 5-50

**Aphasia type**
7 anomic, 7 Broca’s, 2 global; it was an inclusion criterion that the main deficits were in production

**First stroke only?**
Not stated

**Stroke type**
Not stated

**To what extent is the lesion distribution characterized?**
Individual lesions
| Lesion extent | Not stated |
|--------------|-----------|
| Lesion location | L |
| Participants notes | — |

### Imaging

- **Modality**: fMRI
- **Is the study cross-sectional or longitudinal?**: Longitudinal—chronic treatment
- **If longitudinal, at what time point(s) were imaging data acquired?**: T1: pre-treatment/chronic; T2: post-treatment, ~2 weeks later
- **If longitudinal, was there any intervention between the time points?**: CIAT, 3 hours/day, 10 days
- **Is the scanner described?**: Yes (Siemens Vision plus 1.5 Tesla)
- **Is the timing of stimulus presentation and image acquisition clearly described and appropriate?**: No (minor discrepancies in description of timing)

| Design type | Block |
|-------------|-------|
| Total images acquired | 134 |

- **Are the imaging acquisition parameters, including coverage, adequately described and appropriate?**: Yes (whole brain)
- **Is preprocessing and intrasubject coregistration adequately described and appropriate?**: Yes
- **Is first level model fitting adequately described and appropriate?**: Yes
- **Is intersubject normalization adequately described and appropriate?**: No (lesion impact not addressed)

### Conditions

- **Are the conditions clearly described?**: Yes

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|--------------|-------------|----------------------|--------------------------|
| reading words silently | Word (covert) | 4 | Yes | Unknown |
| word stem completion | Word (covert) | 4 | Yes | Unknown |
| rest | None | 10 (?) | N/A | N/A |

| Conditions notes | Preliminary data on the tasks suggests that patients would have been able to perform them, and patients were interviewed regarding the tasks after each fMRI session, however the outcomes of these interviews are not reported |

### Contrasts

- **Are the contrasts clearly described?**: Yes

**Contrast 1: reading words silently vs rest**

| Language condition | Reading words silently |
|--------------------|------------------------|
| Control condition | Rest |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | Somewhat |

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| Question                                                                 | Answer                  |
|-------------------------------------------------------------------------|-------------------------|
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                  |
| Are activations lateralized in the control data?                        | Unknown                  |
| Control activation notes                                                | Appears to be somewhat L-lateralized frontal, but not well visualized |
| Contrast notes                                                          |                         |

**Contrast 2: word stem completion vs rest**

| Language condition          | Word stem completion   |
|-----------------------------|------------------------|
| Control condition           | Rest                   |
| Are the conditions matched for visual demands?                          | No                     |
| Are the conditions matched for auditory demands?                        | Yes                    |
| Are the conditions matched for motor demands?                           | Yes                    |
| Are the conditions matched for cognitive/executive demands?             | No                     |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes       |                         |
| Are control data reported in this paper or another that is referenced?  | Somewhat               |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data?                        | No                     |
| Control activation notes    | Bilateral frontal; other regions not well visualized                   |
| Contrast notes              |                         |

**Analyses**

| Are the analyses clearly described?                                     | No* (moderate limitation) (see specific limitation(s) below) |

**Voxelwise analysis 1**

| First level contrast       | Reading words silently vs rest                                       |
|----------------------------|--------------------------------------------------------------------|
| Analysis class             | Cross-sectional aphasia vs control                                  |
| Group(s)                   | Aphasia T1 vs control                                               |
| Covariate                  | —                                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                  |
| Is accuracy matched across the second level contrast?                   | Unknown, not reported                                               |
| Is reaction time matched across the second level contrast?              | Unknown, not reported                                               |
| Behavioral data notes      | —                                                                  |

| Type of analysis           | Voxelwise                                                          |
| Search volume              | R hemisphere                                                       |
| Correction for multiple comparisons | Mixed** (major limitation)                                        |
| Software                   | BrainVoyager QX 1.7                                                |
| Voxelwise p                | R IFG/R insula ROI: .005; elsewhere: .001                         |
| Cluster extent             | R IFG/R insula ROI: 0.108 cc; elsewhere: none                      |
| Statistical details        | —                                                                  |
| Findings                   | ↑ R IFG                                                             |
| Findings notes             | ↑ R insula                                                         |

**Voxelwise analysis 2**

| First level contrast       | Word stem completion vs rest                                       |
### Voxelwise analysis 3

**First level contrast**: Reading words silently vs rest  

**Analysis class**: Cross-sectional correlation with language or other measure  

**Group(s)**: Aphasia T1  

**Covariate**: Subsequent Δ (T2 vs T1) overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility)  

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**: Somewhat (T1 behavioral measure should be included in model)  

**Is accuracy matched across the second level contrast?**: Unknown, not reported  

**Is reaction time matched across the second level contrast?**: Unknown, not reported  

**Behavioral data notes**: —  

**Type of analysis**: Voxelwise  

**Search volume**: R hemisphere  

**Correction for multiple comparisons**: Mixed** (major limitation)  

**Software**: BrainVoyager QX 1.7  

**Voxelwise p**: R IFG/R insula ROI: .005; elsewhere: .001  

**Cluster extent**: R IFG/R insula ROI: 0.108 cc; elsewhere: none  

**Statistical details**: —  

**Findings**: ↑ R dorsal precentral  

**Findings notes**: Increased activity correlated with more behavioral improvement

### Voxelwise analysis 4

**First level contrast**: Word stem completion vs rest  

**Analysis class**: Cross-sectional correlation with language or other measure  

**Group(s)**: Aphasia T1  

**Covariate**: Subsequent Δ (T2 vs T1) overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility)  

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**: Somewhat (T1 behavioral measure should be included in model)  

**Is accuracy matched across the second level contrast?**: Unknown, not reported  

**Behavioral data notes**: —  

**Type of analysis**: Voxelwise  

**Search volume**: R hemisphere  

**Correction for multiple comparisons**: No correction  

**Software**: BrainVoyager QX 1.7  

**Voxelwise p**: .05  

**Cluster extent**: None  

**Statistical details**: Nature of thresholding not entirely clear, so coded according to best guess  

**Findings**: ↑ R IFG  

**Findings notes**: Increased activity correlated with more behavioral improvement
| Analysis | First level contrast | Analysis class | Group(s) | Covariate | Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Is accuracy matched across the second level contrast? | Is reaction time matched across the second level contrast? | Behavioral data notes | Type of analysis | Search volume | Correction for multiple comparisons | Software | Voxelwise p | Cluster extent | Statistical details | Findings | Findings notes |
|----------|---------------------|----------------|----------|-----------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|---------------------|----------------|----------------|----------------------|-------------|---------------|---------------|----------------|----------|---------------|
| 5        | Reading words silently vs rest | Longitudinal change in aphasia | Aphasia T2 vs T1 | —         | Yes                                           | Unknown, not reported                         | Unknown, not reported                         | —                   | Voxelwise      | R hemisphere | Mixed** (major limitation) | BrainVoyager QX 1.7 | .05          | None          | Nature of thresholding not entirely clear, so coded according to best guess | ↑ R IFG | ↑ R insula    |
| 6        | Word stem completion vs rest | Longitudinal change in aphasia | Aphasia T2 vs T1 | —         | Yes                                           | Unknown, not reported                         | Unknown, not reported                         | —                   | Voxelwise      | R hemisphere | Mixed** (major limitation) | BrainVoyager QX 1.7 | .05          | None          | —                          | None    | —              |
## Findings

| Findings         | None |
|------------------|------|
| Findings notes   | —    |

## ROI analysis 1

| First level contrast       | Reading words silently vs rest |
|----------------------------|-------------------------------|
| Analysis class             | Cross-sectional correlation with language or other measure |
| Group(s)                   | Aphasia T1                     |
| Covariate                  | Subsequent Δ (T2 vs T1) overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (T1 behavioral measure should be included in model) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes      | —                             |
| Type of analysis           | Region of interest (ROI)      |
| ROI type                   | Functional                    |
| How many ROIs are there?   | 1                             |
| What are the ROI(s)?       | L IFG/insula or L perilesional |
| How are the ROI(s) defined? | Peak activations in individual patients in L IFG/insula or L perilesional regions (somewhat unclear) |
| Correction for multiple comparisons | One only |
| Statistical details        | —                             |
| Findings                   | None                          |
| Findings notes             | —                             |

## ROI analysis 2

| First level contrast       | Word stem completion vs rest |
|----------------------------|-------------------------------|
| Analysis class             | Cross-sectional correlation with language or other measure |
| Group(s)                   | Aphasia T1                     |
| Covariate                  | Subsequent Δ (T2 vs T1) overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (T1 behavioral measure should be included in model) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes      | —                             |
| Type of analysis           | Region of interest (ROI)      |
| ROI type                   | Functional                    |
| How many ROIs are there?   | 1                             |
| What are the ROI(s)?       | L IFG/insula or L perilesional |
| How are the ROI(s) defined? | Peak activations in individual patients in L IFG/insula or L perilesional regions (somewhat unclear) |
| Correction for multiple comparisons | One only |
| Statistical details        | —                             |
| Findings                   | None                          |
| Findings notes             | —                             |

## ROI analysis 3

| First level contrast       | Reading words silently vs rest |
|----------------------------|-------------------------------|
| Analysis class             | Longitudinal correlation with language or other measure |
| Group(s)                   | Aphasia T2 vs T1               |
| Covariate                  | Subsequent Δ (T2 vs T1) overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (T1 behavioral measure should be included in model) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes      | —                             |
| Type of analysis           | Region of interest (ROI)      |
| ROI type                   | Functional                    |
| How many ROIs are there?   | 1                             |
| What are the ROI(s)?       | L IFG/insula or L perilesional |
| How are the ROI(s) defined? | Peak activations in individual patients in L IFG/insula or L perilesional regions (somewhat unclear) |
| Correction for multiple comparisons | One only |
| Statistical details        | —                             |
| Findings                   | None                          |
| Findings notes             | —                             |
### Covariate

| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
|---|---|
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

- **Type of analysis**: Regions of interest (ROI)
- **ROI type**: Functional

### How many ROIs are there?

- 4

### What are the ROI(s)?

1. R IFG/insula
2. R precentral
3. R MTG
4. L IFG/insula or L perilesional

### How are the ROI(s) defined?

Regions where T1 activation was correlated with subsequent improvement, along with the previously defined left hemisphere ROI

### Correction for multiple comparisons

- No correction

### Statistical details

- Circular because functional ROIs based on related contrast on same data

### Findings

- ↓ R posterior MTG

### Findings notes

Decreased activity over time correlated with more behavioral improvement

### ROI analysis 4

#### First level contrast

- Word stem completion vs rest

#### Analysis class

- Longitudinal correlation with language or other measure

#### Group(s)

- Aphasia T2 vs T1

#### Covariate

- Δ overall language measure (composite measure of AAT spontaneous speech, token test, ANELT auditory comprehensibility, ANELT semantic comprehensibility)

#### Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?

- Yes

#### Is accuracy matched across the second level contrast?

- Unknown, not reported

#### Is reaction time matched across the second level contrast?

- Unknown, not reported

#### Behavioral data notes

- **Type of analysis**: Regions of interest (ROI)
- **ROI type**: Functional

#### How many ROIs are there?

- 3

#### What are the ROI(s)?

1. (1, 2) two clusters within R IFG/insula ROI
2. (3) L IFG/insula or L perilesional

#### How are the ROI(s) defined?

Regions where T1 activation was correlated with subsequent improvement, along with the previously defined left hemisphere ROI

#### Correction for multiple comparisons

- No correction

#### Statistical details

- Circular because functional ROIs based on related contrast on same data

#### Findings

- ↓ R IFG
- ↓ R insula

#### Findings notes

Decreased activity over time correlated with more behavioral improvement

### Notes

- Excluded analyses: —

### de Boissezon et al. (2009)

#### Reference

- **Authors**: de Boissezon X, Marie N, Castel-Lacanal E, Marque P, Bezy C, Gros H, Lotterie JA, Cardebat D, Puel M, Demonet JF
| Title | Good recovery from aphasia is also supported by right basal ganglia: a longitudinal controlled PET study |
|-------|-----------------------------------------------------------------------------------------------------|
| Reference | *Eur J Phys Rehabil Med* 2009; 45: 547-558 |
| PMID | 20032914 |
| DOI | N/A |

**Participants**

| Language | French |
| Inclusion criteria | Only part of L MCA; able to perform word generation; no severe aphasia |
| Number of individuals with aphasia | 13 |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | Yes (7 out of 13 patients appear to represent the same data reported in de Boissezon et al. (2005)) |
| Is age reported for patients and controls, and matched? | Yes (range 31.2-74.2 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 12; females: 1) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 13; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | No* (moderate limitation) (T1: mean 64 ± 32 days; T2: mean 11.8 ± 1.4 months; T1 varies considerably from early to late subacute) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |
| Language evaluation | Montreal-Toulouse Aphasia Battery |
| Aphasia severity | Not stated |
| Aphasia type | T1: 3 transcortical motor, 2 anomic, 2 Broca's, 2 transcortical sensory, 2 Wernicke's, 1 conduction, 1 agrammatic; T2: not stated |
| First stroke only? | Yes |
| Stroke type | Mixed etiologies |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Range 0.9-43.4 cc |
| Lesion location | L MCA (7 subcortical, 6 cortical) |
| Participants notes | — |

**Imaging**

| Modality | PET (rCBF) |
| Is the study cross-sectional or longitudinal? | Longitudinal—recovery |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: mean 64 ± 32 days; T2: mean 11.8 ± 1.4 months; T1 varies considerably from early to late subacute |
| If longitudinal, was there any intervention between the time points? | Community SLT; 45 minutes/day, 1-3 days/week |
| Is the scanner described? | Yes (CTI-Siemens ECAT EXACT HR+) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | PET |
| Total images acquired | 6 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed) |
| Imaging notes | — |
### Conditions

Are the conditions clearly described?  Yes

| Condition      | Response type   | Repetitions | All groups could do? | All individuals could do? |
|----------------|-----------------|-------------|-----------------------|---------------------------|
| word generation | Word (overt)    | 4           | Yes                   | Yes                       |
| rest           | None            | 2           | N/A                   | N/A                       |

Conditions notes —

### Contrasts

Are the contrasts clearly described?  Yes

**Contrast 1: word generation vs rest**

| Language condition | Word generation |
|--------------------|-----------------|
| Control condition  | Rest            |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

Behavioral data notes —

Does the contrast selectively activate plausible relevant language regions in the control group? Somewhat

Are activations lateralized in the control data? No

Control activation notes Control data in Cardebat et al. (2003); bilateral fronto-temporal and some other regions per text

Contrast notes —

### Analyses

Are the analyses clearly described?  No* (moderate limitation) (see specific limitation(s) below)

**Voxelwise analysis 1**

| First level contrast | Word generation vs rest |
|----------------------|--------------------------|
| Analysis class       | Longitudinal change in aphasia |
| Group(s)             | Aphasia with "good recovery" (n = 6) T2 vs T1 |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (the "good recovery" group showed more improvement than the "poor recovery" group in terms of accuracy on the task, but the distinction was not borne out in behavioral data more generally) |

Is accuracy matched across the second level contrast? Yes, matched

Is reaction time matched across the second level contrast? Unknown, not reported

Behavioral data notes P = 0.07

Type of analysis Voxelwise

Search volume Whole brain

Correction for multiple comparisons Clusterwise correction based on arbitrary cluster extent

Software SPM2

Voxelwise p .001
### Findings

- **↑** L ventral precentral/inferior frontal junction
- **↑** L SMA/medial prefrontal
- **↑** L posterior STG/STS/MTG
- **↑** R dorsolateral prefrontal cortex
- **↑** R SMA/medial prefrontal
- **↑** R angular gyrus
- **↑** R occipital
- **↑** R thalamus
- **↑** R angular gyrus
- **↑** R occipital
- **↑** R thalamus
- **↑** R basal ganglia
- **↑** L cerebellum

### Findings notes

Based on coordinates in Table 5

### Voxelwise analysis 2

| First level contrast | Word generation vs rest |
|----------------------|-------------------------|
| Analysis class       | Longitudinal change in aphasia |
| Group(s)             | Aphasia with "poor recovery" (n = 7) T2 vs T1 |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (the "poor recovery" group showed less improvement than the "good recovery" group in terms of accuracy on the task, but the distinction was not borne out in behavioral data more generally) |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

—

| Type of analysis | Voxelwise |
|------------------|-----------|
| Search volume    | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software         | SPM2 |
| Voxelwise p      | .001 |
| Cluster extent   | 100 voxels (size not stated) |
| Statistical details | Contrast may not have included resting condition; inappropriate masking |

### Voxelwise analysis 3

| First level contrast | Word generation vs rest |
|----------------------|-------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia |
| Covariate            | Word generation accuracy |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

—

| Type of analysis | Voxelwise |
|------------------|-----------|
| Search volume    | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software         | SPM2 |
| Voxelwise p      | .01 |
| Cluster extent | 100 voxels (size not stated) |
|----------------|-------------------------------|
| Statistical details | Each patient's two sessions may be entered into the model without accounting for the dependence between them |
| Findings | ↑ L supramarginal gyrus  |
| | ↑ L occipital  |
| | ↑ L anterior cingulate  |
| | ↑ R insula  |
| | ↑ R SMA/medial prefrontal  |
| | ↑ R posterior STG  |
| | ↑ R anterior temporal  |
| | ↑ R occipital  |
| | ↓ L cerebellum  |
| Findings notes | — |

### Notes
Excluded analyses —

### Fridriksson et al. (2009)

#### Reference

| Authors | Fridriksson J, Baker JM, Moser D |
|——|——|
| Title | Cortical mapping of naming errors in aphasia |
| Reference | *Hum Brain Mapp* 2009; 30: 2487-2498 |
| PMID | 19294641 |
| DOI | 10.1002/hbm.20683 |

#### Participants

| Language | US English |
|——|——|
| Inclusion criteria | — |
| Number of individuals with aphasia | 11 |
| Number of control participants | 10 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (mean 58.8 ± 14.7 years, range 33-78 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 6; females: 5) |
| Is handedness reported for patients and controls, and matched? | No |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 10-101 months) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |
| Language evaluation | WAB; BNT |
| Aphasia severity | AQ range 31.8-91.5 |
| Aphasia type | 6 anomic, 4 Broca's, 1 transcortical motor; alternatively: 6 fluent, 5 non-fluent |
| First stroke only? | Not stated |
| Stroke type | Not stated |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Range 3.0-342.2 cc |
| Lesion location | L MCA |
| Participants notes | — |
### Imaging

| Question                                                                 | Answer            |
|------------------------------------------------------------------------|-------------------|
| Modality                                                               | fMRI              |
| Is the study cross-sectional or longitudinal?                         | Cross-sectional   |
| If longitudinal, at what time point(s) were imaging data acquired?    | —                 |
| If longitudinal, was there any intervention between the time points?   | —                 |
| Is the scanner described?                                              | No (not stated)   |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (timing of picture presentation not clearly explained) |
| Design type                                                            | Event-related     |
| Total images acquired                                                  | 120               |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate?     | Yes               |
| Is intersubject normalization adequately described and appropriate?    | Yes               |
| Imaging notes                                                          | sparse sampling   |

### Conditions

| Condition                  | Response type | Repetitions | All groups could do? | All individuals could do? |
|----------------------------|---------------|-------------|-----------------------|---------------------------|
| picture naming             | Word (overt)  | 80          | Yes                   | No                        |
| viewing scrambled images   | None          | 40          | N/A                   | N/A                       |

### Contrasts

Contrast 1: picture naming (correct trials) vs viewing scrambled images

| Language condition         | Picture naming (correct trials) |
|----------------------------|---------------------------------|
| Control condition          | Viewing scrambled images        |

| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | No  |
| Are the conditions matched for motor demands?   | No  |
| Are the conditions matched for cognitive/executive demands? | No  |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

Behavioral data notes —

Are control data reported in this paper or another that is referenced? | Somewhat |

Does the contrast selectively activate plausible relevant language regions in the control group? | No |

Are activations lateralized in the control data? | Somewhat |

Control activation notes | Control data in Fridriksson et al. (2007); motor activations are prominent; there is some L frontal activation but little temporal activation in either hemisphere |

Contrast notes —
### Contrast 2: picture naming (phonemic paraphasias) vs picture naming (correct trials)

| Language condition | Picture naming (phonemic paraphasias) |
|--------------------|----------------------------------------|
| Control condition  | Picture naming (correct trials)        |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | No, by design |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | N/A |
| Does the contrast selectively activate plausible relevant language regions in the control group? | N/A |
| Are activations lateralized in the control data? | N/A |
| Control activation notes | Control data N/A because controls do not typically make errors |
| Contrast notes | — |

### Contrast 3: picture naming (semantic paraphasias) vs picture naming (correct trials)

| Language condition | Picture naming (semantic paraphasias) |
|--------------------|----------------------------------------|
| Control condition  | Picture naming (correct trials)        |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | No, by design |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | N/A |
| Does the contrast selectively activate plausible relevant language regions in the control group? | N/A |
| Are activations lateralized in the control data? | N/A |
| Control activation notes | Control data N/A because controls do not typically make errors |
| Contrast notes | — |

### Analyses

| Are the analyses clearly described? | Yes |

### Voxelwise analysis 1

| First level contrast | Picture naming (correct trials) vs viewing scrambled images |
|----------------------|-----------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                       |
| Group(s)             | Aphasia vs control                                       |
| Covariate            | —                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
### Behavioral data notes

| Type of analysis       | Voxelwise            |
|------------------------|----------------------|
| Search volume          | Voxel levels across all patients |
| Correction for multiple comparisons | Clusterwise correction with GRFT and lenient voxelwise p |
| Software               | FSL (FEAT 5.4)       |
| Voxelwise p            | ~.01 (z > 2.3)       |
| Cluster extent         | Based on GRFT        |
| Statistical details    |                      |
| Findings               | None                 |
| Findings notes         |                      |

#### Voxelwise analysis 2

| First level contrast                        | Picture naming (phonemic paraphasias) vs picture naming (correct trials) |
| Analysis class                             | Cross-sectional performance-defined conditions |
| Group(s)                                  | Aphasia |
| Covariate                                 | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, by design |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

#### Voxelwise analysis 3

| First level contrast                        | Picture naming (semantic paraphasias) vs picture naming (correct trials) |
| Analysis class                             | Cross-sectional performance-defined conditions |
| Group(s)                                  | Aphasia |
| Covariate                                 | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, by design |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

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ROI analysis 1

First level contrast
Analysis class
Group(s)
Covariate
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?
Is accuracy matched across the second level contrast?
Is reaction time matched across the second level contrast?

Behavioral data notes
Type of analysis
ROI type
How many ROIs are there?
What are the ROI(s)?
How are the ROI(s) defined?
Correction for multiple comparisons

Statistical details
Findings
Findings notes

Notes
Excluded analyses

Menke et al. (2009)

Reference

Authors
Menke R, Meinzer M, Kugel H, Deppe M, Baumgärtner A, Schiffbauer H, Thomas M, Kramer K, Lohmann H, Flöel A, Knecht S, Breitenstein C

Title
Imaging short- and long-term training success in chronic aphasia

Reference
BMC Neurosci 2009; 10: 118

PMID
19772660

DOI
10.1186/1471-2202-10-118

Participants

Language
German

Inclusion criteria
Moderate to severe anomia

Number of individuals with aphasia
8

Number of control participants
9

Were any of the participants included in any previous studies?
No

Is age reported for patients and controls, and matched?
Yes (range 34-67 years)

Is sex reported for patients and controls, and matched?
Yes (males: 5; females: 3)

Is handedness reported for patients and controls, and matched?
Yes (right: 8; left: 0)

Is time post stroke onset reported and appropriate
Yes (range 1.8-6.9 years)
| Question                                                                 | Answer |
|------------------------------------------------------------------------|--------|
| To what extent is the nature of aphasia characterized?                |        |
| Language evaluation                                                    | AAT    |
| Aphasia severity                                                       | 6 moderate-severe, 2 severe |
| Aphasia type                                                           | 7 Broca’s, 1 global |
| First stroke only?                                                     | Yes    |
| Stroke type                                                            | Mixed etiologies |
| To what extent is the lesion distribution characterized?               | Individual lesions |
| Lesion extent                                                          | Not stated |
| Lesion location                                                        | L      |
| Participants notes                                                    | —      |

**Imaging**

| Question                                                                 | Answer |
|------------------------------------------------------------------------|--------|
| Modality                                                               | fMRI   |
| Is the study cross-sectional or longitudinal?                          | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired?     | T1: pre-treatment/chronic; T2: post-treatment, ~2 weeks later; T3: 8 months after the end of treatment |
| If longitudinal, was there any intervention between the time points?   | Intensive anomia training; 3 hours/day; 2 weeks |
| Is the scanner described?                                              | Yes (Philips Intera 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (total images acquired not stated) |
| Design type                                                            | Event-related |
| Total images acquired                                                  | probably ~360, but not stated |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate?     | Yes    |
| Is intersubject normalization adequately described and appropriate?    | Yes    |
| Imaging notes                                                          | —      |

**Conditions**

| Question                                                                 | Answer |
|------------------------------------------------------------------------|--------|
| Are the conditions clearly described?                                  | Yes    |

| Condition                                                                 | Response type | Repetitions | All groups could do? | All individuals could do? |
|-------------------------------------------------------------------------|---------------|-------------|----------------------|--------------------------|
| picture naming (trained items)                                          | Word (overt)  | 30          | No                   | No                       |
| picture naming (untrained items)                                        | Word (overt)  | 30          | No                   | No                       |
| picture naming (already known items)                                   | Word (overt)  | 30          | Yes                  | Unknown                  |
| rest                                                                    | None          | implicit baseline | N/A                  | N/A                      |

**Conditions notes**

Patients could not name trained and untrained items at baseline

**Contrasts**

| Question                                                                 | Answer |
|------------------------------------------------------------------------|--------|
| Are the contrasts clearly described?                                   | Yes    |

**Contrast 1: picture naming (trained items) vs rest**

| Question                                                                 | Answer |
|------------------------------------------------------------------------|--------|
| Language condition                                                    | Picture naming (trained items) |
| Control condition                                                      | Rest   |
| Are the conditions matched for visual demands?                        | No     |
| Condition          | Matched? | Notes                  |
|--------------------|----------|------------------------|
| Auditory demands   | No       |                        |
| Motor demands      | No       |                        |
| Cognitive/executive demands | No |                        |
| Language and control tasks | N/A, tasks not comparable |                        |
| Reaction time      | N/A, tasks not comparable |                        |

**Behavioral data notes**

- Are control data reported in this paper or another that is referenced? Somewhat
- Does the contrast selectively activate plausible relevant language regions in the control group? Unknown
- Are activations lateralized in the control data? Unknown

**Control activation notes**

- Table of coordinates only

**Contrast notes**

- Analyses
  - Are the analyses clearly described? No* (moderate limitation) (see specific limitation(s) below)

**Voxelwise analysis 1**

- First level contrast: Picture naming (trained items) vs rest
- Analysis class: Longitudinal correlation with language or other measure
- Group(s): Aphasia T2 vs T1
- Covariate: Subsequent outcome (T2) picture naming of trained items outside the scanner
- Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? No (the logic behind correlating activation changes and language outcome is unclear)
- Is accuracy matched across the second level contrast? Unknown, no test
- Is reaction time matched across the second level contrast? Unknown, not reported
- Behavioral data notes: —
- Type of analysis: Voxelwise
- Search volume: Whole brain
- Correction for multiple comparisons: Mixed** (major limitation)
There was an exclusive mask based on activation changes for untrained pictures, but it is unclear what the behavioral covariate was for the mask generation, nor were the regions in the mask reported.

Voxelwise analysis 2

| First level contrast | Picture naming (untrained items) vs rest |
|----------------------|-----------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T3 vs T1 |
| Covariate            | Subsequent outcome (T3) picture naming of trained items outside the scanner |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | No (the logic behind correlating activation changes and language outcome is unclear) |
| Is accuracy matched across the second level contrast? | Unknown, no test |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Notes

Excluded analyses

Specht et al. (2009)

Reference

Specht K, Zahn R, Willmes K, Weis S, Holtel C, Krause BJ, Herzog H, Huber W

Joint independent component analysis of structural and functional images reveals complex patterns of functional reorganisation in stroke aphasia

Neurolmage 2009; 47: 2057-2063
19524049
10.1016/j.neuroimage.2009.06.011
## Participants

| Language | German |
|----------|--------|
| Inclusion criteria | — |
| Number of individuals with aphasia | 12 |
| Number of control participants | 12 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | No (mean 49 ± 14 years, range 30-71 years; controls were younger) |
| Is sex reported for patients and controls, and matched? | Yes (males: 9; females: 3) |
| Is handedness reported for patients and controls, and matched? | No |
| Is time post stroke onset reported and appropriate to the study design? | No (mean 1.9 ± 1.4 years, range 0.2-3.7 years; one non-chronic patient is included) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |

### Language evaluation

| Aphasia severity | Not stated |
| Aphasia type | 3 global, 3 Wernicke's, 2 amnestic, 2 Broca's, 2 unclassified |
| First stroke only? | Not stated |
| Stroke type | Not stated |
| To what extent is the lesion distribution characterized? | Lesion overlay |

### Participants notes

15 controls were scanned but 3 were randomly excluded to match group sizes for jICA.

## Imaging

| Modality | PET (rCBF) |
|----------|------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (CTI-Siemens HR+) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | PET |
| Total images acquired | 9 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and inrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | — |

## Conditions

Are the conditions clearly described? Yes

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|--------------------------|
| lexical decision (words vs pseudowords) | Button press | 3 | Yes | Yes |
| lexical decision (words vs reversed foreign words) | Button press | 3 | Yes | Yes |
### Conditions notes

Behavioral data was lost, but it is clearly stated that all participants could perform all tasks above chance; the tone decision task is not described in sufficient detail, but since it is not used in any contrast of interest, the conditions are coded as being clearly described.

### Contrasts

**Are the contrasts clearly described?** Yes

**Contrast 1: lexical decision (words vs pseudowords) vs lexical decision (words vs reversed foreign words)**

| Language condition                        | Lexical decision (words vs pseudowords) |
|-------------------------------------------|----------------------------------------|
| Control condition                         | Lexical decision (words vs reversed foreign words) |
| Are the conditions matched for visual demands? | Yes                                    |
| Are the conditions matched for auditory demands? | Yes                                    |
| Are the conditions matched for motor demands? | Yes                                    |
| Are the conditions matched for cognitive/executive demands? | Yes                                    |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes                     | —                                      |
| Are control data reported in this paper or another that is referenced? | Yes                                    |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                               |
| Are activations lateralized in the control data? | Yes                                    |
| Control activation notes                  | The contrast activated a ventral part of the L IFG, along with L anterior cingulate and L DLPFC |

### Analyses

**Are the analyses clearly described?** Yes

**Voxelwise analysis 1**

| First level contrast                        | Lexical decision (words vs pseudowords) vs lexical decision (words vs reversed foreign words) |
|---------------------------------------------|---------------------------------------------------------------------------------------------|
| Analysis class                             | Cross-sectional aphasia vs control                                                          |
| Group(s)                                   | Aphasia vs control                                                                          |
| Covariate                                  | —                                                                                            |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                            |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                      |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                      |
| Behavioral data notes                      | —                                                                                            |
| Type of analysis                           | Voxelwise                                                                                   |
| Search volume                              | Whole brain                                                                                 |
| Correction for multiple comparisons        | Clusterwise correction based on arbitrary cluster extent                                     |
| Software                                    | SPM5                                                                                       |
| Voxelwise p                                | .001                                                                                       |
| Cluster extent                             | 0.64 cc                                                                                    |
| Statistical details                        | —                                                                                            |
| Findings                                   | ↑ R posterior STG                                                                           |
| Findings notes                             | Activation is 1105 voxels (> 8 cc) so quite convincing, but when the contrast was examined in the patient group, this region was not activated. |
Complex analysis 1

| First level contrast                  | Lexical decision (words vs pseudowords) vs lexical decision (words vs reversed foreign words) |
|---------------------------------------|------------------------------------------------------------------------------------------------|
| Analysis class                        | Cross-sectional aphasia vs control                                                             |
| Group(s)                              | Aphasia vs control                                                                            |
| Covariate                             | —                                                                                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                           |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                        |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                        |
| Behavioral data notes                 | —                                                                                              |
| Type of analysis                      | Complex                                                                                       |
| Statistical details                   | Joint ICA was performed on structural and functional contrast images using FIT 1.1b. Only 1 of the 8 components differed between groups in its loadings and was interpretable. The structural part of this component related to the patients' lesions. The functional part was thresholded at voxelwise p < .001 (CDT), arbitrary minimum cluster extent = 0.64 cc. |
| Findings                              | Other                                                                                         |
| Findings notes                        | The component that differed between groups showed more activation for patients than controls in the L anterior temporal lobe, L cerebellum, R posterior STG, R anterior temporal lobe, R posterior inferior temporal gyrus/fusiform gyrus, R cerebellum, and R brainstem, and less activation in patients than controls in the L IFG, L anterior temporal lobe, L occipital lobe, L anterior cingulate, L cerebellum, L thalamus, and R IFG. |

Notes

Excluded analyses —

Warren et al. (2009)

Reference

Authors Warren JE, Crinion JT, Lambon Ralph MA, Wise RJ
Title Anterior temporal lobe connectivity correlates with functional outcome after aphasic stroke
Reference Brain 2009; 132: 3428-3442
PMID 19903736
DOI 10.1093/brain/awp270

Participants

Language UK English
Inclusion criteria Comprehension deficit per CAT and TROG (1 patient did not meet this criterion); anterolateral superior temporal cortex spared
Number of individuals with aphasia 16 (plus 8 excluded: lesions involved L anterolateral superior temporal cortex)
Number of control participants 11
Were any of the participants included in any previous studies? Yes (reanalysis of subset of dataset from Crinion et al. (2006))
Is age reported for patients and controls, and matched? No (mean 65.8 ± 2.0 SEM years; controls were younger)
Is sex reported for patients and controls, and matched? Yes (males: 11; females: 5)
Is handedness reported for patients and controls, and matched? Yes (right: 16; left: 0)
Is time post stroke onset reported and appropriate to the study design? No (mean 28.8 ± 9.2 months SEM; minimum time post onset not reported, but some patients in Crinion et al. (2006) were subacute)
To what extent is the nature of aphasia characterized? Not at all
| Language evaluation | CAT, TROG |
|---------------------|-----------|
| Aphasia severity    | Not stated |
| Aphasia type        | Not stated |
| First stroke only?  | Yes |
| Stroke type         | Ischemic only |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent       | Patients with positive anterior temporal interconnectivity: mean 93.3 ± 24.0 cc; patients with negative anterior temporal interconnectivity: mean 96.1 ± 27.6 cc |
| Lesion location     | L not including anterolateral superior temporal cortex; maximal overlap in posterior superior temporal cortex |
| Participants notes  | — |

### Imaging

| Modality               | PET (rCBF) |
|------------------------|------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (CTI-Siemens ECAT EXACT HR++/966 (10 patients and all controls) or GE Advance (6 patients)) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type            | PET |
| Total images acquired  | 12-16 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes          | two different scanners used for patients, but not for controls |

### Conditions

| Condition                                | Response type | Repetitions | All groups could do? | All individuals could do? |
|------------------------------------------|---------------|-------------|-----------------------|---------------------------|
| listening to narrative speech            | None          | 6-8         | N/A                   | N/A                       |
| listening to reversed speech              | None          | 6-8         | N/A                   | N/A                       |

### Contrasts

| Contrast 1: listening to narrative speech vs listening to reversed speech |
|---------------------------------------------------------------------------|
| Language condition            | Listening to narrative speech |
| Control condition             | Listening to reversed speech  |
| Are the conditions matched for visual demands?                           | Yes |
| Are the conditions matched for auditory demands?                         | Yes |
| Are the conditions matched for motor demands?                            | Yes |
| Are the conditions matched for cognitive/executive demands?              | Yes |
### Behavioral data notes

- Are control data reported in this paper or another that is referenced? Somewhat
- Does the contrast selectively activate plausible relevant language regions in the control group? Yes
- Are activations lateralized in the control data? Somewhat

### Control activation notes

- 11 participants; L-lateralized posterior temporal, bilateral anterior temporal, no frontal

### Analyses

| Analyses | Is the analyses clearly described? | Yes |
| --- | --- | --- |

#### ROI analysis 1

| First level contrast | Listening to narrative speech vs listening to reversed speech |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

#### ROI type

- Anatomical

#### How many ROIs are there?

- 6

#### What are the ROI(s)?

- (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts

#### How are the ROI(s) defined?

- ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6)

#### Correction for multiple comparisons

- No correction

#### Statistical details

- Somewhat circular because ROIs were defined only in regions where controls showed significant connectivity (even though ROIs were anatomical)

#### Findings

- None

#### Findings notes

- L IFG pars triangularis almost reached significance (p = .053) for more activation in patients

### ROI analysis 2

| First level contrast | Listening to narrative speech vs listening to reversed speech |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia |
| Covariate | Auditory sentence comprehension |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

#### ROI type

- Anatomical

#### How many ROIs are there?

- 6
What are the ROI(s)? | (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts
---|---
How are the ROI(s) defined? | ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6)
Correction for multiple comparisons | No correction
Statistical details | —
Findings | ↑ L anterior temporal
Findings notes | —

**ROI analysis 3**

| First level contrast | Listening to narrative speech vs listening to reversed speech |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia |
| Covariate | Written sentence comprehension |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Anatomical |
| How many ROIs are there? | 6 |
| What are the ROI(s)? | (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts |
| How are the ROI(s) defined? | ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

**ROI analysis 4**

| First level contrast | Listening to narrative speech vs listening to reversed speech |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia |
| Covariate | Auditory single word comprehension |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Anatomical |
| How many ROIs are there? | 6 |
| What are the ROI(s)? | (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts |
| How are the ROI(s) defined? | ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | L anterior temporal p = .08 |
### ROI analysis 5

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|-------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure  |
| Group(s)             | Aphasia                                                     |
| Covariate            | Auditory syntactic comprehension                            |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | —                                                           |
| Type of analysis     | Regions of interest (ROI)                                   |
| ROI type             | Anatomical                                                  |
| How many ROIs are there? | 6                                                          |
| What are the ROI(s)? | (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts |
| How are the ROI(s) defined? | ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) |
| Correction for multiple comparisons | No correction |
| Statistical details | —                                                           |
| Findings             | None                                                        |
| Findings notes       | L anterior temporal p = .09                                 |

### ROI analysis 6

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|-------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure  |
| Group(s)             | Aphasia                                                     |
| Covariate            | Connectivity between L and R ATL                            |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | —                                                           |
| Type of analysis     | Regions of interest (ROI)                                   |
| ROI type             | Anatomical                                                  |
| How many ROIs are there? | 2                                                          |
| What are the ROI(s)? | (1) L anterior superior temporal cortex; (2) R anterior superior temporal cortex |
| How are the ROI(s) defined? | ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) |
| Correction for multiple comparisons | No correction |
| Statistical details | —                                                           |
| Findings             | None                                                        |
| Findings notes       | —                                                           |

### ROI analysis 7

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|-------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure  |
| Group(s)             | Aphasia                                                     |
| Covariate            | Time post onset                                             |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Contrast? | **N/A, no timeable task** |
| --- | --- |
| Behavioral data notes | — |
| Type of analysis | Region of interest (ROI) |
| ROI type | Anatomical |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | **L anterior superior temporal cortex** |
| How are the ROI(s) defined? | ROIs were defined anatomically in regions that were functionally connected with **L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6)** |
| Correction for multiple comparisons | One only |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

**ROI analysis 8**

| First level contrast | Listening to narrative speech vs listening to reversed speech |
| --- | --- |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia |
| Covariate | Lesion volume |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Region of interest (ROI) |
| ROI type | Anatomical |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | **L anterior superior temporal cortex** |
| How are the ROI(s) defined? | ROIs were defined anatomically in regions that were functionally connected with **L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6)** |
| Correction for multiple comparisons | One only |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

**ROI analysis 9**

| First level contrast | Listening to narrative speech vs listening to reversed speech |
| --- | --- |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia with positive anterior temporal interconnectivity (n = 8) vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Anatomical |
| How many ROIs are there? | 6 |
| What are the ROI(s)? | (1) **L anterior superior temporal cortex**; (2) **L basal temporal language area**; (3) **L IFG pars triangularis**; (4-6) homotopic counterparts |
| Question                                                                 | Answer                                                                                                                                                                                                 |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| How are the ROI(s) defined?                                             | ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) |
| Correction for multiple comparisons                                     | No correction                                                                                                                                                                                            |
| Statistical details                                                    | Somewhat circular because ROIs were defined only in regions where controls showed significant connectivity (even though ROIs were anatomical); excluded 3 patients with L IFG damage |
| Findings                                                                | ↑ L IFG pars triangularis                                                                                                                                                                             |
| Findings notes                                                          | —                                                                                                                                                                                                      |

### ROI analysis 10

| First level contrast                                                    | Listening to narrative speech vs listening to reversed speech                                                                                                                                             |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class                                                          | Cross-sectional aphasia vs control                                                                                                                                                                       |
| Group(s)                                                                | Aphasia with negative anterior temporal interconnectivity (n = 8) vs control                                                                                                                             |
| Covariate                                                               | —                                                                                                                                                                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                                                                                                 |
| Is accuracy matched across the second level contrast?                   | N/A, no behavioral measure                                                                                                                                                                             |
| Is reaction time matched across the second level contrast?              | N/A, no timeable task                                                                                                                                                                                  |
| Behavioral data notes                                                  | —                                                                                                                                                                                                      |
| Type of analysis                                                        | Regions of interest (ROI)                                                                                                                                                                               |
| ROI type                                                                | Anatomical                                                                                                                                                                                             |
| How many ROIs are there?                                                | 6                                                                                                                                                                                                      |
| What are the ROI(s)?                                                   | (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts                                                                |
| How are the ROI(s) defined?                                             | ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) |
| Correction for multiple comparisons                                     | No correction                                                                                                                                                                                            |
| Statistical details                                                    | Somewhat circular because ROIs were defined only in regions where controls showed significant connectivity (even though ROIs were anatomical); excluded 1 patient with L IFG damage |
| Findings                                                                | None                                                                                                                                                                                                   |
| Findings notes                                                          | —                                                                                                                                                                                                      |

### ROI analysis 11

| First level contrast                                                    | Listening to narrative speech vs listening to reversed speech                                                                                                                                             |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class                                                          | Cross-sectional between two groups with aphasia                                                                                                                                                           |
| Group(s)                                                                | Aphasia with positive anterior temporal interconnectivity (n = 8) vs with negative anterior temporal interconnectivity (n = 8)                                                                           |
| Covariate                                                               | —                                                                                                                                                                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                                                                                                 |
| Is accuracy matched across the second level contrast?                   | N/A, no behavioral measure                                                                                                                                                                             |
| Is reaction time matched across the second level contrast?              | N/A, no timeable task                                                                                                                                                                                  |
| Behavioral data notes                                                  | —                                                                                                                                                                                                      |
| Type of analysis                                                        | Regions of interest (ROI)                                                                                                                                                                               |
| ROI type                                                                | Anatomical                                                                                                                                                                                             |
| How many ROIs are there?                                                | 6                                                                                                                                                                                                      |
| What are the ROI(s)?                                                   | (1) L anterior superior temporal cortex; (2) L basal temporal language area; (3) L IFG pars triangularis; (4-6) homotopic counterparts                                                                |
| How are the ROI(s) defined?                                             | ROIs were defined anatomically in regions that were functionally connected with L anterior superior temporal cortex in controls (1-4) or homotopic to these (5-6) |
| Correction for multiple comparisons                                     | No correction                                                                                                                                                                                            |
### Statistical details

- Excluded 4 patients with L IFG damage

### Findings

- ↑ L IFG pars triangularis

### Complex notes

---

### Complex analysis 1

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|-------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                                                     |
| Covariate            | Lesion status of each voxel                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

#### Behavioral data notes

---

#### Type of analysis

- Complex

#### Statistical details

- VLSM with FDR correction was used to identify any regions in which damage was predictive of L anterior temporal activation.

### Findings

None

### Findings notes

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### Notes

- Excluded analyses (1) all connectivity analyses because they were based on either both conditions (whole brain analysis) or only the narrative condition (ROI analyses), except where connectivity was investigated in relation to task-based activation differences; (2) correlation with age (covariate not language-related)

### Chau et al. (2010)

#### Reference

- **Authors**: Chau AC, Fai Cheung RT, Jiang X, Au-Yeung PK, Li LS
- **Title**: An fMRI study showing the effect of acupuncture in chronic stage stroke patients with aphasia
- **Reference**: *J Acupunct Meridian Stud* 2010; 30: 53-57
- **PMID**: 20633517
- **DOI**: 10.1016/s2005-2901(10)60009-x

#### Participants

- **Language**: Cantonese
- **Inclusion criteria**: —
- **Number of individuals with aphasia**: 7
- **Number of control participants**: 0
- **Were any of the participants included in any previous studies?**: No
- **Is age reported for patients and controls, and matched?**: Yes (mean 63 ± 10 years, range 56-79 years)
- **Is sex reported for patients and controls, and matched?**: Yes (males: 5; females: 2)
- **Is handedness reported for patients and controls, and matched?**: Yes (right: 7; left: 0)
- **Is time post stroke onset reported and appropriate to the study design?**: Yes (mean 17 ± 8 months, range 8-28 months)
- **To what extent is the nature of aphasia**: Severity only
| Characterized? | Cantonese Aphasia Battery (modified WAB) |
|---------------|----------------------------------------|
| Aphasia severity | 5 patients had AQ > 75, 2 had AQ < 30 |
| Aphasia type | Not stated |
| First stroke only? | Yes |
| Stroke type | Ischemic only |
| To what extent is the lesion distribution characterized? | Location only |
| Lesion extent | Not stated |
| Lesion location | 3 L MCA, 2 L frontal, 2 L basal ganglia |

### Imaging

| Modality | fMRI |
|-----------|------|
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment, ~10 weeks later |
| If longitudinal, was there any intervention between the time points? | Acupuncture, 3 sessions/week, 8 weeks |
| Is the scanner described? | No (not stated) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (inconsistent information regarding timing) |
| Design type | Block |
| Total images acquired | 907 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed) |

### Conditions

| Are the conditions clearly described? | No* (moderate limitation) (nature of questions not described in detail) |

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|--------------------------|
| answering questions from Cantonese Aphasia Battery | Button press | 3 | Unknown | Unknown |
| visual decision | Button press | 3 | Unknown | Unknown |

### Contrasts

| Are the contrasts clearly described? | Yes |

#### Contrast 1: answering questions from Cantonese Aphasia Battery vs visual decision

| Language condition | Answering questions from Cantonese Aphasia Battery |
|--------------------|--------------------------------------------------|
| Control condition | Visual decision |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | No |
Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable
---|---
Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable

### Behavioral data notes
- Are control data reported in this paper or another that is referenced? | No
- Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown
- Are activations lateralized in the control data? | Unknown

### Control activation notes
- Contrast notes

### Analyses
- Are the analyses clearly described? | No* (moderate limitation) (see specific limitation(s) below)

#### Voxelwise analysis 1

| First level contrast | Answering questions from Cantonese Aphasia Battery vs visual decision |
|----------------------|--------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T2 vs T1 |
| Covariate            | Δ WAB AQ |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes
- Type of analysis | Voxelwise
- Search volume | Whole brain
- Correction for multiple comparisons | Unclear or not stated
- Software | SPM2
- Voxelwise p | —
- Cluster extent | —

### Statistical details
- Stated to be corrected p < 0.05, but the nature of correction is not described; it is not entirely clear whether the functional measure was the difference between T1 and T2 (we assume it is); it is also not clear whether or not 2 patients with low AQ were excluded (we assume not)

### Findings
- ↑ L posterior MTG

### Findings notes
- Finding based on table; additional small activations are shown in figure but not table

### Notes
- Excluded analyses | —

### Fridriksson (2010)

#### Reference

| Authors | Fridriksson J |
|---------|---------------|
| Title   | Preservation and modulation of specific left hemisphere regions is vital for treated recovery from anomia in stroke |
| Reference | J Neurosci 2010; 30: 11558-11564 |
| PMID    | 20810877 |
| DOI     | 10.1523/jneurosci.2227-10.2010 |
### Participants

| Description | Details |
|-------------|---------|
| Language    | US English |
| Inclusion criteria | — |
| Number of individuals with aphasia | 19 (plus 7 excluded: 6 for making fewer than 5 correct responses in one or more sessions; 1 for excessive head motion) |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | Yes (“several” patients overlapped with those reported by Fridriksson et al. (2009, 2010)) |
| Is age reported for patients and controls, and matched? | Yes (mean 59.7 ± 12.3 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 12; females: 14) |
| Is handedness reported for patients and controls, and matched? | No |
| Is time post stroke onset reported and appropriate to the study design? | Yes (> 8 months; actual TPO not stated) |
| To what extent is the nature of aphasia characterized? | Severity and type |
| Language evaluation | WAB |
| Aphasia severity | AQ mean 60.4 ± 25.6 (including excluded patients) |
| Aphasia type | 11 anomic, 10 Broca’s, 3 conduction, 1 transcortical motor, 1 Wernicke’s (including excluded patients) |
| First stroke only? | Yes |
| Stroke type | Ischemic only |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Not stated |
| Lesion location | L MCA |
| Participants notes | Demographic data includes excluded patients |

### Imaging

| Description | Details |
|-------------|---------|
| Modality | fMRI |
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment/~4 weeks later; note that there were two separate sessions per time point, as well as another two sessions midway through treatment that are not analyzed in this paper |
| If longitudinal, was there any intervention between the time points? | Anomia treatment using a cueing hierarchy, 3 hours/day, 5 days/week, 2 weeks, with a 1-week gap between the two weeks |
| Is the scanner described? | Yes (Siemens Trio 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (timing of stimuli within the silent periods is unclear) |
| Design type | Event-related |
| Total images acquired | 120 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | sparse sampling |

### Conditions

| Description | Details |
|-------------|---------|
| Are the conditions clearly described? | Yes |
| Condition                      | Response type     | Repetitions | All groups could do? | All individuals could do? |
|-------------------------------|-------------------|-------------|----------------------|--------------------------|
| picture naming                | Word (overt)      | 80          | Yes                  | Unknown                  |
| viewing abstract pictures     | None              | 40          | N/A                  | N/A                      |

Conditions notes: Patients with fewer than 5 correct responses in any session were excluded; there were probably some patients who made 5 or more correct responses but less than 10%, but this is not reported.

Contrasts

Are the contrasts clearly described? Yes

Contrast 1: picture naming (correct trials) vs viewing abstract pictures

| Language condition                  | Picture naming (correct trials)          |
|-------------------------------------|-----------------------------------------|
| Control condition                   | Viewing abstract pictures               |
| Are the conditions matched for visual demands? | Yes                                     |
| Are the conditions matched for auditory demands? | No                                      |
| Are the conditions matched for motor demands? | No                                      |
| Are the conditions matched for cognitive/executive demands? | No                                      |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                   |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                   |
| Behavioral data notes               | —                                         |
| Does the contrast selectively activate plausible relevant language regions in the control group? | No                                      |
| Are activations lateralized in the control data? | Somewhat                                 |
| Control activation notes            | Control data in Fridriksson et al. (2007); motor activations are prominent; there is some L frontal activation but little temporal activation in either hemisphere. |
| Contrast notes                      | —                                         |

Analyses

Are the analyses clearly described? Yes

Voxelwise analysis 1

| First level contrast              | Picture naming (correct trials) vs viewing abstract pictures |
|-----------------------------------|-------------------------------------------------------------|
| Analysis class                    | Longitudinal correlation with language or other measure     |
| Group(s)                          | Aphasia T2 vs T1                                            |
| Covariate                         | Δ picture naming accuracy                                    |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                      |
| Is accuracy matched across the second level contrast? | Yes, correct trials only                                   |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                    |
| Behavioral data notes             | —                                                           |
| Type of analysis                  | Voxelwise                                                  |
| Search volume                     | Whole brain                                                |
| Correction for multiple comparisons | Clusterwise correction with with GRFT and lenient voxelwise p |
| Software                          | FSL 4.1                                                    |
| Voxelwise p                       | ~.01 (z > 2.3)                                             |
| Cluster extent                    | Based on GRFT                                              |
| Statistical details               | —                                                           |
| Findings                          | ↑ L dorsolateral prefrontal cortex                         |
| Findings notes | Activated regions were on the borders on the lesion distribution in the 19 included patients |
|----------------|------------------------------------------------------------------------------------------|

**Notes**

**Excluded analyses**

---

**Fridriksson et al. (2010)**

**Reference**

| Authors | Fridriksson J, Bonilha L, Baker JM, Moser D, Rorden C |
|---------|------------------------------------------------------|
| Title   | Activity in preserved left hemisphere regions predicts anemia severity in aphasia |
| Reference | Cereb Cortex 2010; 20: 1013-1019 |
| PMID    | 19687294 |
| DOI     | 10.1093/cercor/bhp160 |

**Participants**

| Language | US English |
|----------|------------|
| Inclusion criteria | — |
| Number of individuals with aphasia | 15 |
| Number of control participants | 9 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (mean 61.9 years, range 41-81 years) |
| Is sex reported for patients and controls, and matched? | No (males: 7; females: 8; not stated for controls) |
| Is handedness reported for patients and controls, and matched? | No |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 29.7 months, > 6 months) |
| To what extent is the nature of aphasia characterized? | Severity and type |
| Language evaluation | WAB |
| Aphasia severity | AQ mean 77.1, range 47.1-93.7 |
| Aphasia type | 10 anomic, 3 Broca’s, 2 conduction |
| First stroke only? | Yes |
| Stroke type | Ischemic only |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Not stated |
| Lesion location | L MCA |
| Participants notes | — |

**Imaging**

| Modality | fMRI |
|----------|------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between | — |
| the time points? | Is the scanner described? | Yes (Siemens Trio 3 Tesla) |
|-----------------|--------------------------|--------------------------|
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (exact timing of picture presentation not specified) |
| Design type | Event-related |
| Total images acquired | 120 |
| Are the imaging parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | sparse sampling |

**Conditions**

| Are the conditions clearly described? | Yes |

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|--------------------------|
| picture naming | Word (overt) | 80 | Yes | Yes |
| viewing abstract pictures | None | 40 | N/A | N/A |

| Conditions notes | — |

**Contrasts**

| Are the contrasts clearly described? | Yes |

**Contrast 1: picture naming (correct trials) vs viewing abstract pictures**

| Language condition | Picture naming (correct trials) |
|--------------------|--------------------------------|
| Control condition | Viewing abstract pictures |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | Somewhat |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat |
| Are activations lateralized in the control data? | Somewhat |
| Control activation notes | L-lateralized frontal and temporal activations, but also bilateral visual, motor and auditory |
| Contrast notes | — |

**Analyses**

| Are the analyses clearly described? | Yes |

**Voxelwise analysis 1**

| First level contrast | Picture naming (correct trials) vs viewing abstract pictures |
|----------------------|----------------------------------------------------------|
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia |
| Covariate | Picture naming accuracy |
|-----------|-------------------------|
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Behavioral data notes

Type of analysis | Voxelwise |

Search volume | Whole brain |

Correction for multiple comparisons | Clusterwise correction with GRFT and lenient voxelwise p |

Software | FSL 4.1 |

Voxelwise p | ~.02 (z > 2) |

Cluster extent | Based on GRFT |

Statistical details |

Findings | ↑ L IFG pars orbitalis |

| ↑ L occipital |

| ↑ L anterior cingulate |

Findings notes | Greater activation was associated with better picture naming; L IFG pars orbitalis activation classified as middle frontal gyrus in the paper, but coordinates suggest otherwise |

**Voxelwise analysis 2**

| First level contrast | Picture naming (correct trials) vs viewing abstract pictures |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Behavioral data notes |

Type of analysis | Voxelwise |

Search volume | Whole brain |

Correction for multiple comparisons | Clusterwise correction with GRFT and lenient voxelwise p |

Software | FSL 4.1 |

Voxelwise p | ~.02 (z > 2) |

Cluster extent | Based on GRFT |

Statistical details |

Findings | None |

Findings notes |

**ROI analysis 1**

| First level contrast | Picture naming (correct trials) vs viewing abstract pictures |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia |
| Covariate | Picture naming accuracy |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Behavioral data notes |

Type of analysis | Region of interest (ROI) |
ROI type | Functional
---|---
How many ROIs are there? | 1
What are the ROI(s)? | A single ROI comprising 3 regions where activation in patients was correlated with picture naming accuracy: the L IFG pars orbitalis, occipital lobe, and anterior cingulate
How are the ROI(s) defined? | Based on SPM analysis 1
Correction for multiple comparisons | One only
Statistical details | The purpose of this analysis was to determine whether these regions were recruited in the patients with better naming, or not activated in the patients with worse naming, relative to the control mean
Findings | Other
Findings notes | Patients with better naming showed greater activation than controls, while the patients with poorer naming showed less activation than controls.

Complex analysis 1

| First level contrast | Picture naming (correct trials) vs viewing abstract pictures |
| --- | --- |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia |
| Covariate | Lesion status of each voxel |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Complex |
| Statistical details | VLSM was used to identify any regions in which damage was predictive of activation in the regions identified in SPM analysis 1, considered as a single ROI. There was no correction for multiple comparisons, and the analysis is appropriately presented as exploratory. |
| Findings | Other |
| Findings notes | Only in the L IFG pars opercularis was damage predictive of reduced activation in the potentially compensatory network. |

Notes
Excluded analyses | — |

Sharp et al. (2010)

Reference
Authors | Sharp DJ, Turkheimer FE, Bose SK, Scott SK, Wise RJ |
Title | Increased frontoparietal integration after stroke and cognitive recovery |
Reference | Ann Neurol 2010; 68: 753-756 |
PMID | 20687116 |
DOI | 10.1002/ana.21866 |

Participants
Language | UK English |
Inclusion criteria | Lesion in vicinity of L STG; no extensive frontal damage; no inferior temporal damage; able to perform tasks |
Number of individuals with aphasia | 9 |
Number of control participants | 18 |
Were any of the participants included in any previous studies? | Yes (additional analysis of same dataset as Sharp et al. (2004)) |
Is age reported for patients and controls, and matched? Yes (median 58 years, range 39-72 years)

Is sex reported for patients and controls, and matched? Yes (males: 8; females: 1)

Is handedness reported for patients and controls, and matched? Yes (right: 9; left: 0)

Is time post stroke onset reported and appropriate to the study design? Yes (mean 45 months, range 14-145 months)

To what extent is the nature of aphasia characterized? Severity only

Language evaluation Subtests from CAT, subtests from PALPA, Action for dysphasic adults, TROG, PPT

Aphasia severity Mild

Aphasia type Not stated

First stroke only? Yes

Stroke type Not stated

To what extent is the lesion distribution characterized? Lesion overlay

Lesion extent Not stated

Lesion location Lesion in vicinity of L STG; no extensive frontal damage; no inferior temporal damage

Participants notes —

Imaging

Modality PET (rCBF)

Is the study cross-sectional or longitudinal? Cross-sectional

If longitudinal, at what time point(s) were imaging data acquired? —

If longitudinal, was there any intervention between the time points? —

Is the scanner described? Yes (Siemens HR++ 966)

Is the timing of stimulus presentation and image acquisition clearly described and appropriate? Yes

Design type PET

Total images acquired 16

Are the imaging acquisition parameters, including coverage, adequately described and appropriate? Yes (whole brain)

Is preprocessing and intrasubject coregistration adequately described and appropriate? Yes

Is first level model fitting adequately described and appropriate? Yes

Is intersubject normalization adequately described and appropriate? Yes

Imaging notes —

Conditions

Are the conditions clearly described? Yes

| Condition                                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------------------------------------|---------------|-------------|----------------------|---------------------------|
| semantic decision                             | Word (overt)  | aphasia: 8; control: 4 | Yes                 | Yes                       |
| syllable count decision                       | Word (overt)  | aphasia: 8; control: 4 | Yes                 | **Unknown**               |
| semantic decision (noise vocoded) (control only) | Word (overt)  | 4 (control) | Yes                 | Yes                       |
| syllable count decision (noise vocoded) (control only) | Word (overt)  | 4 (control) | Yes                 | Yes                       |

Conditions notes Seems the response was a spoken word, but this is not stated explicitly; assuming all
individuals could do the semantic task because this was an inclusion criterion and behavioral data (PPT) supports, but not sure about the phonological task

### Contrasts

| Are the contrasts clearly described? | Yes |

**Contrast 1: semantic decision (clear in patients; average of clear and noise vocoded in controls) vs syllable count decision (clear in patients; average of clear and noise vocoded in controls)**

| Language condition            | Semantic decision (clear in patients; average of clear and noise vocoded in controls) |
| Control condition             | Syllable count decision (clear in patients; average of clear and noise vocoded in controls) |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | No, different |
| Is reaction time matched between the language and control tasks for all relevant groups? | No, different |
| Behavioral data notes | Significant differences per Sharp et al. (2004) |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat |
| Are activations lateralized in the control data? | Yes |
| Control activation notes | Not stated exactly what contrast was used in controls |

### Analyses

| Are the analyses clearly described? | Yes |

**ROI analysis 1**

| First level contrast | Semantic decision (clear in patients; average of clear and noise vocoded in controls) vs syllable count decision (clear in patients; average of clear and noise vocoded in controls) |
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia vs control |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, but attempt made |
| Is reaction time matched across the second level contrast? | Appear similar |
| Behavioral data notes | Accuracy and RT were not significantly different for the semantic task; statistics are not reported for the syllable counting task, but the data provided suggest that accuracy was probably not matched, while RT probably was |
| Type of analysis      | Regions of interest (ROI) |
| ROI type              | Other |
| How many ROIs are there? | 12 |
| What are the ROI(s)? | Functional connectivity between pairs of spared nodes of the L hemisphere semantic network and R hemisphere homotopic regions: (1) L SFG-L AG; (2) L SFG-L IFG; (3) L SFG-L IT; (4) L AG-L IFG; (5) L AG-L IT; (6) L IFG-L IT; (7-12) homotopic counterparts |
| How are the ROI(s) defined? | Partial correlations between nodes |
| Correction for multiple comparisons | No direct comparison |
| Statistical details   | — |
| Findings              | Other |
Patients showed greater connectivity between L SFG and L AG than controls while performing the semantic task; this was not the case for the syllable counting task, however connectivity during performance of the two tasks was not compared directly.

Excluded analyses

(1) correlations between connection strength of AG-IT and language performance, because there was no functional control condition; (2) controls showed greater connectivity between L SFG and L AG while performing the semantic task with noise vocoded speech relative to clear speech, supporting the interpretation that greater connectivity reflects effortful processing.

Thompson et al. (2010)

Reference

Authors
Thompson CK, den Ouden DB, Bonakdarpour B, Garibaldi K, Parrish TB

Title
Neural plasticity and treatment-induced recovery of sentence processing in agrammatism

Reference
Neuropsychologia 2010; 48: 3211-3227

PMID
20603138

DOI
10.1016/j.neuropsychologia.2010.06.036

Participants

Language
US English

Inclusion criteria
Agrammatic

Number of individuals with aphasia
6

Number of control participants
12

Were any of the participants included in any previous studies?
No

Is age reported for patients and controls, and matched?
Yes (mean 54 years, range 38-66 years)

Is sex reported for patients and controls, and matched?
Yes (males: 5; females: 1)

Is handedness reported for patients and controls, and matched?
Yes (right: 6; left: 0)

Is time post stroke onset reported and appropriate to the study design?
Yes (range 6-146 months)

To what extent is the nature of aphasia characterized?
Comprehensive battery

Language evaluation
WAB, NAVS, narrative language sample

Aphasia severity
AQ range 66.8-85.0

Aphasia type
All agrammatic; per WAB scores provided: 3 Broca’s, 3 unclassified

First stroke only?
Yes

Stroke type
Not stated

To what extent is the lesion distribution characterized?
Individual lesions

Lesion extent
Not stated

Lesion location
5 L MCA, 1 R MCA with aphasia

Participants notes
—

Imaging

Modality
fMRI

Is the study cross-sectional or longitudinal?
Longitudinal—chronic treatment

If longitudinal, at what time point(s) were imaging data acquired?
T1: pre-treatment/chronic; T2: post-treatment, 9-15 weeks later

If longitudinal, was there any intervention between
Treatment of underlying forms
the time points?

| Is the scanner described?                | Yes (Siemens Trio 3 Tesla) |
|-----------------------------------------|-----------------------------|
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (total images acquired not stated) |

Design type                  Event-related

| Total images acquired         | not stated                  |

Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |

Are preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |

Is first level model fitting adequately described and appropriate? | Yes |

Is intersubject normalization adequately described and appropriate? | Yes |

Imaging notes —

**Conditions**

Are the conditions clearly described? Yes

| Condition                                           | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------------------------------------------|---------------|-------------|-----------------------|---------------------------|
| auditory sentence-picture matching (auditory; object cleft) | Button press  | 60          | No                    | No                        |
| auditory sentence-picture matching (subject cleft)  | Button press  | 60          | Yes                   | Yes                       |
| auditory sentence-picture matching (simple past tense active) | Button press  | 60          | Yes                   | No                        |
| rest                                               | None          | implicit baseline | N/A                   | N/A                       |

Conditions notes —

**Contrasts**

Are the contrasts clearly described? Yes

**Contrast 1: auditory sentence-picture matching (all three sentence types) vs rest**

| Language condition | Auditory sentence-picture matching (all three sentence types) |
|--------------------|---------------------------------------------------------------|
| Control condition  | Rest                                                           |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

Behavioral data notes —

Are control data reported in this paper or another that is referenced? No

Does the contrast selectively activate plausible relevant language regions in the control group? Unknown

Are activations lateralized in the control data? Unknown

Control activation notes —

Contrast notes —

**Analyses**

Are the analyses clearly described? Yes
ROI analysis 1

| First level contrast | Auditory sentence-picture matching (all three sentence types) vs rest |
|----------------------|---------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                      |
| Group(s)             | Aphasia T2 vs T1                                                    |
| Covariate            | —                                                                   |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear similar |
| Is reaction time matched across the second level contrast? | Appear similar |

Behavioral data notes —

Type of analysis Regions of interest (ROI)

ROI type Anatomical

How many ROIs are there? 18

What are the ROI(s)? (1) L BA 7; (2) L BA 9; (3) L BA 13; (4) L BA 21; (5) L BA 22; (6) L BA 39; (7) L BA 40; (8) L BA 44; (9) L BA 45; (10-18) homotopic counterparts

How are the ROI(s) defined? WFU pickatlas; proportion of patients who showed increases and decreases in (parts of) each ROI in individual fixed effects SPM analyses

Correction for multiple comparisons No correction

Statistical details —

Findings ↑ L angular gyrus
          ↑ L superior parietal
          ↑ L mid temporal
          ↑ R supramarginal gyrus
          ↑ R superior parietal
          ↓ L insula
          ↓ L posterior STG

Findings notes These are the regions involved in what the authors interpret as a "general shift"

Notes

Excluded analyses Individual patient analyses

Tyler et al. (2010)

Reference

Authors Tyler LK, Wright P, Randall B, Marslen-Wilson WD, Stamatakis EA
Title Reorganization of syntactic processing following left-hemisphere brain damage: does right-hemisphere activity preserve function?
Reference *Brain* 2010; 133: 3396-3408
PMID 20870779
DOI 10.1093/brain/awq262

Participants

Language UK English

Inclusion criteria —

Number of individuals with aphasia 14
Number of control participants 10
Were any of the participants included in any previous studies? No
Is age reported for patients and controls, and matched? Yes (mean 54 years, range 33-76 years)
Is sex reported for patients and controls, and Yes (males: 11; females: 3)
| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Is handedness reported for patients and controls, and matched?         | Yes (right: 14; left: 0)                                                 |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 7 years, range 1.4-37.3 years)                                |
| To what extent is the nature of aphasia characterized?                 | Not at all                                                             |
| Language evaluation                                                    | Sentence-picture matching, lexical decision, phonological similarity, word repetition, sentence repetition, morphological similarity, semantic categorization, sentence acceptability |
| Aphasia severity                                                       | Not stated                                                             |
| Aphasia type                                                           | Not stated                                                             |
| First stroke only?                                                     | Not stated                                                             |
| Stroke type                                                            | Mixed etiologies                                                      |
| To what extent is the lesion distribution characterized?               | Lesion overlay                                                        |
| Lesion extent                                                          | Not stated                                                             |
| Lesion location                                                        | L                                                                     |
| Participants notes                                                    | 2 of the 14 patients were not stroke, but were post resective surgery  |

**Imaging**

| Modality                  | fMRI                                   |
|---------------------------|----------------------------------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional                        |
| If longitudinal, at what time point(s) were imaging data acquired? | —                                      |
| If longitudinal, was there any intervention between the time points?  | —                                      |
| Is the scanner described?  | Yes (Siemens Trio 3 Tesla)             |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (there was only one block per condition per run, so condition could be confounded with low frequency drift; also, the length of the sentences is not stated so it is unclear how well the HRF peak aligns with the sparse acquisitions) |
| Design type               | Block                                  |
| Total images acquired     | 69                                     |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)                     |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes                                   |
| Is first level model fitting adequately described and appropriate?     | Yes                                   |
| Is intersubject normalization adequately described and appropriate?    | Yes                                   |
| Imaging notes             | sparse sampling                        |

**Conditions**

| Condition                                                                 | Response type | Repetitions | All groups could do? | All individuals could do? |
|--------------------------------------------------------------------------|---------------|-------------|----------------------|---------------------------|
| listening to normal sentences and detecting a target word                | Button press  | 2           | Yes                  | Unknown                   |
| listening to grammatical but meaningless sentences and detecting a target word | Button press  | 2           | Yes                  | Unknown                   |
| listening to scrambled sentences and detecting a target word             | Button press  | 2           | Yes                  | Unknown                   |
| listening to "musical rain" and detecting a period of white noise rest   | Button press  | 2           | Yes                  | Unknown                   |
|                                                                           | None          | 2           | N/A                  | N/A                       |
### Conditions notes
Auditory presentation; target detection task with early and late targets; 12-15 trials per block with single sparse acquisition each, but only one block per run, in fixed order; task can apparently be performed by patients with brain damage, but accuracy is not reported.

### Contrasts

Are the contrasts clearly described? Yes

**Contrast 1:** listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word

| Language condition | Listening to grammatical but meaningless sentences and detecting a target word |
|--------------------|--------------------------------------------------------------------------------|
| Control condition  | Listening to scrambled sentences and detecting a target word |

Are the conditions matched for visual demands? Yes
Are the conditions matched for auditory demands? Yes
Are the conditions matched for motor demands? Yes
Are the conditions matched for cognitive/executive demands? Yes

Is accuracy matched between the language and control tasks for all relevant groups? Unknown, not reported
Is reaction time matched between the language and control tasks for all relevant groups? Appear similar

**Behavioral data notes**
There appears to be a small RT difference (control condition slower)

Are control data reported in this paper or another that is referenced? Somewhat

Does the contrast selectively activate plausible relevant language regions in the control group? Yes
Are activations lateralized in the control data? No

**Contrast notes**
The contrast is intended to identify regions involved in syntactic processing, however it seems possible that there are semantic differences between these conditions also

### Analyses

Are the analyses clearly described? Yes

**Voxelwise analysis 1**

| First level contrast | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia vs control |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Appear similar |

**Behavioral data notes**
The two groups showed similar differences between RTs in the two conditions of the contrast

Type of analysis Voxelwise
Search volume Whole brain

**Correction for multiple comparisons** No direct comparison

**Software** SPM5
Voxelwise p —
Cluster extent —

**Statistical details** Qualitative comparison on pp. 3402-3; each group is presented at voxelwise p < .005 (CDT), cluster-corrected p < .05 with GRFT

**Findings**
† R IFG pars triangularis
| Findings notes                      | ↑ R IFG pars orbitalis
|                                  | ↓ L posterior MTG
| Several other potential differences are apparent in the figure, but only the differences tabulated are interpreted in the text |

**ROI analysis 1**

| First level contrast | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia |
| Covariate            | RT difference between early and late targets on grammatical but meaningless sentences (a measure of syntactic processing) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Analyses focuses on RT differences between early and late targets, not on mean RT per se |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L IFG pars triangularis and orbitalis |
| How are the ROI(s) defined? | Activated for the same contrast |
| Correction for multiple comparisons | One only |
| Statistical details  | — |
| Findings             | ↑ L IFG pars triangularis
|                      | ↑ L IFG pars orbitalis |
| Findings notes       | L IFG showed more activation in patients that had a larger target position effect (indicative of better syntactic processing) |

**ROI analysis 2**

| First level contrast | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia |
| Covariate            | RT difference between early and late targets on normal sentences |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L IFG pars triangularis and orbitalis |
| How are the ROI(s) defined? | Activated for the same contrast |
| Correction for multiple comparisons | One only |
| Statistical details  | — |
| Findings             | — |
| Findings notes       | — |

**ROI analysis 3**

| First level contrast | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia |
| Covariate            | RT difference between early and late targets on grammatical but meaningless sentences |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L IFG pars triangularis and orbitalis |
| How are the ROI(s) defined? | Activated for the same contrast |
| Correction for multiple comparisons | One only |
| Statistical details  | — |
| Findings             | — |
| Findings notes       | — |
### ROI analysis 4

| First level contrast | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                                      |
| Group(s)             | Aphasia                                                                                                                         |
| Covariate            | RT difference between early and late targets on scrambled sentences                                                             |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                 |
| Is accuracy matched across the second level contrast? | **Unknown, not reported** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |
| Behavioral data notes | —                                                                                                                                |
| Type of analysis     | Region of interest (ROI)                                                                                                       |
| ROI type             | Functional                                                                                                                      |
| How many ROIs are there? | 1                                                                                                                                  |
| What are the ROI(s)? | L IFG pars triangularis and orbitalis                                                                                           |
| How are the ROI(s) defined? | Activated for the same contrast                                                                                               |
| Correction for multiple comparisons | One only                                                                                                                         |
| Statistical details  | —                                                                                                                                |
| Findings             | None                                                                                                                            |
| Findings notes       | No correlation (p = .57)                                                                                                        |

### ROI analysis 5

| First level contrast | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                                      |
| Group(s)             | Aphasia                                                                                                                         |
| Covariate            | Syntactic processing (presumably the target position effect, though this is not stated)                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                 |
| Is accuracy matched across the second level contrast? | **Unknown, not reported** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |
### Behavioral data notes

| Type of analysis | Region of interest (ROI) |
|------------------|--------------------------|
| ROI type         | Functional               |
| How many ROIs are there? | 1                     |
| What are the ROI(s)? | R IFG pars triangularis and orbitalis |
| How are the ROI(s) defined? | Activated for the same contrast |
| Correction for multiple comparisons | One only |
| Statistical details | —                        |
| Findings         | None                     |
| Findings notes   | No correlation (p = .41) |

### Complex analysis 1

| First level contrast | Listening to grammatical but meaningless sentences and detecting a target word vs listening to scrambled sentences and detecting a target word |
|----------------------|----------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                  |
| Group(s)             | Aphasia                                                                                                         |
| Covariate            | Lesion status of each voxel                                                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                               |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                           |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                          |

### Behavioral data notes

| Type of analysis | Complex |
|------------------|---------|
| Statistical details | VBM was used to identify any regions where damage was predictive of activation in the L IFG pars triangularis and orbitalis. Tissue integrity was quantified in terms of T1 signal. Clusterwise correction was used, which is not appropriate for VBM. |
| Findings         | Other   |
| Findings notes   | Only in the L IFG itself was damage predictive of reduced activation in the L IFG. |

### Notes

- Excluded analyses: (1) patients, unlike controls, showed a correlation between R IFG and R MTG activity, but the authors do not make much of this, and there is no direct comparison was reported to controls; (2) a nonsignificant correlation between L pMTG activation in patients (lacking at the group level) and tissue integrity in that same region.

### van Oers et al. (2010)

**Reference**

| Authors        | van Oers CA, Vink M, van Zandvoort MJ, van der Worp HB, de Haan EH, Kappelle LJ, Ramsey NF, Dijkhuizen RM |
|----------------|----------------------------------------------------------------------------------------------------------|
| Title          | Contribution of the left and right inferior frontal gyrus in recovery from aphasia: a functional MRI study in stroke patients with preserved hemodynamic responsiveness |
| Reference      | NeuroImage 2010; 49: 885-893                                                                           |
| PMID           | 19733673                                                                                                 |
| DOI            | 10.1016/j.neuroimage.2009.08.057                                                                         |

**Participants**

| Language       | Dutch                                                         |
|----------------|---------------------------------------------------------------|
| Inclusion criteria | MCA; mRS < 3; able to perform at least 2 out of the 3 tasks |
| Number of individuals with aphasia | 13                                                                 |
| Number of control participants | 13                                                              |
Were any of the participants included in any previous studies? No
Is age reported for patients and controls, and matched? Yes (mean 53 ± 14 years, range 29-74 years)
Is sex reported for patients and controls, and matched? Yes (males: 4; females: 9)
Is handedness reported for patients and controls, and matched? No (right: 13; left: 0; not stated for controls)
Is time post stroke onset reported and appropriate to the study design? Yes (range 1.3-4.7 years)
To what extent is the nature of aphasia characterized? Comprehensive battery
Language evaluation AAT, BNT, TT
Aphasia severity 4 moderate, 4 severe, 3 recovered, 2 mild; all had aphasia initially
Aphasia type 5 anomic, 4 Broca’s, 3 recovered, 1 Wernicke’s
First stroke only? Yes
Stroke type Ischemic only
To what extent is the lesion distribution characterized? Individual lesions
Lesion extent Range 6.0-167.3 cc
Lesion location L MCA
Participants notes —

### Imaging

| Modality | fMRI |
|----------|------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | Behavioral data (TT and a naming measure) were also acquired subacutely (mean 26 ± 18 days, range 5-56 days) |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Philips Achieva 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | Block |
| Total images acquired | 3036 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | Breath holding scan also done to measure hemodynamic responsiveness |

### Conditions

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|--------------------------|
| written word-picture matching | Button press | 6 | Yes | Yes |
| semantic decision | Button press | 6 | Yes | Yes |
| verb generation | Word (covert) | 8 | Yes | Yes |
| visual decision | Button press | 12 | Unknown | Unknown |
| rest | None | 20 | N/A | N/A |

### Conditions notes
Patients who could not do tasks were excluded from analyses of those tasks (1 patient from...
Contrasts

Are the contrasts clearly described? No (see specific limitation(s) below)

Contrast 1: written word-picture matching vs visual decision

| Language condition          | Written word-picture matching |
|-----------------------------|-------------------------------|
| Control condition           | Visual decision               |
| Are the conditions matched for visual demands? | No                           |
| Are the conditions matched for auditory demands? | Yes                          |
| Are the conditions matched for motor demands? | Yes                          |
| Are the conditions matched for cognitive/executive demands? | No                           |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported         |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported         |
| Behavioral data notes       | Accuracy not reported for control condition |
| Are control data reported in this paper or another that is referenced? | Yes                          |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                     |
| Are activations lateralized in the control data? | Somewhat                     |
| Control activation notes    | —                             |
| Contrast notes              | Not clearly stated that language tasks were contrasted only with arrow decision task and not rest for the first two contrasts, but this can be inferred |

Contrast 2: semantic decision vs visual decision

| Language condition          | Semantic decision |
|-----------------------------|-------------------|
| Control condition           | Visual decision   |
| Are the conditions matched for visual demands? | No               |
| Are the conditions matched for auditory demands? | Yes              |
| Are the conditions matched for motor demands? | Yes              |
| Are the conditions matched for cognitive/executive demands? | No               |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes       | Accuracy not reported for control condition |
| Are control data reported in this paper or another that is referenced? | Yes              |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat         |
| Are activations lateralized in the control data? | Somewhat         |
| Control activation notes    | —                 |
| Contrast notes              | Not clearly stated that language tasks were contrasted only with arrow decision task and not rest for the first two contrasts, but this can be inferred |

Contrast 3: verb generation vs rest

| Language condition          | Verb generation |
|-----------------------------|-----------------|
| Control condition           | Rest            |
| Are the conditions matched for visual demands? | No               |
| Are the conditions matched for auditory demands? | Yes              |
| Question                                                                 | Answer                  |
|-------------------------------------------------------------------------|-------------------------|
| Are the conditions matched for motor demands?                           | Yes                     |
| Are the conditions matched for cognitive/executive demands?            | No                      |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes                                                  | —                       |
| Are control data reported in this paper or another that is referenced? | Yes                     |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                |
| Are activations lateralized in the control data?                       | Somewhat                |
| Control activation notes                                               | —                       |

**Analyses**

| Question                                      | Answer                  |
|-----------------------------------------------|-------------------------|
| Are the analyses clearly described?           | No (see specific limitation(s) below) |

**ROI analysis 1**

| First level contrast                          | Written word-picture matching vs visual decision |
| Analysis class                                | Cross-sectional aphasia vs control               |
| Group(s)                                      | Aphasia vs control                                 |
| Covariate                                     | —                                                   |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes                         | Accuracy not reported for control condition       |
| Type of analysis                              | Regions of interest (ROI)                         |
| ROI type                                      | Mixed                                               |
| How many ROIs are there?                     | 7                                                   |
| What are the ROI(s)?                         | (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI |
| How are the ROI(s) defined?                  | WFU pickatlas                                       |
| Correction for multiple comparisons           | No correction                                       |
| Statistical details                          | —                                                   |
| Findings                                      | ↓ L IFG  ↓ L (language network)  ↓ L (frontal)     |
| Findings notes                               | —                                                   |

**ROI analysis 2**

| First level contrast                          | Semantic decision vs visual decision               |
| Analysis class                                | Cross-sectional aphasia vs control                |
| Group(s)                                      | Aphasia vs control                                 |
| Covariate                                     | —                                                   |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

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### Behavioral data notes

| Accuracy not reported for control condition |
|--------------------------------------------|

### Type of analysis

| Regions of interest (ROI) |
|---------------------------|

### ROI type

| Mixed |
|-------|

### How many ROIs are there?

| 7 |
|---|

### What are the ROI(s)?

1. L anterior language region (IFG); 2. L posterior language region (AG, SMG, STG, MTG); 3. R anterior language region (IFG); 4. R posterior language region (AG, SMG, STG, MTG); 5. frontal LI; 6. temporal LI; 7. whole network LI

### How are the ROI(s) defined?

| WFU pickatlas |
|---------------|

### Correction for multiple comparisons

| No correction |
|---------------|

### Statistical details

| — |
|----|

### Findings

1. L IFG  
2. LI (language network)  
3. LI (frontal)

### Findings notes

| — |
|----|

#### ROI analysis 3

| Verb generation vs rest |
|-------------------------|

| Cross-sectional aphasia vs control |
|-----------------------------------|

| Aphasia vs control |
|---------------------|

| — |
|----|

| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? |
|------------------------------------------------|

| Yes |
|-----|

| Is accuracy matched across the second level contrast? |
|-------------------------------------------------|

| Unknown, not reported |
|-----------------------|

| Is reaction time matched across the second level contrast? |
|----------------------------------------------------------|

| Unknown, not reported |
|-----------------------|

### Behavioral data notes

| — |
|----|

### Type of analysis

| Regions of interest (ROI) |
|---------------------------|

### ROI type

| Mixed |
|-------|

### How many ROIs are there?

| 7 |
|---|

### What are the ROI(s)?

1. L anterior language region (IFG); 2. L posterior language region (AG, SMG, STG, MTG); 3. R anterior language region (IFG); 4. R posterior language region (AG, SMG, STG, MTG); 5. frontal LI; 6. temporal LI; 7. whole network LI

### How are the ROI(s) defined?

| WFU pickatlas |
|---------------|

### Correction for multiple comparisons

| No correction |
|---------------|

### Statistical details

| — |
|----|

### Findings

1. L IFG  
2. LI (language network)  
3. LI (frontal)

### Findings notes

| — |
|----|

#### ROI analysis 4

| Written word-picture matching vs visual decision |
|-----------------------------------------------|

| Cross-sectional correlation with language or other measure |
|----------------------------------------------------------|

| Picture-word matching accuracy |
|-------------------------------|

| Aphasia |
|--------|

| — |
|----|

| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? |
|------------------------------------------------|

| Yes |
|-----|

| Is accuracy matched across the second level contrast? |
|-------------------------------------------------|

| Accuracy is covariate |
|-----------------------|

| Is reaction time matched across the second level contrast? |
|----------------------------------------------------------|

| Unknown, not reported |
|-----------------------|

### Behavioral data notes

| — |
|----|

### Type of analysis

| Regions of interest (ROI) |
|---------------------------|

### ROI type

| Mixed |
|-------|

### How many ROIs are there?

| 7 |
|---|
### What are the ROI(s)?

(1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI

### How are the ROI(s) defined?

WFU pickatlas

### Correction for multiple comparisons

No correction

### Statistical details

—

### Findings

None

### Findings notes

—

---

**ROI analysis 5**

| First level contrast | Semantic decision vs visual decision |
|----------------------|-------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                             |
| Covariate            | Semantic decision accuracy          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

—

### Type of analysis

Regions of interest (ROI)

### ROI type

Mixed

### How many ROIs are there?

7

### What are the ROI(s)?

(1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI

### How are the ROI(s) defined?

WFU pickatlas

### Correction for multiple comparisons

No correction

### Statistical details

—

### Findings

None

### Findings notes

—

---

**ROI analysis 6**

| First level contrast | Written word-picture matching vs visual decision |
|----------------------|-----------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                             |
| Covariate            | Overall language measure              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

—

### Type of analysis

Regions of interest (ROI)

### ROI type

Mixed

### How many ROIs are there?

7

### What are the ROI(s)?

(1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI

### How are the ROI(s) defined?

WFU pickatlas

### Correction for multiple comparisons

No correction

### Statistical details

—

### Findings

None

### Findings notes

—
### ROI analysis 7

| First level contrast       | Semantic decision vs visual decision |
|----------------------------|--------------------------------------|
| Analysis class             | Cross-sectional correlation with language or other measure |
| Group(s)                   | Aphasia                              |
| Covariate                  | Overall language measure             |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes:** —

**Type of analysis:** Regions of interest (ROI)

**ROI type:** Mixed

**How many ROIs are there?** 7

**What are the ROI(s)?**
1. L anterior language region (IFG);
2. L posterior language region (AG, SMG, STG, MTG);
3. R anterior language region (IFG);
4. R posterior language region (AG, SMG, STG, MTG);
5. frontal LI;
6. temporal LI;
7. whole network LI

**How are the ROI(s) defined?** WFU pickatlas

**Correction for multiple comparisons**
No correction

**Statistical details**
Not clear if it was LI for whole language network

**Findings**
↑ LI (language network)

**Findings notes** —

### ROI analysis 8

| First level contrast       | Verb generation vs rest |
|----------------------------|-------------------------|
| Analysis class             | Cross-sectional correlation with language or other measure |
| Group(s)                   | Aphasia                              |
| Covariate                  | Overall language measure             |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes:** —

**Type of analysis:** Regions of interest (ROI)

**ROI type:** Mixed

**How many ROIs are there?** 7

**What are the ROI(s)?**
1. L anterior language region (IFG);
2. L posterior language region (AG, SMG, STG, MTG);
3. R anterior language region (IFG);
4. R posterior language region (AG, SMG, STG, MTG);
5. frontal LI;
6. temporal LI;
7. whole network LI

**How are the ROI(s) defined?** WFU pickatlas

**Correction for multiple comparisons**
No correction

**Statistical details**
Not clear if it was LI for whole language network

**Findings**
None

**Findings notes** —

### ROI analysis 9

| First level contrast       | Written word-picture matching vs visual decision |
|----------------------------|--------------------------------------|
| Analysis class             | Cross-sectional correlation with language or other measure |
| Group(s)                   | Aphasia                              |
| Covariate                  | Lesion volume                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |

**Findings notes** —
| Question                                                                 | Answer                                      |
|-------------------------------------------------------------------------|---------------------------------------------|
| Is accuracy matched across the second level contrast?                   | Unknown, not reported                        |
| Is reaction time matched across the second level contrast?              | Unknown, not reported                        |
| Behavioral data notes                                                  | —                                           |
| Type of analysis                                                       | Regions of interest (ROI)                   |
| ROI type                                                               | Anatomical                                  |
| How many ROIs are there?                                                | 2                                           |
| What are the ROI(s)?                                                   | (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG) |
| How are the ROI(s) defined?                                            | WFU pickatlas                               |
| Correction for multiple comparisons                                    | No correction                               |
| Statistical details                                                    | —                                           |
| Findings                                                               | None                                        |
| Findings notes                                                         | —                                           |

**ROI analysis 10**

| First level contrast         | Semantic decision vs visual decision       |
| Analysis class               | Cross-sectional correlation with language or other measure |
| Group(s)                    | Aphasia                                    |
| Covariate                   | Lesion volume                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast?                 | Unknown, not reported                       |
| Is reaction time matched across the second level contrast?             | Unknown, not reported                       |
| Behavioral data notes       | —                                          |
| Type of analysis            | Regions of interest (ROI)                  |
| ROI type                    | Anatomical                                 |
| How many ROIs are there?    | 2                                          |
| What are the ROI(s)?        | (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG) |
| How are the ROI(s) defined? | WFU pickatlas                               |
| Correction for multiple comparisons                                   | No correction                               |
| Statistical details         | —                                          |
| Findings                    | None                                       |
| Findings notes              | —                                          |

**ROI analysis 11**

| First level contrast         | Verb generation vs rest                    |
| Analysis class               | Cross-sectional correlation with language or other measure |
| Group(s)                    | Aphasia                                    |
| Covariate                   | Lesion volume                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast?                 | Unknown, not reported                       |
| Is reaction time matched across the second level contrast?             | Unknown, not reported                       |
| Behavioral data notes       | —                                          |
| Type of analysis            | Regions of interest (ROI)                  |
| ROI type                    | Anatomical                                 |
| How many ROIs are there?    | 2                                          |
| What are the ROI(s)?        | (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG) |
| How are the ROI(s) defined? | WFU pickatlas                               |
| Correction for multiple comparisons                                   | No correction                               |
| Statistical details | — |
|---------------------|---|
| Findings            | None |
| Findings notes      | — |

### ROI analysis 12

| First level contrast       | Written word-picture matching vs visual decision |
|----------------------------|--------------------------------------------------|
| Analysis class             | Cross-sectional correlation with language or other measure |
| Group(s)                   | Aphasia                                           |
| Covariate                  | Damage to L hemisphere language regions           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

- Type of analysis: Regions of interest (ROI)
- ROI type: Anatomical
- How many ROIs are there? 2
- What are the ROI(s)? (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG)
- How are the ROI(s) defined? WFU pickatlas
- Correction for multiple comparisons: No correction
- Statistical details: —
- Findings: None
- Findings notes: —

### ROI analysis 13

| First level contrast       | Semantic decision vs visual decision |
|----------------------------|-------------------------------------|
| Analysis class             | Cross-sectional correlation with language or other measure |
| Group(s)                   | Aphasia                                           |
| Covariate                  | Damage to L hemisphere language regions           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

- Type of analysis: Regions of interest (ROI)
- ROI type: Anatomical
- How many ROIs are there? 2
- What are the ROI(s)? (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG)
- How are the ROI(s) defined? WFU pickatlas
- Correction for multiple comparisons: No correction
- Statistical details: —
- Findings: None
- Findings notes: —

### ROI analysis 14

| First level contrast       | Verb generation vs rest |
|----------------------------|-------------------------|
| Analysis class             | Cross-sectional correlation with language or other measure |
| Group(s)                   | Aphasia                                           |
| Covariate                  | Damage to L hemisphere language regions           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |

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| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
|--------------------------------------------------------|----------------------|
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |

**Behavioral data notes**

- **Type of analysis**
  - Regions of interest (ROI)
- **ROI type**
  - Anatomical
- **How many ROIs are there?**
  - 2
- **What are the ROI(s)?**
  - (1) R anterior language region (IFG); (2) R posterior language region (AG, SMG, STG, MTG)
- **How are the ROI(s) defined?**
  - WFU pickatlas
- **Correction for multiple comparisons**
  - No correction

**Statistical details**

- **Findings**
  - None
- **Findings notes**
  - —

### ROI analysis 15

**First level contrast**

- **Written word-picture matching vs visual decision**

**Analysis class**

- Cross-sectional correlation with language or other measure

**Group(s)**

- Aphasia

**Covariate**

- Previous (current vs subacute) Δ naming

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**

- No (current activation will reflect not just prior recovery, but also current language function)

**Is accuracy matched across the second level contrast?**

- Unknown, not reported

**Is reaction time matched across the second level contrast?**

- Unknown, not reported

**Behavioral data notes**

- **Type of analysis**
  - Regions of interest (ROI)
- **ROI type**
  - Anatomical
- **How many ROIs are there?**
  - 7
- **What are the ROI(s)?**
  - (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI
- **How are the ROI(s) defined?**
  - WFU pickatlas
- **Correction for multiple comparisons**
  - No correction

**Statistical details**

- **Findings**
  - None
- **Findings notes**
  - —

### ROI analysis 16

**First level contrast**

- **Semantic decision vs visual decision**

**Analysis class**

- Cross-sectional correlation with language or other measure

**Group(s)**

- Aphasia

**Covariate**

- Previous (current vs subacute) Δ naming

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**

- No (current activation will reflect not just prior recovery, but also current language function)

**Is accuracy matched across the second level contrast?**

- Unknown, not reported

**Is reaction time matched across the second level contrast?**

- Unknown, not reported

**Behavioral data notes**

- **Type of analysis**
  - Regions of interest (ROI)
- **ROI type**
  - Anatomical
- **How many ROIs are there?**
  - 7
- **What are the ROI(s)?**
  - (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI
How are the ROI(s) defined? | WFU pickatlas  
---|---
Correction for multiple comparisons | No correction  
Statistical details | —  
Findings | ↑ L IFG  
Findings notes | —

**ROI analysis 17**

| First level contrast | Verb generation vs rest  
Analysis class | Cross-sectional correlation with language or other measure  
Group(s) | Aphasia  
Covariate | Previous (current vs subacute) Δ naming  
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | No (current activation will reflect not just prior recovery, but also current language function)  
Is accuracy matched across the second level contrast? | Unknown, not reported  
Is reaction time matched across the second level contrast? | Unknown, not reported  
Behavioral data notes | —  
Type of analysis | Regions of interest (ROI)  
ROI type | Anatomical  
How many ROIs are there? | 7  
What are the ROI(s)? | (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI  
How are the ROI(s) defined? | WFU pickatlas  
Correction for multiple comparisons | No correction  
Statistical details | —  
Findings | ↑ L IFG  
Findings notes | —

**ROI analysis 18**

| First level contrast | Written word-picture matching vs visual decision  
Analysis class | Cross-sectional correlation with language or other measure  
Group(s) | Aphasia  
Covariate | Previous (current vs subacute) Δ TT  
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | No (current activation will reflect not just prior recovery, but also current language function; TT not optimal measure of overall language function)  
Is accuracy matched across the second level contrast? | Unknown, not reported  
Is reaction time matched across the second level contrast? | Unknown, not reported  
Behavioral data notes | —  
Type of analysis | Regions of interest (ROI)  
ROI type | Anatomical  
How many ROIs are there? | 7  
What are the ROI(s)? | (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI  
How are the ROI(s) defined? | WFU pickatlas  
Correction for multiple comparisons | No correction  
Statistical details | —  
Findings | None  
Findings notes | —
| First level contrast | Semantic decision vs visual decision |
|---------------------|-------------------------------------|
| Analysis class      | Cross-sectional correlation with language or other measure |
| Group(s)            | Aphasia |
| Covariate           | Previous (current vs subacute) Δ TT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | No (current activation will reflect not just prior recovery, but also current language function; TT not optimal measure of overall language function) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis    | Regions of interest (ROI) |
| ROI type            | Anatomical |
| How many ROIs are there? | 7 |
| What are the ROI(s)? | (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI |
| How are the ROI(s) defined? | WFU pickatlas |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings            | ↑ L IFG |
| Findings notes      | — |

### ROI analysis 20

| First level contrast | Verb generation vs rest |
|---------------------|-------------------------|
| Analysis class      | Cross-sectional correlation with language or other measure |
| Group(s)            | Aphasia |
| Covariate           | Previous (current vs subacute) Δ TT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | No (current activation will reflect not just prior recovery, but also current language function; TT not optimal measure of overall language function) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis    | Regions of interest (ROI) |
| ROI type            | Anatomical |
| How many ROIs are there? | 7 |
| What are the ROI(s)? | (1) L anterior language region (IFG); (2) L posterior language region (AG, SMG, STG, MTG); (3) R anterior language region (IFG); (4) R posterior language region (AG, SMG, STG, MTG); (5) frontal LI; (6) temporal LI; (7) whole network LI |
| How are the ROI(s) defined? | WFU pickatlas |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings            | ↑ L IFG |
| Findings notes      | — |

### Notes

Excluded analyses

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Papoutsi et al. (2011)
## Reference

| Authors | Papoutsi M, Stamatakis EA, Griffiths J, Marslen-Wilson WD, Tyler LK |
|---|---|
| Title | Is left fronto-temporal connectivity essential for syntax? Effective connectivity, tractography and performance in left-hemisphere damaged patients |
| Reference | *NeuroImage* 2011; 58: 656-664 |
| PMID | 21722742 |
| DOI | 10.1016/j.neuroimage.2011.06.036 |

## Participants

| Language | UK English |
|---|---|
| Inclusion criteria | — |
| Number of individuals with aphasia | 14 |
| Number of control participants | 15 |
| Were any of the participants included in any previous studies? | Yes (reanalysis of same dataset from Tyler et al. (2011)) |
| Is age reported for patients and controls, and matched? | Yes (mean 56 ± 12 years, range 35-77 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 11; females: 3) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 14; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 8 ± 9 years, range 2-40 years) |
| To what extent is the nature of aphasia characterized? | Not at all |
| Language evaluation | Sentence-picture matching, grammaticality judgment, lexical decision, phonological discrimination, semantic categorization, sentence repetition, word repetition |
| Aphasia severity | Not stated |
| Aphasia type | Not stated |
| First stroke only? | Not stated |
| Stroke type | Not stated |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Not stated |
| Lesion location | L MCA |
| Participants notes | 1 patient had post-surgical haematoma rather than stroke (per Tyler et al., 2011) |

## Imaging

| Modality | fMRI |
|---|---|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Siemens Trio 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (length of stimuli not described) |
| Design type | Event-related |
| Total images acquired | 1059 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | No (lacks explanation of event durations) |
| Is intersubject normalization adequately described | Yes |
and appropriate?

**Imaging notes**
—

## Conditions

**Are the conditions clearly described?** Yes

| Condition                                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|------------------------------------------------|---------------|-------------|-----------------------|---------------------------|
| Listening to unambiguous sentences            | None          | 42          | N/A                   | N/A                       |
| Listening to ambiguous sentences with dominant resolution | None          | 42          | N/A                   | N/A                       |
| Listening to ambiguous sentences with subordinate resolution | None          | 42          | N/A                   | N/A                       |
| Listening to filler sentences                 | None          | 126         | N/A                   | N/A                       |
| Listening to "musical rain"                   | None          | 42          | N/A                   | N/A                       |
| Rest                                           | None          | implicit    | N/A                   | N/A                       |

**Conditions notes**  
—

## Contrasts

**Are the contrasts clearly described?** Yes

**Contrast 1: listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to ambiguous sentences with dominant resolution ("dominant")**

| Language condition                           | Listening to ambiguous sentences with subordinate resolution ("subordinate") |
| Control condition                            | Listening to ambiguous sentences with dominant resolution ("dominant")     |
| Are the conditions matched for visual demands? | Yes                                                       |
| Are the conditions matched for auditory demands? | Yes                                                      |
| Are the conditions matched for motor demands?  | Yes                                                       |
| Are the conditions matched for cognitive/executive demands? | Yes                                                                   |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure                                      |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task                                                |

**Behavioral data notes**  
—

| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes |
| Are activations lateralized in the control data? | Yes |
| Control activation notes                           | Control data in Tyler et al. (2011); L frontal and temporal |
| Contrast notes                                     | —   |

## Analyses

**Are the analyses clearly described?** Yes

**Voxelwise analysis 1**

| First level contrast                          | Listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to ambiguous sentences with dominant resolution ("dominant") |
| Analysis class                                | Cross-sectional correlation with language or other measure |
| Group(s)                                      | Aphasia |
| Covariate                                     | Difference in percent of unacceptable judgments between subordinate and dominant sentences (dominance effect) |
| Is the second level contrast valid in terms of the | Yes |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
|-------------------------------------------------|------|
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

**Behavioral data notes**

- Type of analysis: Complex
- Statistical details:
  - A PPI analysis was carried out with the L IFG as the seed region. Correlations were computed between voxelwise modulation of connectivity with this region, and a behavioral measure of syntactic processing, which was the dominance effect: the difference in percent of unacceptable judgments between subordinate and dominant sentences. The resultant SPM was thresholded at voxelwise p < .01 (CDT), then corrected for multiple corrections based on cluster extent and GRFT using SPM8.

- Findings notes:
  - Patients with better syntactic performance had more connectivity from the L IFG seed region to L pMTG and adjacent areas (including the insula); pMTG also significant at voxelwise p < .001 in Figure 2B, corrected for multiple comparisons with GRFT.

**Complex analysis 2**

| First level contrast | Listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to ambiguous sentences with dominant resolution ("dominant") |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia |
| Covariate            | Modulation of L pMTG connectivity by dominance effect |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

**Behavioral data notes**

- Type of analysis: Complex
## Statistical details

A similar PPI analysis was carried out with the L pMTG as the seed region. **Thresholding was the same as in the previous analysis.**

## Findings

None

## Findings notes

—

## Notes

Excluded analyses

—

### Sebastian & Kiran (2011)

| Reference | Authors | Title | Reference | PMID | DOI |
|-----------|---------|-------|-----------|------|-----|
|           | Sebastian R, Kiran S. | Task-modulated neural activation patterns in chronic stroke patients with aphasia | *Aphasiology* 2011; 25: 927-951 | N/A | 10.1080/02687038.2011.557436 |

## Participants

| Language | US English |
|----------|------------|
| Inclusion criteria | — |
| Number of individuals with aphasia | 8 |
| Number of control participants | 8 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (range 40-79 years) |
| Is sex reported for patients and controls, and matched? | No (males: 5; females: 3; control sex not stated, but reported to be matched) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 8; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 48.3 months, range 30-78 months) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |
| Language evaluation | WAB, BNT, portions of PALPA, PPT, CLQT |
| Aphasia severity | AQ range 74.0-97.8 |
| Aphasia type | 6 anomic, 2 recovered |
| First stroke only? | Not stated |
| Stroke type | Mixed etiologies |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent | Range 23-45 cc |
| Lesion location | L MCA |
| Participants notes | — |

## Imaging

| Modality | fMRI |
|-----------|------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | No (GE 3 Tesla; model not stated) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (control events took place in the inter-trial interval between language events, and may have been systematically confounded in timing; the total number of functional images acquired is not stated) |
|---|---|
| Design type | Event-related |
| Total images acquired | not stated |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | No (only correct trials are included but it is not stated how incorrect trials were modeled; in general, it is not stated whether the control events were modeled at all) |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | — |

## Conditions

| Are the conditions clearly described? | Yes |

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|---|---|---|---|---|
| picture naming | Word (overt) | 60 | Yes | Yes |
| viewing scrambled images and saying "pass" | Word (overt) | 60 | Unknown | Unknown |
| semantic decision | Button press | 48 | Yes | Yes |
| visual decision | Button press | 48 | Unknown | Unknown |

| Conditions notes | — |

## Contrasts

| Are the contrasts clearly described? | Yes |

### Contrast 1: picture naming (correct trials) vs viewing scrambled images and saying "pass"

| Language condition | Picture naming (correct trials) |
|---|---|
| Control condition | Viewing scrambled images and saying "pass" |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes | Accuracy/RT not reported for control task |
| Are control data reported in this paper or another that is referenced? | Somewhat |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat |
| Are activations lateralized in the control data? | No |
| Control activation notes | Reporting is selective, but appears mostly bilateral with slight L-lateralization of language areas |
| Contrast notes | — |

### Contrast 2: semantic decision (correct trials) vs visual decision

| Language condition | Semantic decision (correct trials) |
|---|---|
| Control condition | Visual decision |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Question                                                                 | Answer                                                                 |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| Are the conditions matched for motor demands?                           | Yes                                                                    |
| Are the conditions matched for cognitive/executive demands?             | Yes                                                                    |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported                                                  |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported                                                  |
| Behavioral data notes                                                   | Accuracy/RT not reported for control task                              |
| Are control data reported in this paper or another that is referenced?  | Somewhat                                                              |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                                                              |
| Are activations lateralized in the control data?                        | Yes                                                                   |
| Control activation notes                                                | Clearly lateralized frontal activation, but very modest temporal activation |
| Behavioral data notes                                                   | Accuracy/RT not reported for control task                              |
| Are control data reported in this paper or another that is referenced?  | Somewhat                                                              |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                                                              |
| Are activations lateralized in the control data?                        | Yes                                                                   |
| Control activation notes                                                | Clearly lateralized frontal activation, but very modest temporal activation |
| Analyses                                                               |                                                                        |
| Are the analyses clearly described?                                     | Yes                                                                   |

**ROI analysis 1**

| First level contrast                                      | Picture naming (correct trials) vs viewing scrambled images and saying "pass" |
|-----------------------------------------------------------|-------------------------------------------------------------------------------|
| Analysis class                                            | Cross-sectional correlation with language or other measure                   |
| Group(s)                                                  | Aphasia                                                                       |
| Covariate                                                 | Lesion volume                                                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                           |
| Is accuracy matched across the second level contrast?     | Yes, correct trials only                                                      |
| Is reaction time matched across the second level contrast?| Unknown, not reported                                                        |
| Behavioral data notes                                     | —                                                                             |
| Type of analysis                                          | Regions of interest (ROI)                                                     |
| ROI type                                                  | Mixed                                                                         |
| How many ROIs are there?                                  | 4                                                                             |
| What are the ROI(s)?                                     | (1) L IFG (oper/tri); (2) L posterior perisylvian (pSTG, pMTG, AG, SMG); (3) R IFG (oper/tri); (4) R posterior perisylvian (pSTG, pMTG, AG, SMG); (5) language network LI |
| How are the ROI(s) defined?                               | Harvard–Oxford atlas                                                         |
| Correction for multiple comparisons                       | No correction                                                                 |
| Statistical details                                       | —                                                                             |
| Findings                                                  | ↑ R supramarginal gyrus                                                      |
|                                                           | ↑ R angular gyrus                                                             |
|                                                           | ↑ R posterior STG/STS/MTG                                                     |
|                                                           | ↓ LI (language network)                                                      |
| Findings notes                                            | Larger lesions were associated with more R posterior perisylvian activation   |

**ROI analysis 2**

| First level contrast                                      | Semantic decision (correct trials) vs visual decision                        |
|-----------------------------------------------------------|-------------------------------------------------------------------------------|
| Analysis class                                            | Cross-sectional correlation with language or other measure                   |
| Group(s)                                                  | Aphasia                                                                       |
| Covariate                                                 | Lesion volume                                                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                           |
| Is accuracy matched across the second level contrast?     | Yes, correct trials only                                                      |
| Is reaction time matched across the second level contrast?| Unknown, not reported                                                        |
Behavioral data notes

| Type of analysis | Regions of interest (ROI) |
|------------------|---------------------------|
| ROI type         | Mixed                     |
| How many ROIs are there? | 4                          |
| What are the ROI(s)? | (1) L IFG (oper/tri); (2) L posterior perisylvian (pSTG, pMTG, AG, SMG); (3) R IFG (oper/tri); (4) R posterior perisylvian (pSTG, pMTG, AG, SMG); (5) language network LI |
| How are the ROI(s) defined? | Harvard–Oxford atlas |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

Notes

| Excluded analyses | (1) individual patient analyses; (2) comparisons between the two language tasks |

Szaflarski et al. (2011)

Reference

| Authors       | Szaflarski JP, Vannest J, Wu SW, DiFrancesco MW, Banks C, Gilbert DL |
|---------------|------------------------------------------------------------------|
| Title         | Excitatory repetitive transcranial magnetic stimulation induces improvements in chronic post-stroke aphasia |
| Reference     | Med Sci Monit 2011; 17: CR132-139 |
| PMID          | 21358599 |
| DOI           | 10.12659/msm.881446 |

Participants

| Language      | US English |
|---------------|------------|
| Inclusion criteria | Moderate aphasia, L MCA |
| Number of individuals with aphasia | 8 (plus 3 excluded: 2 metallic artifact; 1 seizure at time of stroke) |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (mean 54.4 ± 12.7 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 4; females: 4) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 8; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 5.3 ± 3.6 years, > 12 months) |
| To what extent is the nature of aphasia characterized? | Severity and type |
| Language evaluation | BNT; phonemic fluency, semantic fluency, complex ideation from BDAE, PPVT, communicative activities log |
| Aphasia severity | Moderate |
| Aphasia type | 4 Broca’s, 3 anomic, 1 anomic/conduction |
| First stroke only? | Not stated |
| Stroke type | Not stated |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent | Not stated |
| Lesion location | L MCA |
| Participants notes | — |
| Imaging |   |
|-------------------------------|-------------------------------|
| **Modality**                  | fMRI                          |
| **Is the study cross-sectional or longitudinal?** | Longitudinal—chronic treatment |
| **If longitudinal, at what time point(s) were imaging data acquired?** | T1: pre-treatment/chronic; T2: post-treatment, ~2 weeks later |
| **If longitudinal, was there any intervention between the time points?** | RTMS to residual activation near Broca’s area, 5 sessions/week, 2 weeks |
| **Is the scanner described?** | Yes (Varian Unity INOVA 4 T) |
| **Is the timing of stimulus presentation and image acquisition clearly described and appropriate?** | No (timing not clear, because previous studies cited are not all identical in terms of timing) |
| **Design type**               | Block                         |
| **Total images acquired**     | not stated                    |
| **Are the imaging acquisition parameters, including coverage, adequately described and appropriate?** | Yes (whole brain) |
| **Is preprocessing and intrasubject coregistration adequately described and appropriate?** | Yes |
| **Is first level model fitting adequately described and appropriate?** | Yes |
| **Is intersubject normalization adequately described and appropriate?** | No (lesion impact not addressed) |
| **Imaging notes**             | —                             |

| Conditions |   |
|------------|-------------------------------|
| **Are the conditions clearly described?** | No (based on Binder et al. (1997), but details not reported) |

| Condition                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|-------------------------------|---------------|-------------|-----------------------|---------------------------|
| semantic decision             | Button press  | not stated  | Unknown               | No                        |
| tone decision                 | Button press  | not stated  | Unknown               | No                        |

| Conditions notes | Group only just above chance, unclear whether significantly better; clearly some individuals were at chance |

| Contrasts |   |
|-----------|-------------------------------|
| **Are the contrasts clearly described?** | Yes |

**Contrast 1: semantic decision vs tone decision**

| Language condition | Semantic decision |
|--------------------|-------------------|
| Control condition  | Tone decision     |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | Appear similar |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes |
| Are activations lateralized in the control data? | Yes |
| Control activation notes | Control data in Kim et al. (2011) and Szafirski et al. (2008); L frontal and temporal, plus other semantic regions |
| Contrast notes | — |
### Analyses

| Are the analyses clearly described? | No* (moderate limitation) (see specific limitation(s) below) |

### Voxelwise analysis 1

| First level contrast | Semantic decision vs tone decision |
|----------------------|----------------------------------|
| Analysis class       | Longitudinal change in aphasia   |
| Group(s)             | Aphasia T2 vs T1                |
| Covariate            | —                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (patients improved only on semantic fluency) |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Language and control tasks both matched |
| Type of analysis     | Voxelwise                        |
| Search volume        | Whole brain                      |
| Correction for multiple comparisons | No correction |
| Software             | in-house                         |
| Voxelwise p          | .05                               |
| Cluster extent       | None                             |
| Statistical details  | The figure shows a cutoff of z > 10, which would not correspond to p < .05; increases and decreases in Figure 3 do not accord with the data from T1 and T2 in Figure 2, raising concerns about the implementation of the analyses; there is no explicit description of the second level analysis |
| Findings             | ↑ L IFG                           |
|                      | ↑ L SMA/medial prefrontal        |
|                      | ↑ L orbitofrontal                |
|                      | ↑ L inferior parietal lobule     |
|                      | ↑ L supramarginal gyrus          |
|                      | ↑ L angular gyrus                |
|                      | ↑ L precuneus                    |
|                      | ↑ L occipital                    |
|                      | ↑ L anterior cingulate           |
|                      | ↑ L basal ganglia                |
|                      | ↑ L hippocampus/MTL              |
|                      | ↑ R dorsal precentral            |
|                      | ↑ R precuneus                    |
|                      | ↑ R occipital                    |
|                      | ↑ R basal ganglia                |
|                      | ↑ R hippocampus/MTL              |
|                      | ↓ R insula                       |
|                      | ↓ R supramarginal gyrus          |
|                      | ↓ R posterior STG                |
| Findings notes       | Based on a combination of coordinates in Table 2, and Figure 3 |

### ROI analysis 1

| First level contrast | Semantic decision vs tone decision |
|----------------------|----------------------------------|
| Analysis class       | Longitudinal change in aphasia   |
| Group(s)             | Aphasia T2 vs T1                |
| Covariate            | —                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (patients improved only on semantic fluency) |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
Behavioral data notes
Language and control tasks both matched

Type of analysis
Regions of interest (ROI)

ROI type
Functional

How many ROIs are there?
3

What are the ROI(s)?
(1) frontal LI; (2) temporal LI; (3) language network LI

How are the ROI(s) defined?
No correction

Correction for multiple comparisons

Statistical details
T1 LI (temporal) is reported to be negative, which does not accord with the voxelwise analysis in Figure 2; increases and decreases in Figure 3 do not accord with the data from T1 and T2 in Figure 2, raising concerns about the implementation of the analyses

Findings
↑ LI (language network)
↑ LI (frontal)
↑ LI (temporal)

Findings notes
—

Notes
Excluded analyses
—

---

Tyler et al. (2011)

Reference

Authors
Tyler LK, Marslen-Wilson WD, Randall B, Wright P, Devereux B, Zhuang J, Papoutsi M, Stamatakis EA

Title
Left inferior frontal cortex and syntax: function, structure and behaviour in patients with left hemisphere damage

Reference
Brain 2011; 134: 415-431

PMID
21278407

DOI
10.1093/brain/awq369

Participants

Language
UK English

Inclusion criteria
—

Number of individuals with aphasia
14

Number of control participants
15

Were any of the participants included in any previous studies?
Yes (not stated, but it seems like most of the patients also participated in Tyler et al. (2010))

Is age reported for patients and controls, and matched?
Yes (mean 56 years, range 34-77 years)

Is sex reported for patients and controls, and matched?
Yes (males: 11; females: 3)

Is handedness reported for patients and controls, and matched?
Yes (right: 14; left: 0)

Is time post stroke onset reported and appropriate to the study design?
Yes (mean 7 years, > 1.5 years)

To what extent is the nature of aphasia characterized?
Not at all

Language evaluation
Sentence-picture matching, grammaticality judgment, lexical decision, phonological discrimination, semantic categorization, sentence repetition, word repetition

Aphasia severity
Not stated

Aphasia type
Not stated

First stroke only?
Not stated

Stroke type
Not stated

To what extent is the lesion distribution
Lesion overlay
characterized?
Lesion extent: Not stated
Lesion location: L MCA
Participants notes: 1 patient had post-surgical haematoma rather than stroke

### Imaging

| Modality | fMRI |
|----------------------|----------------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Siemens Trio 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (run length not stated; length of stimuli not described) |
| Design type | Event-related |
| Total images acquired | not stated but 1059 per Papoutsi et al. (2011) |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | No (lacks explanation of event durations) |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | — |

### Conditions

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|----------------------|----------------------|----------------------|----------------------|----------------------|
| listening to unambiguous sentences ("unambiguous") | None | 42 | N/A | N/A |
| listening to ambiguous sentences with dominant resolution ("dominant") | None | 42 | N/A | N/A |
| listening to ambiguous sentences with subordinate resolution ("subordinate") | None | 42 | N/A | N/A |
| listening to filler sentences | None | 126 | N/A | N/A |
| listening to "musical rain" | None | 42 | N/A | N/A |
| rest | None | implicit baseline | N/A | N/A |

### Contrasts

| Contrast 1: listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences ("unambiguous") |
|----------------------|----------------------|
| Language condition | Listening to ambiguous sentences (dominant and subordinate) |
| Control condition | Listening to unambiguous sentences ("unambiguous") |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and | N/A, no behavioral measure |
| control tasks for all relevant groups? | N/A, no timeable task |
|--------------------------------------|-----------------------|
| Behavioral data notes                | —                     |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat |
| Are activations lateralized in the control data? | Yes |
| Control activation notes             | L frontal and parietal; R frontal (but L > R); no L temporal |
| Contrast notes                       | —                     |

**Contrast 2: listening to ambiguous sentences with dominant resolution ("dominant") vs listening to unambiguous sentences ("unambiguous")**

| Language condition | Listening to ambiguous sentences with dominant resolution ("dominant") |
|--------------------|---------------------------------------------------------------------|
| Control condition  | Listening to unambiguous sentences ("unambiguous") |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat |
| Are activations lateralized in the control data? | Yes |
| Control activation notes | L frontal and parietal; no L temporal |
| Contrast notes | — |

**Contrast 3: listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to unambiguous sentences ("unambiguous")**

| Language condition | Listening to ambiguous sentences with subordinate resolution ("subordinate") |
|--------------------|---------------------------------------------------------------------|
| Control condition  | Listening to unambiguous sentences ("unambiguous") |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes |
| Are activations lateralized in the control data? | Yes |
| Control activation notes | L frontal, temporal and parietal, R frontal (but L > R) |
| Contrast notes | — |
Contrast 4: listening to ambiguous sentences with subordinate resolution (“subordinate”) vs listening to ambiguous sentences with dominant resolution (“dominant”)

| Language condition | Listening to ambiguous sentences with subordinate resolution (“subordinate”) |
|--------------------|--------------------------------------------------|
| Control condition  | Listening to ambiguous sentences with dominant resolution (“dominant”) |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes |
| Are activations lateraled in the control data? | Yes |
| Control activation notes | L frontal and temporal |
| Contrast notes | — |

**Analyses**

Are the analyses clearly described? Yes

**Voxelwise analysis 1**

| First level contrast | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences (“unambiguous”) |
|----------------------|------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia vs control |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Search volume        | Plausible fronto-temporo-parietal language regions |
| Correction for multiple comparisons | No direct comparison |
| Software             | SPM5 |
| Voxelwise p          | — |
| Cluster extent       | — |
| Statistical details  | Qualitative comparison on p. 423 |
| Findings             | ▼ L IFG |
| Findings notes       | — |

**Voxelwise analysis 2**

| First level contrast | Listening to ambiguous sentences with dominant resolution (“dominant”) vs listening to unambiguous sentences (“unambiguous”) |
|----------------------|------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia vs control |
| Covariate            | — |
| Is the second level contrast valid in terms of the | Yes |
| Group(s), time point(s), and measures involved? | N/A, no behavioral measure |
|---|---|
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Voxelwise |
| Search volume | Plausible fronto-temporo-parietal language regions |
| Correction for multiple comparisons | No direct comparison |
| Software | SPM5 |
| Voxelwise p | — |
| Cluster extent | — |
| Statistical details | Qualitative comparison on p. 423 |
| Findings | ↓ L IFG |
| Findings notes | — |

**Voxelwise analysis 3**

| First level contrast | Listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to unambiguous sentences ("unambiguous") |
|---|---|
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Voxelwise |
| Search volume | Plausible fronto-temporo-parietal language regions |
| Correction for multiple comparisons | No direct comparison |
| Software | SPM5 |
| Voxelwise p | — |
| Cluster extent | — |
| Statistical details | Qualitative comparison on p. 423 |
| Findings | ↓ L IFG |
| Findings notes | Lack of patient activation in pMTG implied in text, but this activation looks fairly similar in patients and controls (c.f. Figure 3C vs 2C) |

**Voxelwise analysis 4**

| First level contrast | Listening to ambiguous sentences with subordinate resolution ("subordinate") vs listening to ambiguous sentences with dominant resolution ("dominant") |
|---|---|
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Voxelwise |
| Search volume | Plausible fronto-temporo-parietal language regions |
| Correction for multiple comparisons | No direct comparison |
| Software     | SPM5       |
|--------------|------------|
| Voxelwise p  | —          |
| Cluster extent | —        |
| Statistical details | Qualitative comparison on p. 423 |
| Findings     | ↓ L IFG    |
|              | ↓ L posterior MTG |
| Findings notes | —       |

### Voxelwise analysis 5

| First level contrast | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences (“unambiguous”) |
|----------------------|------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                      |
| Group(s)             | Aphasia                                                                                                          |
| Covariate            | Performance on acceptability judgment task (difference in percent of unacceptable judgments between ambiguous and unambiguous sentences) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                               |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure                                                                                      |
| Is reaction time matched across the second level contrast? | N/A, no timeable task                                                                                           |
| Behavioral data notes | —                                                                  |
| Type of analysis     | Voxelwise                                                                                                         |
| Search volume        | Plausible fronto-temporo-parietal language regions                                                                 |
| Correction for multiple comparisons | Clusterwise correction with with GRFT and lenient voxelwise p                                                  |
| Software              | SPM5                                                                                                               |
| Voxelwise p          | .01                                                                                                                |
| Cluster extent       | Based on GRFT                                                                                                      |
| Statistical details  | —                                                                  |
| Findings             | ↑ L IFG pars triangularis                                                                                         |
|                       | ↑ L IFG pars orbitalis                                                                                             |
|                       | ↑ R insula                                                                                                         |
|                       | ↑ R mid temporal                                                                                                   |
| Findings notes       | Also L pMTG but this did not reach significance                                                                  |

### Voxelwise analysis 6

| First level contrast | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences (“unambiguous”) |
|----------------------|------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                      |
| Group(s)             | Aphasia                                                                                                          |
| Covariate            | Performance on sentence-picture matching task                                                                   |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                               |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure                                                                                      |
| Is reaction time matched across the second level contrast? | N/A, no timeable task                                                                                           |
| Behavioral data notes | —                                                                  |
| Type of analysis     | Voxelwise                                                                                                         |
| Search volume        | Plausible fronto-temporo-parietal language regions                                                                 |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent                                                          |
| Software              | SPM5                                                                                                               |
| Voxelwise p          | .01                                                                                                                |
| Cluster extent       | 30 (units not stated)                                                                                             |
| Statistical details  | —                                                                  |
| Findings             | ↑ L IFG pars orbitalis                                                                                           |
### Voxelwise analysis 7

| First level contrast | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences ("unambiguous") |
|----------------------|---------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                  |
| Group(s)             | Aphasia                                                                                                       |
| Covariate            | Performance on word monitoring task                                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                           |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure                                                                                     |
| Is reaction time matched across the second level contrast? | N/A, no timeable task                                                                                         |

### Behavioral data notes

- Type of analysis: Voxelwise
- Search volume: Plausible fronto-temporo-parietal language regions
- Correction for multiple comparisons: Clusterwise correction based on arbitrary cluster extent
- Software: SPM5
- Voxelwise p: .05
- Cluster extent: 10 (units not stated)
- Statistical details: —
- Findings: ↑ L IFG pars orbitalis, ↑ L posterior MTG, ↑ R insula, ↑ R mid temporal

### Voxelwise analysis 8

| First level contrast | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences ("unambiguous") |
|----------------------|---------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                  |
| Group(s)             | Aphasia                                                                                                       |
| Covariate            | Difference in percent of unacceptable judgments between subordinate and dominant sentences (dominance effect) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                           |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure                                                                                     |
| Is reaction time matched across the second level contrast? | N/A, no timeable task                                                                                         |

### Behavioral data notes

- Type of analysis: Voxelwise
- Search volume: Plausible fronto-temporo-parietal language regions
- Correction for multiple comparisons: Clusterwise correction with with GRFT and lenient voxelwise p
- Software: SPM5
- Voxelwise p: .01
- Cluster extent: Based on GRFT
- Statistical details: —
- Findings: None
- Findings notes: —
### ROI analysis 1

| First level contrast | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences (“unambiguous”) |
|----------------------|---------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                    |
| Group(s)             | Aphasia                                                                                                       |
| Covariate            | Performance on acceptability judgment task (difference in percent of unacceptable judgments between ambiguous and unambiguous sentences) |

| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

**Behavioral data notes** —

**Type of analysis** Regions of interest (ROI)

**ROI type** Anatomical

**How many ROIs are there?** 3

**What are the ROI(s)?** (1) IFG pars opercularis; (2) IFG pars triangularis; (3) IFG pars orbitalis

**How are the ROI(s) defined?** AAL

**Correction for multiple comparisons** No correction

**Statistical details** —

**Findings**
- ↑ L IFG pars triangularis
- ↑ L IFG pars orbitalis

**Findings notes** —

### ROI analysis 2

| First level contrast | Listening to ambiguous sentences (dominant and subordinate) vs listening to unambiguous sentences (“unambiguous”) |
|----------------------|---------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                    |
| Group(s)             | Aphasia                                                                                                       |
| Covariate            | Difference in percentage of unacceptable judgments between subordinate and dominant sentences (dominance effect) |

| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

**Behavioral data notes** —

**Type of analysis** Regions of interest (ROI)

**ROI type** Anatomical

**How many ROIs are there?** 3

**What are the ROI(s)?** (1) IFG pars opercularis; (2) IFG pars triangularis; (3) IFG pars orbitalis

**How are the ROI(s) defined?** AAL

**Correction for multiple comparisons** No correction

**Statistical details** —

**Findings** None

**Findings notes** —

### Notes

**Excluded analyses** It is mentioned in the supplementary material that there was no correlation between activation and lexical (non-syntactic) errors
Weiduschat et al. (2011)

**Reference**

| Authors       | Weiduschat N, Thiel A, Rubi-Fessen I, Hartmann A, Kessler J, Merl P, Kracht L, Rommel T, Heiss WD |
|---------------|--------------------------------------------------------------------------------------------------|
| Title         | Effects of repetitive transcranial magnetic stimulation in aphasic stroke: a randomized controlled pilot study |
| Reference     | Stroke 2011; 42: 409-415                                                                          |
| PMID          | 21164121                                                                                         |
| DOI           | 10.1161/strokeaha.110.597864                                                                    |

**Participants**

| Language                  | German                                                                                   |
|---------------------------|------------------------------------------------------------------------------------------|
| Inclusion criteria        | Age 55-85                                                                               |
| Number of individuals with aphasia | 10 (plus 4 excluded: 3 malfunction of TMS device or claustrophobia; 1 recovered nearly completely prior to intervention) |
| Number of control participants | 0                                                                 |
| Were any of the participants included in any previous studies? | No                                                                 |
| Is age reported for patients and controls, and matched? | Yes (range 59-83 years)                                                                  |
| Is sex reported for patients and controls, and matched? | Yes (males: 5; females: 5)                                                                |
| Is handedness reported for patients and controls, and matched? | Yes (right: 10; left: 0)                                                                  |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 18-97 days; patients at different subacute stages of recovery)                |
| To what extent is the nature of aphasia characterized? | Type only                                                                               |
| Language evaluation       | AAT                                                                                      |
| Aphasia severity          | T1: TT range 0-45 errors; T2: TT range 0-44 errors                                       |
| Aphasia type              | T1: 5 Wernicke's, 2 Broca's, 2 global, 1 amnestic fluent; T2: not stated                  |
| First stroke only?        | Yes                                                                                      |
| Stroke type               | Not stated                                                                                |
| To what extent is the lesion distribution characterized? | Extent and location                                                                       |
| Lesion extent             | Range 0.7-88.9 cc                                                                         |
| Lesion location           | L MCA                                                                                    |
| Participants notes        | —                                                                                         |

**Imaging**

| Modality                  | PET (rCBF)                                                                               |
|---------------------------|------------------------------------------------------------------------------------------|
| Is the study cross-sectional or longitudinal? | Longitudinal—mixed                                                                       |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/subacute (range 18-97 days post onset); T2: post-treatment, ~2 weeks later |
| If longitudinal, was there any intervention between the time points? | Individualized SLT, 45 minutes/day, 5 days/week, 2 weeks; 6 patients underwent rTMS to the R IFG pars triangularis; 4 received vertex (sham) rTMS |
| Is the scanner described? | Yes (CTI-Siemens ECAT EXACT HR)                                                           |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes                                                                                      |
| Design type               | PET                                                                                      |
| Total images acquired     | 8                                                                                         |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)                                                                         |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes                                                                                      |
Is first level model fitting adequately described and appropriate? Yes
Is intersubject normalization adequately described and appropriate? Yes
Imaging notes —

Conditions

Are the conditions clearly described? Yes

| Condition       | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------|---------------|-------------|----------------------|---------------------------|
| verb generation | Word (covert) | 4           | Unknown              | Unknown                   |
| rest            | None          | 4           | N/A                  | N/A                       |

Conditions notes —

Contrasts

Are the contrasts clearly described? Yes

Contrast 1: verb generation vs rest

Language condition Verb generation
Control condition Rest
Are the conditions matched for visual demands? Yes
Are the conditions matched for auditory demands? No
Are the conditions matched for motor demands? Yes
Are the conditions matched for cognitive/executive demands? No
Is accuracy matched between the language and control tasks for all relevant groups? N/A, tasks not comparable
Is reaction time matched between the language and control tasks for all relevant groups? N/A, tasks not comparable
Behavioral data notes —
Does the contrast selectively activate plausible relevant language regions in the control group? Unknown
Are activations lateralized in the control data? Unknown
Control activation notes Control data in Herholz et al. (1996); insufficient to fully validate the contrast
Contrast notes —

Analyses

Are the analyses clearly described? Yes

ROI analysis 1

First level contrast Verb generation vs rest
Analysis class Longitudinal change in aphasia
Group(s) Aphasia T2 vs T1 (regardless of rTMS)
Covariate —
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes
Is accuracy matched across the second level contrast? Unknown, not reported
Is reaction time matched across the second level contrast? Unknown, not reported
Behavioral data notes —
Type of analysis Regions of interest (ROI)
ROI type Laterality indices
### ROI analysis 2

| First level contrast | Verb generation vs rest |
|----------------------|-------------------------|
| Analysis class       | Longitudinal change in aphasia |
| Group(s)             | Aphasia treated with rTMS (n = 6) T2 vs T1 |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Laterality indices |
| How many ROIs are there? | 3 |
| What are the ROI(s)? | (1) IFG LI; (2) superior temporal LI; (3) SMA LI |
| How are the ROI(s) defined? | Correction for multiple comparisons |
| Statistical details  | No correction |
| Findings             | None |
| Findings notes       | — |

### ROI analysis 3

| First level contrast | Verb generation vs rest |
|----------------------|-------------------------|
| Analysis class       | Longitudinal between two groups with aphasia |
| Group(s)             | (Aphasia with R IFG rTMS (n = 6) T2 vs T1) vs (with sham rTMS (n = 4) T2 vs T1) |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Laterality indices |
| How many ROIs are there? | 3 |
| What are the ROI(s)? | (1) IFG LI; (2) superior temporal LI; (3) SMA LI |
| How are the ROI(s) defined? | Correction for multiple comparisons |
| Statistical details  | No correction |
| Findings             | None |
| Findings notes       | IFG LI was stable in the stimulation group, but shifted to the R in the sham group, yielding a significant difference between groups |

### ROI analysis 4

| First level contrast | Verb generation vs rest |
|----------------------|-------------------------|
| Analysis class       | — |
| Group(s)             | — |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Laterality indices |
| How many ROIs are there? | 3 |
| What are the ROI(s)? | (1) IFG LI; (2) superior temporal LI; (3) SMA LI |
| How are the ROI(s) defined? | Correction for multiple comparisons |
| Statistical details  | No correction |
| Findings             | None |
| Findings notes       | IFG LI was stable in the stimulation group, but shifted to the R in the sham group, yielding a significant difference between groups |
| Analysis class | Longitudinal correlation with language or other measure |
|---------------|------------------------------------------------------|
| Group(s)      | Aphasia T2 vs T1 (regardless of rTMS)                |
| Covariate     | Δ AAT total score                                    |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Region of interest (ROI) |
| ROI type | Laterality indices |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | IFG LI |
| How are the ROI(s) defined? | — |
| Correction for multiple comparisons | One only |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

**Notes**

Excluded analyses (1) difference between groups at T1 (pre-treatment); (2) sham group T2 vs T1 (n = 4)

### Allendorfer et al. (2012)

**Reference**

| Authors | Allendorfer JB, Kissela BM, Holland SK, Szafarski JP |
|---------|--------------------------------------------------|
| Title   | Different patterns of language activation in post-stroke aphasia are detected by overt and covert versions of the verb generation fMRI task |
| Reference | *Med Sci Monit* 2012; 18: CR135-147 |
| PMID    | 22367124 |
| DOI     | 10.12659/msm.882518 |

**Participants**

| Language | US English |
|----------|------------|
| Inclusion criteria | MCA; moderate-severe aphasia; mRS ≤ 3 |
| Number of individuals with aphasia | 16 |
| Number of control participants | 32 |
| Were any of the participants included in any previous studies? | Yes (“part of a larger ongoing study”, may overlap with other studies from this group) |
| Is age reported for patients and controls, and matched? | Yes (mean 54.4 ± 9.5 years, range 38-78 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 9; females: 7) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 16; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 3.7 ± 3.5 years, range 0.5-11.4 years) |
| To what extent is the nature of aphasia characterized? | Severity and type |
| Language evaluation | TT, PPVT, BNT, semantic and phonemic fluency, complex ideation subtest of BDAE |
| Aphasia severity | Moderate-severe; TT mean 25.5 ± 11.3; unclear how to reconcile moderate-severe severity with mostly anomic aphasia |
| Aphasia type | Mostly anomic with some non-fluent |
|-------------|----------------------------------|
| First stroke only? | Not stated |
| Stroke type | Ischemic only |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent | Range 2.8-248.9 cc |
| Lesion location | L MCA |
| Participants notes | — |

**Imaging**

| Modality | fMRI |
|-----------|------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | No (Phillips 3 Tesla; model not stated) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | Mixed |
| Total images acquired | 435 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | No (no description of HRF model, which is important given sparse sampling design) |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed) |
| Imaging notes | sparse sampling |

**Conditions**

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|--------------|-------------|----------------------|--------------------------|
| verb generation (overt, event-related) | Multiple words (overt) | 15 | Yes | Unknown |
| verb generation (covert, event-related) | Multiple words (covert) | 15 | Unknown | Unknown |
| noun repetition (event-related) | Multiple words (covert) | 15 | Yes | Unknown |
| verb generation (covert, block) | Multiple words (covert) | 10 | Unknown | Unknown |
| finger tapping (block) | Other | 10 | Unknown | Unknown |

**Conditions notes**

Given the means and standard deviations presented, it is likely that some patients could not perform some tasks; post-scan recognition tests not considered to quantify performance.

**Contrasts**

| Contrast 1: verb generation (covert, block) vs finger tapping (block) |
|--------------------------|--------------------------|
| Language condition | Verb generation (covert, block) |
| Control condition | Finger tapping (block) |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Question                                                                 | Answer                                      |
|------------------------------------------------------------------------|---------------------------------------------|
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                   |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                   |
| Behavioral data notes                                                 |                                             |
| Are control data reported in this paper or another that is referenced? | Yes                                         |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes                                         |
| Are activations lateralized in the control data?                      | Yes                                         |
| Control activation notes                                              | Strongly lateralized frontal and temporal activation |
| Contrast notes                                                        |                                             |

**Contrast 2: verb generation (overt, event-related) vs noun repetition (event-related)**

| Language condition | Verb generation (overt, event-related) |
|--------------------|----------------------------------------|
| Control condition  | Noun repetition (event-related)         |
| Are the conditions matched for visual demands? | Yes                                    |
| Are the conditions matched for auditory demands? | Yes                                    |
| Are the conditions matched for motor demands? | Yes                                    |
| Are the conditions matched for cognitive/executive demands? | No                                     |
| Is accuracy matched between the language and control tasks for all relevant groups? | Appear mismatched                      |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported                   |
| Behavioral data notes                                                 |                                             |
| Are control data reported in this paper or another that is referenced? | Yes                                    |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                                |
| Are activations lateralized in the control data?                      | Somewhat                                 |
| Control activation notes                                              | Somewhat L-lateralized frontal, temporal and parietal activations, but also extensive midline activation |
| Contrast notes                                                        |                                             |

**Contrast 3: verb generation (overt, event-related) vs verb generation (covert, event-related)**

| Language condition | Verb generation (overt, event-related) |
|--------------------|----------------------------------------|
| Control condition  | Verb generation (covert, event-related) |
| Are the conditions matched for visual demands? | Yes                                    |
| Are the conditions matched for auditory demands? | No                                     |
| Are the conditions matched for motor demands? | No                                     |
| Are the conditions matched for cognitive/executive demands? | Yes                                    |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable               |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable               |
| Behavioral data notes                                                 |                                             |
| Are control data reported in this paper or another that is referenced? | Yes                                    |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                                |
| Are activations lateralized in the control data?                      | N/A                                     |
| Control activation notes                                              | Bilateral speech motor activations, but also extensive midline activation |
| Contrast notes                                                        |                                             |
Analyses

| Are the analyses clearly described? | Yes |

**ROI analysis 1**

| First level contrast | Verb generation (covert, block) vs finger tapping (block) |
|----------------------|--------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                    |
| Group(s)             | Aphasia vs control                                    |
| Covariate            | —                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                      |
| Type of analysis     | Regions of interest (ROI)                             |
| ROI type             | Laterality indices                                    |
| How many ROIs are there? | 2                                                      |
| What are the ROI(s)? | (1) frontal LI; (2) temporal LI                       |
| How are the ROI(s) defined? | —                                                      |
| Correction for multiple comparisons | No correction |
| Statistical details  | —                                                      |
| Findings             | ↓ LI (temporal)                                       |
| Findings notes       | —                                                      |

**ROI analysis 2**

| First level contrast | Verb generation (overt, event-related) vs noun repetition (event-related) |
|----------------------|------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                     |
| Group(s)             | Aphasia vs control                                                    |
| Covariate            | —                                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Patients less accurate and produced less responses on both conditions, but the difference between groups was greater for verb generation |
| Type of analysis     | Regions of interest (ROI)                                             |
| ROI type             | Laterality indices                                                   |
| How many ROIs are there? | 2                                                      |
| What are the ROI(s)? | (1) frontal LI; (2) temporal LI                                      |
| How are the ROI(s) defined? | —                                                      |
| Correction for multiple comparisons | No correction |
| Statistical details  | —                                                                      |
| Findings             | ↓ LI (frontal)                                                       |
| Findings notes       | —                                                                      |

**ROI analysis 3**

| First level contrast | Verb generation (overt, event-related) vs verb generation (covert, event-related) |
|----------------------|------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                     |
| Group(s)             | Aphasia vs control                                                    |
| Covariate            | —                                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Question | Answer |
|----------|--------|
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Overt performance differed, so covert performance probably did too |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Laterality indices |
| How many ROIs are there? | 2 |
| What are the ROI(s)? | (1) frontal LI; (2) temporal LI |
| How are the ROI(s) defined? | |
| Correction for multiple comparisons | No correction |
| Statistical details | None |
| Findings notes | Lack of lateralization in controls makes this analysis difficult to interpret |

**ROI analysis 4**

| First level contrast | Verb generation (overt, event-related) vs noun repetition (event-related) |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia |
| Covariate | Overt verb generation accuracy |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 3 |
| What are the ROI(s)? | (1) L MTG; (2) L SFG/CG; (3) left MFG |
| How are the ROI(s) defined? | Regions activated by the contrast of overt verb generation vs noun repetition in patients |
| Correction for multiple comparisons | No correction |
| Statistical details | |
| Findings | ↑ L dorsolateral prefrontal cortex |
| Findings notes | ↑ L SMA/medial prefrontal |

**ROI analysis 5**

| First level contrast | Verb generation (overt, event-related) vs verb generation (covert, event-related) |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia |
| Covariate | Overt verb generation accuracy |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 2 |
| What are the ROI(s)? | (1) R insula/IFG; (2) R STG |
| How are the ROI(s) defined? | Prominent R hemisphere activations for the contrast of overt and covert verb generation in |
Correction for multiple comparisons: No correction

Statistical details: —

Findings: None

Findings notes: —

Notes

Excluded analyses: Analysis of LI distribution (left/right/bilateral) yielded similar results

Fridriksson, Hubbard, et al. (2012)

Reference

Authors: Fridriksson J, Hubbard HI, Hudspeth SG, Holland AL, Bonilha L, Fromm D, Rorden C
Title: Speech entrainment enables patients with Broca’s aphasia to produce fluent speech
Reference: Brain 2012; 135: 3815-3829
PMID: 23250889
DOI: 10.1093/brain/aws301

Participants

Language: US English
Inclusion criteria: Broca’s aphasia
Number of individuals with aphasia: 10 (plus 3 excluded: 1 due to a metal implant; 2 for severely non-fluent speech)
Number of control participants: 20
Were any of the participants included in any previous studies? No
Is age reported for patients and controls, and matched? Yes (mean 56.9 ± 9.2 years, range 45-75 years)
Is sex reported for patients and controls, and matched? No (males: 9; females: 4; control sex not matched)
Is handedness reported for patients and controls, and matched? Yes (right: 12; left: 1)
Is time post stroke onset reported and appropriate to the study design? Yes (mean 63.8 ± 64.3 months, range 10-261 months)
To what extent is the nature of aphasia characterized? Comprehensive battery
Language evaluation: WAB, BNT, AoS from ABA
Aphasia severity: AQ mean 48.5 ± 20.6, range 20.9-73.5
Aphasia type: Broca’s
First stroke only? Yes
Stroke type: Not stated
To what extent is the lesion distribution characterized? Lesion overlay
Lesion extent: Not stated
Lesion location: L MCA
Participants notes: Demographic data includes excluded patients

Imaging

Modality: fMRI
Is the study cross-sectional or longitudinal? Cross-sectional
If longitudinal, at what time point(s) were imaging data acquired? —
If longitudinal, was there any intervention between the time points? —
| Question                                                                 | Answer                                                                 |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| Is the scanner described?                                                | No (Siemens 3 Tesla; model not stated)                                  |
| Is the timing of stimulus presentation and image acquisition clearly    | No* (moderate limitation) (it appears that each of the three conditions was presented in a separate run) |
| acquired and appropriate?                                               |                                                                        |
| Design type                                                             | Event-related                                                          |
| Total images acquired                                                   | 180?                                                                  |
| Are the imaging acquisition parameters, including coverage, adequately  | Yes (whole brain)                                                      |
| described and appropriate?                                              |                                                                        |
| Is preprocessing and intrasubject coregistration adequately described   | Yes                                                                    |
| and appropriate?                                                        |                                                                        |
| Is first level model fitting adequately described and appropriate?      | No (not described clearly)                                             |
| Is intersubject normalization adequately described and appropriate?      | Yes                                                                    |
| Imaging notes                                                           | sparse sampling                                                        |
| **Conditions**                                                          |                                                                        |
| Are the conditions clearly described?                                   | No (rest condition implied but not described)                         |
| **Condition**                                                           | **Response type** | **Repetitions** | **All groups could do?** | **All individuals could do?** |
| listening to/watching audiovisual sentences, while producing the same   | Sentence (overt) | 30 (?)         | Yes                       | Unknown                      |
| sentences in unison (speech entrainment)                               |                                                                        |
| listening to reversed sentences and viewing a mouth speaking, while    | Sentence (overt) | 30 (?)         | Yes                       | Unknown                      |
| producing unrelated sentences                                           |                                                                        |
| listening to/watching audiovisual sentences and viewing a mouth        | None                     | 30 (?)         | N/A                       | N/A                          |
| rest                                                                    |                                                                        |
| **Conditions notes**                                                    | —                                                                     |
| **Contrasts**                                                           |                                                                        |
| Are the contrasts clearly described?                                    | No (see specific limitation(s) below)                                  |
| **Contrast 1: listening to/watching audiovisual sentences, while       | Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) vs |
| producing the same sentences in unison (speech entrainment) vs          | listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences |
| listening to reversed sentences and viewing a mouth speaking, while    |                                                                        |
| producing unrelated sentences                                           |                                                                        |
| Language condition                                                      | Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) |
| Control condition                                                       | Listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences |
| Are the conditions matched for visual demands?                          | Yes                                                                   |
| Are the conditions matched for auditory demands?                        | Yes                                                                   |
| Are the conditions matched for motor demands?                           | Yes                                                                   |
| Are the conditions matched for cognitive/executive demands?            | Yes                                                                   |
| Is accuracy matched between the language and control tasks for all     | Unknown, not reported                                                  |
| relevant groups?                                                        |                                                                        |
| Is reaction time matched between the language and control tasks for    | Unknown, not reported                                                  |
| all relevant groups?                                                    |                                                                        |
| Behavioral data notes                                                   | Behavioral data outside the scanner suggest not matched, but in-scanner behavioral data not reported |
| Are control data reported in this paper or another that is referenced?  | Somewhat                                                              |
| Does the contrast selectively activate plausible relevant language      | No                                                                    |
| regions in the control group?                                           |                                                                        |
| Are activations lateralized in the control data?                        | No                                                                    |
| Control activation notes | Control and patient data are combined; this contrast activates bilateral anterior insula and posterior MTG, slightly more extensive on the L |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Contrast notes           | —                                                                                                                                 |

**Contrast 2: listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) vs rest**

| Language condition | Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) |
|--------------------|----------------------------------------------------------------------------------------------------------------|
| Control condition  | Rest                                                                                                                   |
| Are the conditions matched for visual demands? | No                                                                                           |
| Are the conditions matched for auditory demands? | No                                                                                           |
| Are the conditions matched for motor demands? | No                                                                                           |
| Are the conditions matched for cognitive/executive demands? | No                                                                                           |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                                                 |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                                                 |

**Behavioral data notes**

- Are control data reported in this paper or another that is referenced? | No |
- Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
- Are activations lateralized in the control data? | Unknown |

**Control activation notes**

- Rest condition implied but not explicitly described

**Contrast 3: listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences vs rest**

| Language condition | Listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences |
|--------------------|-----------------------------------------------------------------------------------------------|
| Control condition  | Rest                                                                                           |
| Are the conditions matched for visual demands? | No                                                                                           |
| Are the conditions matched for auditory demands? | No                                                                                           |
| Are the conditions matched for motor demands? | No                                                                                           |
| Are the conditions matched for cognitive/executive demands? | No                                                                                           |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                                                 |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                                                 |

**Behavioral data notes**

- Are control data reported in this paper or another that is referenced? | No |
- Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
- Are activations lateralized in the control data? | Unknown |

**Control activation notes**

- Rest condition implied but not explicitly described

**Contrast 4: listening to/watching audiovisual sentences and viewing a mouth vs rest**

| Language condition | Listening to/watching audiovisual sentences and viewing a mouth |
|--------------------|------------------------------------------------------------------|
| Control condition  | Rest                                                              |
| Are the conditions matched for visual demands? | No                                                                 |
| Are the conditions matched for auditory demands? | No                                                                 |
| Are the conditions matched for motor demands? | No                                                                 |
| Are the conditions matched for cognitive/executive demands? | No                                                                 |

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| Question                                                                 | Answer                                      |
|------------------------------------------------------------------------|---------------------------------------------|
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure                  |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task                       |
| Behavioral data notes                                                  | —                                           |
| Are control data reported in this paper or another that is referenced? | No                                          |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                                     |
| Are activations lateralized in the control data?                       | Unknown                                     |
| Control activation notes                                               | —                                           |
| Contrast notes                                                         | Rest condition implied but not explicitly described |

### Analyses

| Are the analyses clearly described? | No** (major limitation) (see specific limitation(s) below) |

#### Voxelwise analysis 1

| First level contrast | Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) vs listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences |
|----------------------|-------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                                                                  |
| Group(s)             | Aphasia T1 vs control                                                                                                |
| Covariate            | —                                                                    |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                  |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                               |
| Is reaction time matched across the second level contrast? | N/A, no timeable task                                               |
| Behavioral data notes | —                                                                    |
| Type of analysis     | Voxelwise                                                          |
| Search volume        | Whole brain                                                         |
| Correction for multiple comparisons | Unclear or not stated                                        |
| Software             | FSL (FEAT 5.98)                                                      |
| Voxelwise p          | —                                                                    |
| Cluster extent       | —                                                                    |
| Statistical details  | Thresholding not stated                                             |
| Findings             | ↑ L angular gyrus                                                   |
|                      | ↓ L anterior temporal                                                |
| Findings notes       | Based on coordinates in Table 2                                      |

#### Voxelwise analysis 2

| First level contrast | Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) vs rest |
|----------------------|-------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                                                                   |
| Group(s)             | Aphasia T2 vs T1                                                                                                 |
| Covariate            | —                                                                    |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                  |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                               |
| Is reaction time matched across the second level contrast? | N/A, no timeable task                                               |
| Behavioral data notes | —                                                                    |
| Type of analysis     | Voxelwise                                                          |
| Search volume        | Whole brain                                                         |
### Correction for multiple comparisons

**Unclear or not stated**

### Software

FSL (FEAT 5.98)

### Voxelwise p

—

### Cluster extent

—

### Statistical details

Thresholding not stated

### Findings

† L SMA/medial prefrontal
† L anterior cingulate
† R precuneus
† R occipital
† R hippocampus/MTL
† L supramarginal gyrus

### Findings notes

Some labels changed based on coordinates

### Voxelwise analysis 3

| First level contrast | Listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences vs rest |
|----------------------|---------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                                                   |
| Group(s)             | Aphasia T2 vs T1                                                                                  |
| Covariate            | —                                                                                                 |

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**

Yes

**Is accuracy matched across the second level contrast?**

Unknown, not reported

**Is reaction time matched across the second level contrast?**

N/A, no timeable task

### Behavioral data notes

—

### Type of analysis

Voxelwise

### Search volume

Whole brain

### Correction for multiple comparisons

Unclear or not stated

### Software

FSL (FEAT 5.98)

### Voxelwise p

—

### Cluster extent

—

### Statistical details

Thresholding not stated

### Findings

None

### Findings notes

—

### Voxelwise analysis 4

| First level contrast | Listening to/watching audiovisual sentences and viewing a mouth vs rest |
|----------------------|------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                         |
| Group(s)             | Aphasia T2 vs T1                                                       |
| Covariate            | —                                                                      |

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**

Yes

**Is accuracy matched across the second level contrast?**

N/A, no behavioral measure

**Is reaction time matched across the second level contrast?**

N/A, no timeable task

### Behavioral data notes

—

### Type of analysis

Voxelwise

### Search volume

Whole brain

### Correction for multiple comparisons

Unclear or not stated

### Software

FSL (FEAT 5.98)

### Voxelwise p

—

### Cluster extent

—

### Statistical details

Thresholding not stated

### Findings

None

### Findings notes

—
### Findings notes

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#### ROI analysis 1

| First level contrast | Listening to/watching audiovisual sentences, while producing the same sentences in unison (speech entrainment) vs listening to reversed sentences and viewing a mouth speaking, while producing unrelated sentences |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                                                                                                                                    |
| Group(s)             | Aphasia T1 vs control                                                                                      |
| Covariate            | —                                                                                                                   |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

#### Behavioral data notes

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| Type of analysis | Regions of interest (ROI) |
|------------------|---------------------------|
| ROI type         | Functional |
| How many ROIs are there? | 6 |
| What are the ROI(s)? | (1) L anterior insula/IFG pars orbitalis; (2) R anterior insula/IFG pars orbitalis; (3) Broca's area; (4) L MTG; (5) L BA 37; (6) R BA 37 |
| How are the ROI(s) defined? | Regions activated in both groups considered together |
| Correction for multiple comparisons | No correction |
| Statistical details | There were no interactions of group by condition; two regions showed main effects of group but this is not pertinent to the contrast |
| Findings | None |
| Findings notes | — |

#### Notes

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**Excluded analyses**

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#### Fridriksson, Richardson, et al. (2012)

**Reference**

| Authors | Fridriksson J, Richardson JD, Fillmore P, Cai B |
|---------|-----------------------------------------------|
| Title   | Left hemisphere plasticity and aphasia recovery |
| Reference | *Neuroimage* 2012; 60: 854-863 |
| PMID    | 22227052 |
| DOI     | 10.1016/j.neuroimage.2011.12.057 |

**Participants**

| Language | US English |
|----------|------------|
| Inclusion criteria | — |
| Number of individuals with aphasia | 29 (plus 1 excluded: contraindications to MRI) |
| Number of control participants | 14 |
| Were any of the participants included in any previous studies? | Yes (26 of 30 patients were included in Fridriksson (2010)) |
| Is age reported for patients and controls, and matched? | Yes (mean 59.2 years, range 33-81 years) |
| Is sex reported for patients and controls, and matched? | No (males: 14; females: 16; not stated for controls) |
| Is handedness reported for patients and controls, and matched? | No |
Is time post stroke onset reported and appropriate to the study design? Yes (mean 51.1 months, range 6-350 months)

To what extent is the nature of aphasia characterized? Severity and type

Language evaluation WAB

Aphasia severity AQ mean 57.9 ± 25.8, range 17.2-95.2

Aphasia type 13 Broca's, 10 anomic, 3 conduction, 2 Wernicke's, 1 global, 1 transcortical motor

First stroke only? Yes

Stroke type Mixed etiologies

To what extent is the lesion distribution characterized? Lesion overlay

Lesion extent Range 7.7-420.5 cc

Lesion location L MCA

Participants notes Demographic data includes excluded patient

**Imaging**

| Modality       | fMRI |
|----------------|------|
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment/~4 weeks later; note that there were two separate sessions per time point, as well as another two sessions midway through treatment that are not analyzed in this paper |
| If longitudinal, was there any intervention between the time points? | Anomia treatment using a cueing hierarchy, 3 hours/day, 5 days/week, 2 weeks, with a 1-week gap between the two weeks |
| Is the scanner described? | Yes (Siemens Trio 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (timing of stimuli within the silent periods is unclear) |

**Design type**

| Total images acquired | 120 |
|-----------------------|-----|
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |

**Imaging notes**

sparse sampling; 26 patients were also scanned with arterial spin labelling

**Conditions**

Are the conditions clearly described? Yes

| Condition                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|-------------------------------|---------------|-------------|----------------------|--------------------------|
| picture naming                | Word (overt)  | 80          | Yes                  | Unknown                  |
| viewing abstract pictures     | None          | 40          | N/A                  | N/A                      |

Conditions notes —

**Contrasts**

Are the contrasts clearly described? Yes

**Contrast 1: picture naming vs viewing abstract pictures**

| Language condition | Control condition |
|--------------------|-------------------|
| Picture naming     | Viewing abstract pictures |

Are the conditions matched for visual demands? Yes

Are the conditions matched for auditory demands? No

Are the conditions matched for motor demands? No
| Question                                                                 | Answer                                      |
|-------------------------------------------------------------------------|---------------------------------------------|
| Are the conditions matched for cognitive/executive demands?             | No                                          |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                    |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                    |
| Behavioral data notes                                                   |                                             |
| Are control data reported in this paper or another that is referenced?  | Somewhat                                    |
| Does the contrast selectively activate plausible relevant language regions in the control group? | No                                          |
| Are activations lateralized in the control data?                        | Somewhat                                    |
| Control activation notes                                                | Control data in Fridriksson et al. (2007); motor activations are prominent; there is some L frontal activation but little temporal activation in either hemisphere |
| Contrasts notes                                                         |                                             |

### Analyses

| Question                                                                 | Answer                                      |
|-------------------------------------------------------------------------|---------------------------------------------|
| Are the analyses clearly described?                                     | No* (moderate limitation) (see specific limitation(s) below) |

#### ROI analysis 1

| First level contrast | Picture naming vs viewing abstract pictures |
|----------------------|---------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T2 vs T1                             |
| Covariate            | Δ picture naming accuracy                    |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast?                  | Accuracy is covariate                        |
| Is reaction time matched across the second level contrast?             | Unknown, not reported                         |
| Behavioral data notes                                               |                                             |
| Type of analysis         | Regions of interest (ROI)                    |
| ROI type                | Other                                        |
| How many ROIs are there?                                             | 3                                           |
| What are the ROI(s)?                                                | (1) perilesional L hemisphere language regions; (2) perilesional L hemisphere non-language regions; (3) undamaged non-perilesional L hemisphere language regions |
| How are the ROI(s) defined?                                         | Based on individual lesions and control activation for picture naming |
| Correction for multiple comparisons                                  | No correction                               |
| Statistical details                                                 |                                             |
| Findings                                                            | Other                                       |
| Findings notes                                                      | Change in perilesional non-language regions positively correlated with improvement in accuracy |

#### ROI analysis 2

| First level contrast | Picture naming vs viewing abstract pictures |
|----------------------|---------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T2 vs T1                             |
| Covariate            | Δ (decrease in) semantic errors              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes |                                             |
| Type of analysis      | Regions of interest (ROI)                    |
| ROI analysis 3 |
|----------------|
| **First level contrast** | Picture naming vs viewing abstract pictures |
| **Analysis class** | Longitudinal correlation with language or other measure |
| **Group(s)** | Aphasia T2 vs T1 |
| **Covariate** | Δ (decrease in) phonological paraphasias |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | Other |
| **How many ROIs are there?** | 3 |
| **What are the ROI(s)?** | (1) perilesional L hemisphere language regions; (2) perilesional L hemisphere non-language regions; (3) undamaged non-perilesional L hemisphere language regions |
| **How are the ROI(s) defined?** | Based on individual lesions and control activation for picture naming |
| **Correction for multiple comparisons** | No correction |
| **Statistical details** | — |
| **Findings** | Other |
| **Findings notes** | Change in undamaged non-perilesional language regions negatively correlated with decrease in semantic errors |

| ROI analysis 4 |
|----------------|
| **First level contrast** | Picture naming vs viewing abstract pictures |
| **Analysis class** | Cross-sectional correlation with language or other measure |
| **Group(s)** | Aphasia T1 |
| **Covariate** | Subsequent Δ (T2 vs T1) picture naming accuracy |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Somewhat (T1 behavioral measure should be included in model) |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | Other |
| **How many ROIs are there?** | 3 |
| **What are the ROI(s)?** | (1) perilesional L hemisphere language regions; (2) perilesional L hemisphere non-language regions; (3) undamaged non-perilesional L hemisphere language regions |
| **How are the ROI(s) defined?** | Based on individual lesions and control activation for picture naming |
| **Correction for multiple comparisons** | No correction |
| **Statistical details** | — |
| **Findings** | Other |
| **Findings notes** | Change in perilesional language regions, and change in undamaged non-perilesional language regions, negatively correlated with decrease in phonological paraphasias |
### Findings notes

—

### ROI analysis 5

| First level contrast | Picture naming vs viewing abstract pictures |
|----------------------|---------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia T1 |
| Covariate            | Subsequent Δ (T2 vs T1, decrease in) semantic errors |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (T1 behavioral measure should be included in model) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

—

**Type of analysis**

Regions of interest (ROI)

**ROI type**

Other

**How many ROIs are there?**

3

**What are the ROI(s)?**

(1) perilesional L hemisphere language regions; (2) perilesional L hemisphere non-language regions; (3) undamaged non-perilesional L hemisphere language regions

**How are the ROI(s) defined?**

Based on individual lesions and control activation for picture naming

**Correction for multiple comparisons**

No correction

### Statistical details

**Findings**

Other

**Findings notes**

Change in perilesional language regions correlated with decrease in phonological paraphasias

### Notes

Excluded analyses

(1) breakdown of frontal, temporal and parietal components of masks, because stepwise regression not described in sufficient detail; (2) pASL rCBF predictors not task-based; (3) ancillary analyses based on total naming responses instead of accuracy; (4) ancillary analyses after excluding one patient
### Marcotte et al. (2012)

| **Reference** |
|----------------|
| **Authors** | Marcotte K, Adrover-Roig D, Damien B, de Préaumont M, Généreux S, Hubert M, Ansaldo AI |
| **Title** | Therapy-induced neuroplasticity in chronic aphasia |
| **Reference** | *Neuropsychologia* 2012; 50: 1776-1786 |
| **PMID** | 22564481 |
| **DOI** | 10.1016/j.neuropsychologia.2012.04.001 |

| **Participants** |
|-------------------|
| **Language** | Canadian French |
| **Inclusion criteria** | Moderate-severe aphasia; anomia |
| **Number of individuals with aphasia** | 9 |
| **Number of control participants** | 0 |
| **Were any of the participants included in any previous studies?** | No |
| **Is age reported for patients and controls, and matched?** | Yes (mean 62 ± 6.0 years, range 50-67 years) |
| **Is sex reported for patients and controls, and matched?** | Yes (males: 5; females: 4) |
| **Is handedness reported for patients and controls, and matched?** | Yes (right: 9; left: 0) |
| **Is time post stroke onset reported and appropriate to the study design?** | Yes (mean 110.2 ± 92.5 months, range 50-300 months) |
| **To what extent is the nature of aphasia characterized?** | Comprehensive battery |
| **Language evaluation** | Montreal-Toulouse Aphasia Battery, picture naming |
| **Aphasia severity** | Moderate-severe |
| **Aphasia type** | 7 Broca’s, 1 Broca’s + AoS, 1 Wernicke’s + AoS |
| **First stroke only?** | Yes |
| **Stroke type** | Not stated |
| **To what extent is the lesion distribution characterized?** | Lesion overlay |
| **Lesion extent** | Range 14.6-295.8 cc |
| **Lesion location** | L MCA |
| **Participants notes** | — |

| **Imaging** |
|----------------|
| **Modality** | fMRI |
| **Is the study cross-sectional or longitudinal?** | Longitudinal—chronic treatment |
| **If longitudinal, at what time point(s) were imaging data acquired?** | T1: pre-treatment/chronic; T2: post-treatment, 3-6 weeks later (after 80% performance on trained items, or 6 weeks) |
| **If longitudinal, was there any intervention between the time points?** | Semantic feature analysis, 1 hour/day, 3 days/week, 3-6 weeks |
| **Is the scanner described?** | Yes (Siemens Trio 3 Tesla) |
| **Is the timing of stimulus presentation and image acquisition clearly described and appropriate?** | No (total images acquired not stated) |
| **Design type** | Event-related |
| **Total images acquired** | not stated |
| **Are the imaging acquisition parameters, including coverage, adequately described and appropriate?** | Yes (whole brain) |
| **Is preprocessing and intrasubject coregistration adequately described and appropriate?** | Yes |
| **Is first level model fitting adequately described and appropriate?** | Yes |
| **Is intersubject normalization adequately described** | No (lesion impact not addressed) |
and appropriate?

Imaging notes —

Conditions

Are the conditions clearly described? Yes

| Condition                                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------------------------------------|---------------|-------------|-----------------------|---------------------------|
| picture naming (already known items)         | Word (overt)  | 20          | Yes                   | Yes                       |
| picture naming (trained items)               | Word (overt)  | 20          | No                    | No                        |
| picture naming (untrained items)             | Word (overt)  | 40          | No                    | No                        |
| viewing scrambled images and saying "baba"   | Word (overt)  | 20          | Yes                   | Yes                       |
| rest                                          | None          | Implicit baseline | N/A                   | N/A                       |

Conditions notes —

Contrasts

Are the contrasts clearly described? No (see specific limitation(s) below)

Contrast 1: picture naming (T1: known items; T2: trained items; correct trials) vs viewing scrambled images and saying "baba"

Language condition Picture naming (T1: known items; T2: trained items; correct trials)
Control condition Viewing scrambled images and saying "baba"
Are the conditions matched for visual demands? Yes
Are the conditions matched for auditory demands? Yes
Are the conditions matched for motor demands? Yes
Are the conditions matched for cognitive/executive demands? No
Is accuracy matched between the language and control tasks for all relevant groups? Yes, correct trials only
Is reaction time matched between the language and control tasks for all relevant groups? Unknown, not reported
Behavioral data notes —
Are control data reported in this paper or another that is referenced? No
Does the contrast selectively activate plausible relevant language regions in the control group? Unknown
Are activations lateralized in the control data? Unknown
Control activation notes —
Contrast notes Different contrasts at different time points not clearly explained

Contrast 2: picture naming (known items, correct trials) vs viewing scrambled images and saying "baba"

Language condition Picture naming (known items, correct trials)
Control condition Viewing scrambled images and saying "baba"
Are the conditions matched for visual demands? Yes
Are the conditions matched for auditory demands? Yes
Are the conditions matched for motor demands? Yes
Are the conditions matched for cognitive/executive demands? No
Is accuracy matched between the language and control tasks for all relevant groups? Yes, correct trials only
Is reaction time matched between the language and control tasks for all relevant groups? Unknown, not reported
Behavioral data notes —
Are control data reported in this paper or another that is referenced? No
| Question                                                                 | Answer                                      |
|-------------------------------------------------------------------------|---------------------------------------------|
| Does the contrast selectively activate plausible relevant language     | Unknown                                     |
| regions in the control group?                                            |                                             |
| Are activations lateralized in the control data?                        | Unknown                                     |
| Control activation notes                                                | —                                           |
| Contrast notes                                                          | Different contrasts at different time points not clearly explained |

Contrast 3: picture naming (trained items, correct trials) vs viewing scrambled images and saying "baba"

| Language condition                          | Picture naming (trained items, correct trials) |
| Control condition                           | Viewing scrambled images and saying "baba"    |
| Are the conditions matched for visual demands? | Yes                                      |
| Are the conditions matched for auditory demands? | Yes                                      |
| Are the conditions matched for motor demands? | Yes                                      |
| Are the conditions matched for cognitive/executive demands? | No                                      |
| Is accuracy matched between the language and control tasks for all relevant groups? | Yes, correct trials only |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |

Behavioral data notes

Are control data reported in this paper or another that is referenced? No

Does the contrast selectively activate plausible relevant language regions in the control group? Unknown

Contrast notes

Findings notes

Labels based on figures rather than text

Analyses

Are the analyses clearly described? No (see specific limitation(s) below)

Voxelwise analysis 1

First level contrast

Picture naming (T1: known items; T2: trained items; correct trials) vs viewing scrambled images and saying "baba"

Analysis class

Longitudinal change in aphasia

Group(s)

Aphasia T2 vs T1

Covariate

—

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes

Is accuracy matched across the second level contrast? Yes, correct trials only

Is reaction time matched across the second level contrast? Unknown, not reported

Behavioral data notes

—

Type of analysis

Voxelwise

Search volume

Whole brain

Correction for multiple comparisons

No direct comparison

Software

SPM5

Voxelwise p

—

Cluster extent

—

Statistical details

Qualitative comparison on p. 1780; different contrasts at different time points not clearly explained

Findings

† L supramarginal gyrus

‡ L dorsal precentral

¶ L posterior MTG

Findings notes

—
### Voxelwise analysis 2

| First level contrast | Picture naming (known items, correct trials) vs viewing scrambled images and saying "baba" |
|----------------------|------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                      |
| Group(s)             | Aphasia T1                                                                                     |
| Covariate            | Subsequent Δ (T2 vs T1) naming of trained items                                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | [Somewhat](T1 behavioral measure should be included in model) |
| Is accuracy matched across the second level contrast? | Yes, correct trials only                                                                       |
| Is reaction time matched across the second level contrast? | [Unknown](T2 activation not an appropriate measure of treatment-induced recovery because it reflects T2 performance) |
| Behavioral data notes| —                                                                                               |
| Type of analysis      | Voxelwise                                                                                      |
| Search volume         | Whole brain                                                                                    |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent                                      |
| Software              | SPM5                                                                                           |
| Voxelwise p           | .005                                                                                            |
| Cluster extent        | 10 voxels (size not stated)                                                                    |
| Statistical details   | Different contrasts at different time points not clearly explained                            |
| Findings              | ▲ L dorsolateral prefrontal cortex                                                               |
|                       | ▲ L SMA/medial prefrontal                                                                       |
|                       | ▲ L somato-motor                                                                                 |
|                       | ▲ L anterior cingulate                                                                           |
|                       | ▲ R dorsolateral prefrontal cortex                                                               |
|                       | ▲ R somato-motor                                                                                 |
|                       | ▲ R thalamus                                                                                    |
| Findings notes        | Labels based on figures and text                                                                |

### Voxelwise analysis 3

| First level contrast | Picture naming (trained items, correct trials) vs viewing scrambled images and saying "baba" |
|----------------------|------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                      |
| Group(s)             | Aphasia T2                                                                                     |
| Covariate            | Previous Δ (T2 vs T1) naming of trained items                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | [No](T2 activation not an appropriate measure of treatment-induced recovery because it reflects T2 performance) |
| Is accuracy matched across the second level contrast? | Yes, correct trials only                                                                       |
| Is reaction time matched across the second level contrast? | [Unknown](T2 activation not an appropriate measure of treatment-induced recovery because it reflects T2 performance) |
| Behavioral data notes| —                                                                                               |
| Type of analysis      | Voxelwise                                                                                      |
| Search volume         | Whole brain                                                                                    |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent                                      |
| Software              | SPM5                                                                                           |
| Voxelwise p           | .005                                                                                            |
| Cluster extent        | 10 voxels (size not stated)                                                                    |
| Statistical details   | Different contrasts at different time points not clearly explained                            |
| Findings              | ▲ L somato-motor                                                                                 |
| Findings notes        | Label based on figure                                                                           |

**Notes**

Excluded analyses: Individual analyses of participants with more and less successful recovery
**Schofield et al. (2012)**

### Reference

| Authors                  | Schofield TM, Penny WD, Stephan KE, Crinion JT, Thompson AJ, Price CJ, Leff AP |
|--------------------------|--------------------------------------------------------------------------------|
| Title                    | Changes in auditory feedback connections determine the severity of speech processing deficits after stroke |
| Reference                | J Neurosci 2012; 32: 4260-4270 |
| PMID                     | 22442088 |
| DOI                      | 10.1523/jneurosci.4670-11.2012 |

### Participants

| Language                  | UK English |
|---------------------------|------------|
| Inclusion criteria        | Comprehension deficit |
| Number of individuals with aphasia | 20 (plus 1 excluded: excessive head motion) |
| Number of control participants | 26 |
| Were any of the participants included in any previous studies? | Yes (patients recruited from database so may have participated in prior studies from this group, but not stated explicitly) |
| Is age reported for patients and controls, and matched? | Yes (range 35.8-90.3 years) |
| Is sex reported for patients and controls, and matched? | No (males: 16; females: 4; control sex not stated) |
| Is handedness reported for patients and controls, and matched? | No |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 3.5 years, range 0.6-8.6 years) |
| To what extent is the nature of aphasia characterized? | Severity only |
| Language evaluation       | CAT |
| Aphasia severity          | 11 patients (plus one excluded) had moderate comprehension impairments, 9 had severe comprehension impairments; this distribution was bimodal |
| Aphasia type              | Not stated |
| First stroke only?        | Yes |
| Stroke type               | Ischemic only |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent             | Range 24.2-403.6 cc |
| Lesion location           | L MCA |
| Participants notes        | Demographic data includes excluded patient |

### Imaging

| Modality                  | fMRI |
|---------------------------|------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Siemens Sonata 1.5 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type               | Block |
| Total images acquired     | 488 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (mostly whole brain but convexity or cerebellum excluded in some participants) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and | Yes |
Is intersubject normalization adequately described and appropriate? Yes

Imaging notes

Conditions

Are the conditions clearly described? Yes

| Condition                                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|------------------------------------------------|---------------|-------------|-----------------------|---------------------------|
| Listening to word pairs, speaker gender judgment | Button press  | 18          | Yes                   | Unknown                   |
| Listening to reversed word pairs, speaker gender judgment | Button press  | 18          | Yes                   | Unknown                   |
| Rest                                          | None          | 40 (?)      | N/A                   | N/A                       |

Conditions notes

Contrasts

Are the contrasts clearly described? Yes

Contrast 1: listening to word pairs or reversed word pairs, speaker gender judgment vs rest

| Language condition | Listening to word pairs or reversed word pairs, speaker gender judgment |
|--------------------|--------------------------------------------------------------------------|
| Control condition  | Rest                                                                     |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | No |
| Are activations lateralized in the control data? | No |
| Control activation notes | Control data in Leff et al. (2008); auditory contrast, not intended to be language contrast |
| Contrast notes | — |

Contrast 2: listening to word pairs, speaker gender judgment vs listening to reversed word pairs, speaker gender judgment

| Language condition | Listening to word pairs, speaker gender judgment |
|--------------------|--------------------------------------------------|
| Control condition  | Listening to reversed word pairs, speaker gender judgment |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes | Behavioral data not separated by condition |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible | Somewhat |

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relevant language regions in the control group? Yes
Are activations lateralized in the control data? Yes
Control activation notes Control data in Leff et al. (2008); L-lateralized activation of posterior STS
Contrast notes —

Analyses
Are the analyses clearly described? No** (major limitation) (see specific limitation(s) below)

Voxelwise analysis 1
First level contrast Listening to word pairs or reversed word pairs, speaker gender judgment vs rest
Analysis class Cross-sectional aphasia vs control
Group(s) Moderate aphasia (n = 11) vs control
Covariate —
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes
Is accuracy matched across the second level contrast? Unknown, not reported
Is reaction time matched across the second level contrast? Unknown, not reported
Behavioral data notes —
Type of analysis Voxelwise
Search volume Whole brain
Correction for multiple comparisons No correction
Software SPM8
Voxelwise p .001
Cluster extent None
Statistical details —
Findings ↓ L Heschl's gyrus
Findings notes Structurally, HG was not significantly damaged in this group

Voxelwise analysis 2
First level contrast Listening to word pairs or reversed word pairs, speaker gender judgment vs rest
Analysis class Cross-sectional aphasia vs control
Group(s) Severe aphasia (n = 9) vs control
Covariate —
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes
Is accuracy matched across the second level contrast? Unknown, not reported
Is reaction time matched across the second level contrast? Unknown, not reported
Behavioral data notes —
Type of analysis Voxelwise
Search volume Whole brain
Correction for multiple comparisons Mixed** (major limitation)
Software SPM8
Voxelwise p MGB: SVC; elsewhere: .001
Cluster extent None
Statistical details —
Findings ↓ L posterior STG ↓ L Heschl's gyrus ↓ L thalamus
Findings notes Specifically: PT, HG and MGB; structurally, the PT and HG were significantly damaged, but not the MGB

Voxelwise analysis 3
| First level contrast | Listening to word pairs or reversed word pairs, speaker gender judgment vs rest |
|---------------------|--------------------------------------------------------------------------------|
| Analysis class      | Cross-sectional between two groups with aphasia                               |
| Group(s)            | Severe (n = 9) vs moderate (n = 11) aphasia                                  |
| Covariate           | —                                                                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                                            |
| Type of analysis    | Voxelwise                                                                    |
| Search volume       | Whole brain                                                                  |
| Correction for multiple comparisons | No correction |
| Software            | SPM8                                                                          |
| Voxelwise p         | .001                                                                          |
| Cluster extent      | None                                                                          |
| Statistical details | —                                                                              |
| Findings            | ↓ L posterior STG                                                            |
| Findings notes      | Specifically, PT; structurally, severe patients had more damage in HG and PT |
| Notes               |                                                                                |
| Excluded analyses   | Intelligibility contrasts, because findings are unclear: statements of significance in the text do not match Table 5. DCM analyses (which are the main focus of the paper) |

### Wright et al. (2012)

#### Reference

| Authors            | Wright P, Stamatakis EA, Tyler LK                                           |
|--------------------|----------------------------------------------------------------------------|
| Title              | Differentiating hemispheric contributions to syntax and semantics in patients with left-hemisphere lesions |
| Reference          | J Neurosci 2012; 32: 8149-8157                                             |
| PMID               | 22699896                                                                     |
| DOI                | 10.1523/jneurosci.0485-12.2012                                              |

#### Participants

| Language          | UK English                                                                 |
|-------------------|-----------------------------------------------------------------------------|
| Inclusion criteria | —                                                                           |
| Number of individuals with aphasia | 21                                                                         |
| Number of control participants | 21                                                                           |
| Were any of the participants included in any previous studies? | Yes (unclear how many, if any, patients were included in previous studies from this group; design is identical to Tyler et al. (2010)) |
| Is age reported for patients and controls, and matched? | Yes (mean 57.4 ± 12.5 years)                                                 |
| Is sex reported for patients and controls, and matched? | Yes (males: 15; females: 6)                                                  |
| Is handedness reported for patients and controls, and matched? | Yes (right: 21; left: 0)                                                     |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 6.5 ± 7.5 years, > 1.4 years)                                      |
| To what extent is the nature of aphasia characterized? | Not at all                                                                  |
| Language evaluation | Sentence-picture matching                                                        |
### Aphasia

| Aphasia severity | Not stated |
|------------------|------------|
| Aphasia type      | Not stated |
| First stroke only? | Yes       |
| Stroke type       | Not stated |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent     | Not stated |
| Lesion location   | L MCA      |
| Participants notes | 3 of the 21 patients were not stroke, but were post resective surgery |

### Imaging

| Modality          | fMRI        |
|-------------------|-------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Siemens Trio 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (there was only one block per condition per run, so condition could be confounded with low frequency drift; also, the length of the sentences is not stated so it is unclear how well the HRF peak aligns with the sparse acquisitions) |
| Design type       | Block       |
| Total images acquired | 69 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes     | sparse sampling |

### Conditions

| Condition                                             | Response type | Repetitions | All groups could do? | All individuals could do? |
|-------------------------------------------------------|---------------|-------------|----------------------|---------------------------|
| listening to normal sentences and detecting a target word | Button press  | 2           | Yes                  | Yes                       |
| listening to grammatical but meaningless sentences and detecting a target word | Button press  | 2           | Yes                  | Yes                       |
| listening to scrambled sentences and detecting a target word | Button press  | 2           | Yes                  | Yes                       |
| listening to "musical rain" and detecting a period of white noise | Button press  | 2           | Yes                  | Yes                       |
| rest                                                  | None          | 2           | N/A                  | N/A                       |

### Conditions notes

Auditory presentation; target detection task with early and late targets; 12-15 trials per block with single sparse acquisition each, but only one block of each condition per run, in fixed order

### Contrasts

| Are the contrasts clearly described? | Yes |
|-------------------------------------|-----|

**Contrast 1: listening to normal sentences and detecting a target word vs rest**

| Language condition | Listening to normal sentences and detecting a target word |
|--------------------|---------------------------------------------------------|
| Control condition       | Rest              |
|------------------------|-------------------|
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes  | —                |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | No |
| Are activations lateralized in the control data? | No |
| Control activation notes | Bilateral superior temporal, sensorimotor and visual |
| Contrast notes          | —                |

Contrast 2: listening to grammatical but meaningless sentences and detecting a target word vs rest

| Language condition | Listening to grammatical but meaningless sentences and detecting a target word vs rest |
|--------------------|--------------------------------------------------------------------------------------|
| Control condition  | Rest                                                                                  |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes  | —                                      |
| Are control data reported in this paper or another that is referenced? | No |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data? | Unknown |
| Control activation notes | —                                   |
| Contrast notes          | —                                      |

Analyses

| Are the analyses clearly described? | Yes |

Voxelwise analysis 1

| First level contrast            | Listening to normal sentences and detecting a target word vs rest |
|---------------------------------|------------------------------------------------------------------|
| Analysis class                  | Cross-sectional aphasia vs control                               |
| Group(s)                        | Aphasia vs control                                              |
| Covariate                       | —                                                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes           | —                                                                |
| Type of analysis                | Voxelwise                                                        |
| Search volume       | Whole brain |
|---------------------|-------------|
| Correction for multiple comparisons | No correction |
| Software            | SPM5        |
| Voxelwise p         | .01         |
| Cluster extent      | —           |
| Statistical details | —           |
| Findings            | ↓ L posterior STG/STS/MTG |
|                     | ↓ L Heschl's gyrus |
|                     | ↓ L mid temporal |
| Findings notes      | At a more stringent threshold of p < .001, with correction for multiple comparisons based on GRFT and cluster extent, only L HG showed reduced activity in patients |

### Complex analysis 1

| First level contrast | Listening to normal sentences and detecting a target word vs rest |
|----------------------|---------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                                                      |
| Covariate            | See statistical details                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                            |
| Type of analysis     | Complex                                                      |
| Statistical details  | Joint ICA was performed on structural and functional contrast images for each of the two contrasts using FIT 2.0b. Seven components were derived, of which 2 were further investigated since their loadings correlated with relevant behavioral measures. Functional components were thresholded at p < .001, cluster-corrected for multiple comparisons, minimum cluster extent = 1.27 cc. Component 1 was considered a "semantics component" because it correlated with the semantic behavioral measure and not with either of the two syntactic measures. This component did not have any anatomical aspect to it. Component 2 was considered a "syntax component" because it correlated with both syntactic behavioral measures and not with the semantic measure. This conceptualization seems somewhat speculative, given that WPE NP and WPE AP are rather indirect measures of syntactic and semantic processing. Component 2 involved damage to left frontal and insular cortex, and underlying dorsal white matter. |
| Findings             | Other                                                        |
| Findings notes       | Contrast 1 loaded primarily on the R STG for component 1 (the "semantics component") and on the L ITG for component 2 (the "syntax component"). |

### Complex analysis 2

| First level contrast | Listening to grammatical but meaningless sentences and detecting a target word vs rest |
|----------------------|-------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                          |
| Group(s)             | Aphasia                                                                              |
| Covariate            | See statistical details                                                               |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                                                    |
| Type of analysis     | Complex                                                                              |
| Statistical details  | Joint ICA was performed on structural and functional contrast images for each of the two contrasts using FIT 2.0b. Seven components were derived, of which 2 were further investigated since their loadings correlated with relevant behavioral measures. Functional components were thresholded at p < .001, cluster-corrected for multiple comparisons, minimum cluster extent = 1.27 cc. Component 1 was considered a "semantics component" because it correlated with the semantic behavioral measure and not with either of the two syntactic measures. This component did not have any anatomical aspect to it. Component 2 was considered a "syntax component" because it correlated with both syntactic behavioral measures and not with the semantic measure. This conceptualization seems somewhat speculative, given that WPE NP and WPE AP are rather indirect measures of syntactic and semantic processing. Component 2 involved damage to left frontal and insular cortex, and underlying dorsal white matter. |
components were thresholded at p < .001, cluster-corrected for multiple comparisons, minimum cluster extent = 1.27 cc. Component 1 was considered a "semantics component" because it correlated with the semantic behavioral measure and not with either of the two syntactic measures. This component did not have any anatomical aspect to it. Component 2 was considered a "syntax component" because it correlated with both syntactic behavioral measures and not with the semantic measure. This conceptualization seems somewhat speculative, given that WPE NP and WPE AP are rather indirect measures of syntactic and semantic processing. Component 2 involved damage to left frontal and insular cortex, and underlying dorsal white matter.

Findings

Notes

Excluded analyses —

Szaflarski et al. (2013)

Reference

Authors Szaflarski JP, Allendorfer JB, Banks C, Vannest J, Holland SK
Title Recovered vs. not-recovered from post-stroke aphasia: the contributions from the dominant and non-dominant hemispheres
Reference Restor Neurol Neurosci 2013; 31: 347-360
PMID 23482065
DOI 10.3233/rnn-120267

Participants

Language US English
Inclusion criteria —
Number of individuals with aphasia 27
Number of control participants 0
Were any of the participants included in any previous studies? No
Is age reported for patients and controls, and matched? Yes (recovered: mean 50 ± 13 years; non-recovered: mean 51 ± 13 years)
Is sex reported for patients and controls, and matched? Yes (males: 15; females: 12)
Is handedness reported for patients and controls, and matched? Yes (right: 27; left: 0)
Is time post stroke onset reported and appropriate to the study design? Yes (recovered: mean 2.1 ± 2.1 years; non-recovered: mean 4.9 ± 3.1 years)
To what extent is the nature of aphasia characterized? Severity only
Language evaluation TT, BNT, semantic fluency, phonemic fluency, PPVT, complex ideation subtest of BDAE
Aphasia severity Recovered: TT mean 43 ± 1, ≥ 41; non-recovered: TT mean 23 ± 12, < 41
Aphasia type Not stated
First stroke only? Not stated
Stroke type Not stated
To what extent is the lesion distribution characterized? Lesion overlay
Lesion extent Recovered: median 9.2 cc, range 2.2-26.5 cc; non-recovered: median 74 cc, range 5.1-206.0 cc
Lesion location L MCA
Participants notes —
### Imaging

| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Modality                                                               | fMRI                                                                   |
| Is the study cross-sectional or longitudinal?                         | Cross-sectional                                                       |
| If longitudinal, at what time points were imaging data acquired?      | —                                                                     |
| If longitudinal, was there any intervention between the time points?  | —                                                                     |
| Is the scanner described?                                              | No (Phillips 3 Tesla; model not stated)                                 |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes                                                                     |
| Design type                                                            | Block                                                                  |
| Total images acquired                                                  | 330                                                                    |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)                                                     |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes                                                                 |
| Is first level model fitting adequately described and appropriate?     | Yes                                                                   |
| Is intersubject normalization adequately described and appropriate?    | Yes                                                                   |
| Imaging notes                                                          | —                                                                     |

### Conditions

| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Are the conditions clearly described?                                  | Yes                                                                    |

| Condition          | Response type | Repetitions | All groups could do? | All individuals could do? |
|--------------------|---------------|-------------|----------------------|--------------------------|
| semantic decision  | Button press  | 10          | No                   | No                       |
| tone decision      | Button press  | 12          | No                   | No                       |

### Contrasts

| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Are the contrasts clearly described?                                   | Yes                                                                    |

**Contrast 1: semantic decision vs tone decision**

| Language condition | Semantic decision |
|--------------------|-------------------|
| Control condition  | Tone decision     |
| Are the conditions matched for visual demands?                        | Yes                                                          |
| Are the conditions matched for auditory demands?                     | Yes                                                          |
| Are the conditions matched for motor demands?                        | Yes                                                          |
| Are the conditions matched for cognitive/executive demands?          | Yes                                                          |
| Is accuracy matched between the language and control tasks for all relevant groups? | **Appear mismatched** |
| Is reaction time matched between the language and control tasks for all relevant groups? | **Unknown, not reported** |

| Behavioral data notes | Accuracy appears similar in the non-recovered group, but not in the recovered group |
|-----------------------|-----------------------------------------------------------------------------|
| Are control data reported in this paper or another that is referenced? | Yes                                                                           |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes                                                                           |
| Are activations lateralized in the control data?                      | Yes                                                                           |
| Control activation notes   | Control data in Kim et al. (2011) and Szafarski et al. (2008); L frontal and temporal, plus other semantic regions |

### Contrast notes

—
## Analyses

Are the analyses clearly described? | Yes
--- | ---

### Voxelwise analysis 1

| First level contrast | Semantic decision vs tone decision |
| Analysis class | Cross-sectional between two groups with aphasia |
| Group(s) | Aphasia not recovered (n = 18) vs recovered (n = 9) |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

Interaction of group by condition not reported; non-recovered patients were significantly less accurate only on the semantic decision condition, but they actually showed a smaller difference between conditions than the recovered patients.

**Type of analysis** | Voxelwise |
| Search volume | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on 3dClustSim |
| Software | AFNI |
| Voxelwise p | .05 |
| Cluster extent | 4.16 cc |
| Statistical details | Cluster-defining threshold (CDT) p < 0.05 too lenient |

**Findings**

| | ↑ L dorsolateral prefrontal cortex | ↑ L superior parietal | ↑ L cerebellum | ↑ R cerebellum | ↓ R posterior STG |
| --- | --- | --- | --- | --- | --- |

**Findings notes**

—

### ROI analysis 1

| First level contrast | Semantic decision vs tone decision |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia (recovered and non-recovered) |
| Covariate | BNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

—

**Type of analysis** | Regions of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 4 |
| What are the ROI(s)? | (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus |
| How are the ROI(s) defined? | Regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs |
| Correction for multiple comparisons | Familywise error (FWE) |
| Statistical details | Circular because defined based on recovered status |

**Findings**

| | ↑ L dorsolateral prefrontal cortex |
| --- | --- |

**Findings notes**

—

### ROI analysis 2

| First level contrast | Semantic decision vs tone decision |
| Analysis class                        | Cross-sectional correlation with language or other measure |
|--------------------------------------|------------------------------------------------------------|
| Group(s)                             | Aphasia (recovered and non-recovered)                      |
| Covariate                            | Semantic fluency                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                        |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                     |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                     |
| Behavioral data notes                |                                                            |
| Type of analysis                     | Regions of interest (ROI)                                 |
| ROI type                             | Functional                                                |
| How many ROIs are there?             | 4                                                         |
| What are the ROI(s)?                 | (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus |
| How are the ROI(s) defined?          | Regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs |
| Correction for multiple comparisons  | Familywise error (FWE)                                    |
| Statistical details                  | Circular because defined based on recovered status         |
| Findings                             | ✡ L dorsolateral prefrontal cortex                        |
| Findings notes                       |                                                            |

**ROI analysis 3**

| First level contrast                  | Semantic decision vs tone decision                         |
| Analysis class                        | Cross-sectional correlation with language or other measure |
| Group(s)                              | Aphasia (recovered and non-recovered)                      |
| Covariate                             | Single word comprehension (PPVT)                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                        |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                     |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                     |
| Behavioral data notes                 |                                                            |
| Type of analysis                      | Regions of interest (ROI)                                 |
| ROI type                              | Functional                                                |
| How many ROIs are there?              | 4                                                         |
| What are the ROI(s)?                  | (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus |
| How are the ROI(s) defined?           | Regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs |
| Correction for multiple comparisons   | Familywise error (FWE)                                    |
| Statistical details                   | Circular because defined based on recovered status         |
| Findings                              | ✡ L dorsolateral prefrontal cortex                        |
| Findings notes                        |                                                            |

**ROI analysis 4**

| First level contrast                  | Semantic decision vs tone decision                         |
| Analysis class                        | Cross-sectional correlation with language or other measure |
| Group(s)                              | Aphasia (recovered and non-recovered)                      |
| Covariate                             | BDAE complex ideation subtest                             |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                        |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                     |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                     |
### ROI analysis 5

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia (recovered and non-recovered) |
| Covariate            | Phonemic fluency |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

| Type of analysis | Regions of interest (ROI) |
| ROI type         | Functional |
| How many ROIs are there? | 4 |
| What are the ROI(s)? | (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus |
| How are the ROI(s) defined? | Regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs |
| Correction for multiple comparisons | Familywise error (FWE) |
| Statistical details | Circular because defined based on recovered status |
| Findings | ↑ L dorsolateral prefrontal cortex |
| Findings notes | — |

### ROI analysis 6

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia (recovered and non-recovered) |
| Covariate            | Semantic decision accuracy |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

| Type of analysis | Regions of interest (ROI) |
| ROI type         | Functional |
| How many ROIs are there? | 4 |
| What are the ROI(s)? | (1) bilateral cerebellum; (2) R pSTG; (3) L superior parietal lobule; (4) L superior frontal gyrus |
| How are the ROI(s) defined? | Regions that were differentially recruited between recovered and non-recovered patients; average t scores from individual SPMs |
| Correction for multiple comparisons | Familywise error (FWE) |
| Statistical details | Circular because defined based on recovered status |
### Thiel et al. (2013)

**Reference**

| Authors | Thiel A, Hartmann A, Rubi-Fessen I, Anglade C, Kracht L, Weiduschat N, Kessler J, Rommel T, Heiss WD |
| Title | Effects of noninvasive brain stimulation on language networks and recovery in early poststroke aphasia |
| Reference | *Stroke* 2013; 44: 2240-2246 |
| PMID | 23813984 |
| DOI | 10.1161/strokeaha.111.000574 |

**Participants**

| Language | German |
| Number of individuals with aphasia | 24 (plus 6 excluded: 4 did not tolerate MRI or PET scans; 2 TMS device was defective) |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (rTMS group: mean 69.8 ± 8.0 years; sham group: mean 71.2 ± 7.8 years) |
| Is sex reported for patients and controls, and matched? | No |
| Is handedness reported for patients and controls, and matched? | Yes (right: 24; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (rTMS group: mean 37.5 ± 18.5 days; sham group: mean 50.6 ± 22.6 days) |
| To what extent is the nature of aphasia characterized? | Severity and type |
| Language evaluation | AAT |
| Aphasia severity | T1: rTMS group: AAT sum of scores mean 251.5 ± 32.4; sham group: mean 251.1 ± 39.5; T2 not stated |
| Aphasia type | T1: rTMS group: 7 Wernicke's, 3 amnestic, 2 global, 1 Broca's; sham group: 5 Wernicke's, 3 Broca's, 2 global, 1 amnestic; T2: not stated |
| First stroke only? | Yes |
| Stroke type | Ischemic only |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent | RTMS group: 233 ± 197 cc; sham group: 244 ± 243 cc; lesion extent in images appears much smaller than the stated volumes |
| Lesion location | L MCA |
| Participants notes | — |

**Imaging**

| Modality | PET (rCBF) |
| Is the study cross-sectional or longitudinal? | Longitudinal—mixed |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/subacute (rTMS group: mean 37.5 ± 18.5 days post onset; sham group: mean 50.6 ± 22.6 days post onset); T2 post-treatment, ~2.5 weeks later |
If longitudinal, was there any intervention between the time points? | RTMS group: inhibitory rTMS over the R IFG pars triangularis + SLT for 45 minutes/day, 5 days/week, 2 weeks; control group: sham TMS + SLT
---|---
Is the scanner described? | Yes (CTI-Siemens ECAT EXACT HR)
Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes
Design type | PET
Total images acquired | 8
Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)
Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes
Is first level model fitting adequately described and appropriate? | Yes
Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed)
Imaging notes | —

### Conditions

Are the conditions clearly described? | Yes

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|--------------------------|
| verb generation | Word (overt) | 4 | Unknown | Unknown |
| rest | None | 4 | N/A | N/A |

Conditions notes | —

### Contrasts

Are the contrasts clearly described? | Yes

**Contrast 1: verb generation vs rest**

| Language condition | Verb generation | Rest |
|-------------------|-----------------|------|
| Control condition | Verb generation | Rest |
| Are the conditions matched for visual demands? | Yes | |
| Are the conditions matched for auditory demands? | No | |
| Are the conditions matched for motor demands? | No | |
| Are the conditions matched for cognitive/executive demands? | No | |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable | |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable | |
| Behavioral data notes | — | |
| Are control data reported in this paper or another that is referenced? | Somewhat | |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown | |
| Are activations lateralized in the control data? | Unknown | |
| Control activation notes | Cites Weiduschat et al. (2011) which in turn cites Herholz et al. (1996) which provides some minimal control data | |
| Contrast notes | — | |

### Analyses

Are the analyses clearly described? | Yes

**Voxelwise analysis 1**

| First level contrast | Verb generation vs rest |
### Analysis class
Longitudinal between two groups with aphasia

### Group(s)
(Aphasia with rTMS (n = 13) T2 vs T1) vs (aphasia with sham (n = 11) T2 vs T1)

### Covariate
—

### Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?
Yes

### Is accuracy matched across the second level contrast?
Unknown, not reported

### Is reaction time matched across the second level contrast?
Unknown, not reported

### Behavioral data notes
—

### Type of analysis
Voxelwise

### Search volume
Whole brain

### Correction for multiple comparisons
No direct comparison

### Software
SPM8

### Voxelwise p
—

### Cluster extent
—

### Statistical details
Qualitative comparison on p. 2244

### Findings
|   |   |
|---|---|
| ↑ | L IFG |
| ↑ | L posterior STG/STS/MTG |
| ↓ | R IFG |
| ↓ | R posterior STG/STS/MTG |

### Findings notes
Approximate interpretation of qualitative patterns shown in Figure 3; T1 R lateralization surprising relative to other findings from this group

### ROI analysis 1

#### First level contrast
Verb generation vs rest

#### Analysis class
Longitudinal between two groups with aphasia

#### Group(s)
(Aphasia with rTMS (n = 13) T2 vs T1) vs (aphasia with sham (n = 11) T2 vs T1)

#### Covariate
—

#### Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?
Yes

#### Is accuracy matched across the second level contrast?
Unknown, not reported

#### Is reaction time matched across the second level contrast?
Unknown, not reported

#### Behavioral data notes
—

#### Type of analysis
Region of interest (ROI)

#### ROI type
Laterality indices

#### How many ROIs are there?
1

#### What are the ROI(s)?
Language network LI

#### How are the ROI(s) defined?
Language network LI

#### Correction for multiple comparisons
One only

#### Statistical details
Actual LIs are not reported, only change in LI

#### Findings
↑ LI (language network)

#### Findings notes
T1 R lateralization surprising relative to other findings from this group

### ROI analysis 2

#### First level contrast
Verb generation vs rest

#### Analysis class
Longitudinal correlation with language or other measure

#### Group(s)
Aphasia T2 vs T1

#### Covariate
Δ AAT total score

#### Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?
Yes

#### Is accuracy matched across the second level contrast?
Unknown, not reported

#### Is reaction time matched across the second level contrast?
Unknown, not reported
| Behavioral data notes | — |
|-----------------------|----------------|
| Type of analysis      | Region of interest (ROI) |
| ROI type              | Laterality indices |
| How many ROIs are there? | 1 |
| What are the ROI(s)?  | Language network LI |
| How are the ROI(s) defined? | One only |
| Correction for multiple comparisons | Model did not include treatment group (rTMS vs sham) |
| Statistical details   | Model did not include treatment group (rTMS vs sham) |
| Findings              | ↑ LI (language network) |
| Findings notes        | Patients who improved more showed a greater leftward shift of activation; T1 R lateralization surprising relative to other findings from this group |

**Notes**

**Excluded analyses**

| Abel et al. (2014) |
|-------------------|
| **Reference**     | Abel S, Weiller C, Huber W, Willmes K |
| **Title**         | Neural underpinnings for model-oriented therapy of aphasic word production |
| **Reference**     | Neuropsychologia 2014; 57: 154-165 |
| **PMID**          | 24686092 |
| **DOI**           | 10.1016/j.neuropsychologia.2014.03.010 |

**Participants**

| Language | German |
| Inclusion criteria | Anomia; no severe AoS or dysarthria |
| Number of individuals with aphasia | 14 (plus 9 excluded: 4 for ceiling performance; 5 for technical problems) |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (median 48 years, range 35-74 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 10; females: 4) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 14; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (median 41 months, range 11-72 months) |
| To what extent is the nature of aphasia characterized? | Type only |
| Language evaluation | AAT |
| Aphasia severity | Not stated |
| Aphasia type | 8 Broca's, 3 Wernicke's, 1 fluent non-classifiable, 1 global, 1 transcortical sensory |
| First stroke only? | Yes |
| Stroke type | Mixed etiologies |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Not stated |
| Lesion location | L MCA; 2 also had ACA |
| Participants notes | — |
### Imaging

| Question                                                                 | Answer                                                                 |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| Modality                                                                | fMRI                                                                   |
| Is the study cross-sectional or longitudinal?                           | Longitudinal—chronic treatment                                          |
| If longitudinal, at what time point(s) were imaging data acquired?     | T1: pre-treatment/chronic; T2: post-treatment, ~6 weeks later (labeled T2 and T3 in paper) |
| If longitudinal, was there any intervention between the time points?    | Lexical therapy, alternating between weeks with phonological and semantic treatment, 4 weeks; 60 out of the 132 items were trained |
| Is the scanner described?                                               | Yes (Philips Achieva 3 Tesla)                                           |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (trials too close together (~8 s) and insufficient jitter (1-3 s) for event-related design) |
| Design type                                                             | Event-related                                                          |
| Total images acquired                                                   | 560                                                                    |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes                                                                     |
| Is first level model fitting adequately described and appropriate?      | Yes                                                                    |
| Is intersubject normalization adequately described and appropriate?     | No (lesion impact not addressed)                                       |
| Imaging notes                                                           | —                                                                      |

### Conditions

| Condition                                                                 | Response type  | Repetitions | All groups could do? | All individuals could do? |
|--------------------------------------------------------------------------|----------------|-------------|-----------------------|---------------------------|
| picture naming (semantic trained items)                                  | Word (overt)   | 30          | Yes                   | Unknown                   |
| picture naming (phonological trained items)                             | Word (overt)   | 30          | Yes                   | Unknown                   |
| picture naming (untrained items)                                        | Word (overt)   | 30          | Yes                   | Unknown                   |
| picture naming (already known items)                                    | Word (overt)   | 42          | Yes                   | Unknown                   |
| rest                                                                     | None           | implicit baseline | N/A                     | N/A                       |

### Contrasts

| Contrasts                                                                 | Answer                                                                 |
|--------------------------------------------------------------------------|------------------------------------------------------------------------|
| Contrast 1: picture naming (all conditions) vs rest                      |                                                                        |
| Language condition                                                      | Picture naming (all conditions)                                        |
| Control condition                                                       | Rest                                                                   |
| Are the conditions matched for visual demands?                          | No                                                                     |
| Are the conditions matched for auditory demands?                        | No                                                                     |
| Are the conditions matched for motor demands?                           | No                                                                     |
| Are the conditions matched for cognitive/executive demands?             | No                                                                     |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                               |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                               |
| Behavioral data notes                                                   | —                                                                      |
| Are control data reported in this paper or another that is referenced?  | No                                                                     |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                                                               |
| Are activations lateralized in the control data?                        | Unknown                                                               |
Control activation notes

- But see control data reported in a subsequent paper (Abel et al., 2015)

Contrast notes

Contrast 2: picture naming (trained items) vs picture naming (untrained items)

| Language condition | Picture naming (trained items) |
|---------------------|--------------------------------|
| Control condition   | Picture naming (untrained items) |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | No, different |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |

Behavioral data notes

- Are control data reported in this paper or another that is referenced? No
- Does the contrast selectively activate plausible relevant language regions in the control group? Unknown
- Are activations lateralized in the control data? Unknown

Contrast notes

Contrast 3: picture naming (semantic trained items) vs picture naming (phonological trained items)

| Language condition | Picture naming (semantic trained items) |
|---------------------|----------------------------------------|
| Control condition   | Picture naming (phonological trained items) |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | Yes, matched |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |

Behavioral data notes

- Are control data reported in this paper or another that is referenced? No
- Does the contrast selectively activate plausible relevant language regions in the control group? Unknown
- Are activations lateralized in the control data? Unknown

Contrast notes

Analyses

- Are the analyses clearly described? Yes

Voxelwise analysis 1

| First level contrast | Picture naming (all conditions) vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia T1 |
| Covariate            | Subsequent Δ (T2 vs T1) picture naming |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (T1 behavioral measure should be included in model) |
Is accuracy matched across the second level contrast? | Accuracy is covariate
---|---
Is reaction time matched across the second level contrast? | Unknown, not reported
Behavioral data notes | —
Type of analysis | Voxelwise
Search volume | Whole brain
Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta
Software | SPM8
Voxelwise p | .01
Cluster extent | 11 voxels (size not stated)
Statistical details | —
Findings | ↑ L IFG pars opercularis
          | ↓ R basal ganglia
Findings notes | —

**Voxelwise analysis 2**

| First level contrast | Picture naming (all conditions) vs rest
| Analysis class | Longitudinal correlation with language or other measure
| Group(s) | Aphasia T2 vs T1
| Covariate | Δ picture naming accuracy
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes
| Is accuracy matched across the second level contrast? | Accuracy is covariate
| Is reaction time matched across the second level contrast? | Unknown, not reported
Behavioral data notes | —
Type of analysis | Voxelwise
Search volume | Whole brain
Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta
Software | SPM8
Voxelwise p | .01
Cluster extent | 11 voxels (size not stated)
Statistical details | —
Findings | ↑ L somato-motor
          | ↑ L inferior parietal lobule
          | ↑ L supramarginal gyrus
          | ↑ L posterior STS
          | ↑ L posterior MTG
          | ↑ L occipital
Findings notes | —

**Voxelwise analysis 3**

| First level contrast | Picture naming (trained items) vs picture naming (untrained items)
| Analysis class | Longitudinal change in aphasia
| Group(s) | Aphasia T2 vs T1
| Covariate | —
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes
| Is accuracy matched across the second level contrast? | No, different
| Is reaction time matched across the second level contrast? | Unknown, not reported
Behavioral data notes | Trained items improved more than untrained items
Type of analysis | Voxelwise
### Voxelwise analysis 4

| Search volume       | Whole brain                                                                 |
|---------------------|------------------------------------------------------------------------------|
| Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta                      |
| Software            | SPM8                                                                         |
| Voxelwise p         | .01                                                                          |
| Cluster extent      | 11 voxels (size not stated)                                                  |
| Statistical details |                                                                              |
| Findings            | ↑ L precuneus, ↑ L posterior STG, ↑ L Heschl's gyrus, ↑ L mid temporal, ↑ L posterior cingulate, ↑ L thalamus, ↑ R ventral precentral/inferior frontal junction, ↑ R somato-motor, ↑ R Heschl's gyrus, ↑ R posterior cingulate, ↑ R thalamus, ↑ R basal ganglia |
| Findings notes      |                                                                              |

### Voxelwise analysis 5

| Search volume       | Whole brain                                                                 |
|---------------------|------------------------------------------------------------------------------|
| Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta                      |
| Software            | SPM8                                                                         |
| Voxelwise p         | .01                                                                          |
| Cluster extent      | 11 voxels (size not stated)                                                  |
| Statistical details |                                                                              |
| Findings            | ↓ R superior parietal, ↓ L dorsolateral prefrontal cortex, ↓ L somato-motor, ↓ L occipital, ↓ L anterior cingulate, ↓ L posterior cingulate, ↓ R precuneus, ↓ R occipital, ↓ R anterior cingulate, ↓ R posterior cingulate, ↓ R hippocampus/MTL |
| Findings notes      |                                                                              |
| Question                                                                 | Answer                                      |
|------------------------------------------------------------------------|---------------------------------------------|
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                         |
| Is accuracy matched across the second level contrast?                  | Unknown, not reported                        |
| Is reaction time matched across the second level contrast?             | Unknown, not reported                        |

**Behavioral data notes**

- Type of analysis: Voxelwise
- Search volume: Whole brain
- Correction for multiple comparisons: Clusterwise correction based on cluster_threshold_beta
- Software: SPM8
- Voxelwise p: .01
- Cluster extent: 11 voxels (size not stated)
- Statistical details: —
- Findings:
  - ↑ R IFG pars triangularis
  - ↑ R dorsolateral prefrontal cortex
  - ↑ L thalamus
  - ↑ L basal ganglia
  - ↑ R somato-motor
  - ↓ L IFG pars opercularis

**Voxelwise analysis 6**

First level contrast: Picture naming (all conditions) vs rest

Analysis class: Longitudinal between two groups with aphasia

Group(s):
- Aphasia with semantic impairment (n = 8) T2 vs T1
- Aphasia with phonological impairment (n = 6) T2 vs T1

Covariate: —

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes

Is accuracy matched across the second level contrast? No, different

Is reaction time matched across the second level contrast? Unknown, not reported

Behavioral data notes: Phonological patients showed more improvement on trained items

Type of analysis: Voxelwise

Search volume: Whole brain

Correction for multiple comparisons: Clusterwise correction based on cluster_threshold_beta

Software: SPM8

Voxelwise p: .01

Cluster extent: 11 voxels (size not stated)

Statistical details: —

Findings:
- ↑ L somato-motor
- ↑ L Heschl's gyrus
- ↑ L anterior temporal
- ↑ L occipital
- ↑ L thalamus
- ↑ L basal ganglia
- ↑ R somato-motor
- ↓ L IFG pars opercularis

Findings notes: —

**Voxelwise analysis 7**

First level contrast: Picture naming (all conditions) vs rest

Analysis class: Longitudinal change in aphasia

Group(s): Aphasia with semantic impairment (n = 8) T2 vs T1

Covariate: —

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes

Is accuracy matched across the second level contrast? No, different
contrast? Is reaction time matched across the second level contrast? 

Behavioral data notes  
Type of analysis  
Voxelwise  
Search volume  
Whole brain  
Correction for multiple comparisons 
Clusterwise correction based on cluster_threshold.beta  
Software  
SPM8  
Voxelwise p  
.01  
Cluster extent  
11 voxels (size not stated)  
Statistical details  
—  
Findings  
↑ L basal ganglia  
Findings notes  
—  

Voxelwise analysis 8  
First level contrast  
Picture naming (all conditions) vs rest  
Analysis class  
Longitudinal change in aphasia  
Group(s)  
Aphasia with phonological impairment (n = 6) T2 vs T1  
Covariate  
—  
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?  
Yes  
Is accuracy matched across the second level contrast?  
No, different  
Is reaction time matched across the second level contrast?  
Unknown, not reported  
Behavioral data notes  
—  
Type of analysis  
Voxelwise  
Search volume  
Whole brain  
Correction for multiple comparisons  
Clusterwise correction based on cluster_threshold.beta  
Software  
SPM8  
Voxelwise p  
.01  
Cluster extent  
11 voxels (size not stated)  
Statistical details  
—  
Findings  
—  
Findings notes  
—  

Notes  
Excluded analyses  
—  

Benjamin et al. (2014)  

Reference  
Authors  
Benjamin ML, Towler S, Garcia A, Park H, Sudhyadhom A, Harnish SM, McGregor KM, Zlatar Z, Reilly JJ, Rosenbek JC, Gonzalez LJ, Crosson B  
Title  
A behavioral manipulation engages right frontal cortex during aphasia therapy  
Reference  
Neurorehabil Neural Repair 2014; 28: 545-553  
PMID  
24407914  
DOI  
10.1177/1545968313517754  

Participants  
Language  
US English  
Inclusion criteria  
"at least minimal evidence of non-fluent output"; lesion including precentral gyrus or
Number of individuals with aphasia | 14
Number of control participants | 0
Were any of the participants included in any previous studies? | No
Is age reported for patients and controls, and matched? | Yes (intention group: mean 72.1 ± 10.5 years; control group: mean 63.0 ± 9.2 years)
Is sex reported for patients and controls, and matched? | Yes (males: 8; females: 6)
Is handedness reported for patients and controls, and matched? | Yes (right: 14; left: 0)
Is time post stroke onset reported and appropriate to the study design? | Yes (intention group: mean 37.4 ± 33.5 months, range 12-87 months; control group: 38.1 ± 37.4 months, range 10-112 months)
To what extent is the nature of aphasia characterized? | Severity and type

Language evaluation | WAB, BNT, PPVT
Aphasia severity | Intention group: AQ mean 65.5 ± 8.3; control group: AQ mean 71.9 ± 11.9
Aphasia type | Intention group: 4 conduction, 2 Broca’s, 1 anomic; control group: 4 anomic, 1 Broca’s, 1 conduction, 1 transcortical motor
First stroke only? | No
Stroke type | Mixed etiologies
To what extent is the lesion distribution characterized? | Lesion overlay
Lesion extent | Not stated
Lesion location | L MCA, extending frontally at least into the precentral gyrus or underlying white matter

Imaging

| Modality | fMRI
Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment
If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment; T3: 3 months after the end of treatment
If longitudinal, was there any intervention between the time points? | Word finding therapy for both groups, but the intention group had to produce complex left hand movements, while the control group did not; note that groups were not directly compared in any imaging analyses
Is the scanner described? | Yes (Philips Achieva 3 Tesla)
Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (total images acquired not stated)
Design type | Event-related
Total images acquired | not stated
Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)
Is preprocessing and intersubject coregistration adequately described and appropriate? | No (not described)
Is first level model fitting adequately described and appropriate? | No (not described clearly)
Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed)

Conditions

Are the conditions clearly described? | Yes

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|---------------------|--------------------------|
| word generation | Word (overt) | 60 | Unknown | Unknown |
| rest | None | implicit | N/A | N/A |
Conditions notes

Contrasts

Are the contrasts clearly described? Yes

Contrast 1: word generation vs rest

| Language condition | Word generation |
|--------------------|-----------------|
| Control condition  | Rest            |
| Are the conditions matched for visual demands? No |
| Are the conditions matched for auditory demands? No |
| Are the conditions matched for motor demands? No |
| Are the conditions matched for cognitive/executive demands? No |
| Is accuracy matched between the language and control tasks for all relevant groups? N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? N/A, tasks not comparable |

Behavioral data notes

Are control data reported in this paper or another that is referenced? No
Does the contrast selectively activate plausible relevant language regions in the control group? Unknown
Are activations lateralized in the control data? Unknown

Contrast notes
Contrast not described explicitly but there is only one possible contrast

Analyses

Are the analyses clearly described? Yes

ROI analysis 1

First level contrast Word generation vs rest
Analysis class Longitudinal change in aphasia
Group(s) Aphasia with intention treatment (n = 7) T2 vs T1
Covariate —
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes
Is accuracy matched across the second level contrast? Unknown, not reported
Is reaction time matched across the second level contrast? Unknown, not reported

Behavioral data notes

Type of analysis Regions of interest (ROI)
ROI type Laterality indices
How many ROIs are there? 3
What are the ROI(s)? (1) lateral frontal LI; (2) medial frontal LI; (3) posterior perisylvian LI
How are the ROI(s) defined? Laterality shift for lateral frontal LI, not medial frontal LI

Correction for multiple comparisons No correction
Statistical details —
Findings ↓ LI (frontal)
Findings notes Laterality shift for lateral frontal LI, not medial frontal LI

ROI analysis 2

First level contrast Word generation vs rest
| Analysis class               | Longitudinal change in aphasia |
|-----------------------------|--------------------------------|
| Group(s)                    | Aphasia with intention treatment (n = 6) T3 vs T1 |
| Covariate                   | —                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes       | —                              |
| Type of analysis            | Regions of interest (ROI) |
| ROI type                    | Laterality indices |
| How many ROIs are there?    | 3 |
| What are the ROI(s)?        | (1) lateral frontal LI; (2) medial frontal LI; (3) posterior perisylvian LI |
| How are the ROI(s) defined? |                                 |
| Correction for multiple comparisons | No correction |
| Statistical details         | —                              |
| Findings                    | ↓ LI (frontal) |
| Findings notes              | Laterality shift for both lateral and medial frontal LIs |

**ROI analysis 3**

| First level contrast         | Word generation vs rest |
|-----------------------------|-------------------------|
| Analysis class              | Longitudinal change in aphasia |
| Group(s)                    | Aphasia with control treatment (n = 7) T2 vs T1 |
| Covariate                   | —                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes       | —                              |
| Type of analysis            | Regions of interest (ROI) |
| ROI type                    | Laterality indices |
| How many ROIs are there?    | 3 |
| What are the ROI(s)?        | (1) lateral frontal LI; (2) medial frontal LI; (3) posterior perisylvian LI |
| How are the ROI(s) defined? |                                 |
| Correction for multiple comparisons | No correction |
| Statistical details         | —                              |
| Findings                    | None |
| Findings notes              | —                              |

**ROI analysis 4**

| First level contrast         | Word generation vs rest |
|-----------------------------|-------------------------|
| Analysis class              | Longitudinal change in aphasia |
| Group(s)                    | Aphasia with control treatment (n = 7) T3 vs T1 |
| Covariate                   | —                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes       | —                              |
| Type of analysis            | Regions of interest (ROI) |

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| ROI analysis 5 | First level contrast | Word generation vs rest |
|----------------|----------------------|-------------------------|
| Analysis class | Longitudinal correlation with language or other measure |
| Group(s)       | Aphasia with intention treatment (n = 7) T2 vs T1 |
| Covariate      | Δ category-member generation probe performance |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Laternality ind(ices) |
| How many ROIs are there? | 3 |
| What are the ROI(s)? | (1) lateral frontal Ll; (2) medial frontal Ll; (3) posterior perisylvian Ll |
| How are the ROI(s) defined? | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

| ROI analysis 6 | First level contrast | Word generation vs rest |
|----------------|----------------------|-------------------------|
| Analysis class | Longitudinal correlation with language or other measure |
| Group(s)       | Aphasia with control treatment (n = 7) T2 vs T1 |
| Covariate      | Δ category-member generation probe performance |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Laterality ind(ices) |
| How many ROIs are there? | 3 |
| What are the ROI(s)? | (1) lateral frontal Ll; (2) medial frontal Ll; (3) posterior perisylvian Ll |
| How are the ROI(s) defined? | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

| ROI analysis 7 | First level contrast | Word generation vs rest |
|----------------|----------------------|-------------------------|
| Analysis class | Longitudinal correlation with language or other measure |
| Group(s)       | Aphasia with intention treatment (n = 7) T2 vs T1 |
| Covariate      | Δ category-member generation probe performance |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Laterality ind(ices) |
| How many ROIs are there? | 3 |
| What are the ROI(s)? | (1) lateral frontal Ll; (2) medial frontal Ll; (3) posterior perisylvian Ll |
| How are the ROI(s) defined? | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | — |
### Analysis class
Longitudinal correlation with language or other measure

### Group(s)
Aphasia with intention treatment (n = 7) T2 vs T1

### Covariate
Δ picture naming probe performance

### Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?
Yes

### Is accuracy matched across the second level contrast?
Unknown, not reported

### Is reaction time matched across the second level contrast?
Unknown, not reported

### Behavioral data notes
—

### Type of analysis
Regions of interest (ROI)

### ROI type
Laterality indices

### How many ROIs are there?
3

### What are the ROI(s)?
(1) lateral frontal LI; (2) medial frontal LI; (3) posterior perisylvian LI

### How are the ROI(s) defined?
(1) lateral frontal LI; (2) medial frontal LI; (3) posterior perisylvian LI

### Correction for multiple comparisons
No correction

### Statistical details
—

### Findings
None

### Findings notes
—

---

### ROI analysis 8

### First level contrast
Word generation vs rest

### Analysis class
Longitudinal correlation with language or other measure

### Group(s)
Aphasia with control treatment (n = 7) T2 vs T1

### Covariate
Δ picture naming probe performance

### Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?
Yes

### Is accuracy matched across the second level contrast?
Unknown, not reported

### Is reaction time matched across the second level contrast?
Unknown, not reported

### Behavioral data notes
—

### Type of analysis
Regions of interest (ROI)

### ROI type
Laterality indices

### How many ROIs are there?
3

### What are the ROI(s)?
(1) lateral frontal LI; (2) medial frontal LI; (3) posterior perisylvian LI

### How are the ROI(s) defined?
(1) lateral frontal LI; (2) medial frontal LI; (3) posterior perisylvian LI

### Correction for multiple comparisons
No correction

### Statistical details
—

### Findings
None

### Findings notes
—

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### Notes

### Excluded analyses
SPM analysis in Figure 3, because the authors do not attempt to interpret it

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### Brownsett et al. (2014)

### Reference

| Authors       | Brownsett SL, Warren JE, Geranmayeh F, Woodhead Z, Leech R, Wise RJ |
|---------------|---------------------------------------------------------------------|
| Title         | Cognitive control and its impact on recovery from aphasic stroke    |
| Reference     | Brain 2014; 137: 242-254                                            |
| PMID          | 24163248                                                             |
**DOI**
10.1093/brain/awt289

### Participants

| Language               | UK English |
|------------------------|------------|
| Inclusion criteria     | No involvement of ACA territory |
| Number of individuals with aphasia | 16 (plus 3 excluded: 2 withdrew after attempting first scan; 1 had severe dysarthria) |
| Number of control participants | 17 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (mean 60 years, range 37-84 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 11; females: 5) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 16; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 4 years, range 6 months-11 years) |
| To what extent is the nature of aphasia characterized? | Not at all |
| Language evaluation    | Not stated |
| Aphasia severity       | Not stated |
| Aphasia type           | Not stated, but all had auditory comprehension and repetition deficits, and all could at least attempt to repeat |
| First stroke only?     | Not stated |
| Stroke type            | Not stated |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent          | Not stated |
| Lesion location         | L temporal and parietal cortex; 4 extended into the frontal lobe; no lesions involved ACA territory |
| Participants notes     | — |

### Imaging

| Modality | fMRI |
|----------|-----|
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | Patients: T1: acclimatization/chronic (but used in some analyses); T2: pre-treatment/chronic (not stated how long after T1); T3: post-treatment/~4 weeks later; controls: T1: pre-training; T2: post-training/~2 weeks later |
| If longitudinal, was there any intervention between the time points? | Patients: home-based therapy consisting of auditory discrimination and repetition tasks for 3 or 4 weeks between T2 and T3; control: 2 weeks of similar training using noise vocoded speech |
| Is the scanner described? | Yes (Philips Intera 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (timing of sentence presentation not described; sparse event-related design, but ITI of only 8 s and consistent linear order of listening and repetition trials could make it difficult to disentangle hemodynamic responses to listening and repeating trials) |
| Design type | Event-related |
| Total images acquired | 168 (patients); 280 (controls) |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | No* (moderate limitation) (consistent linear order of listening and repetition trials could make it difficult to disentangle hemodynamic responses to listening and repeating trials) |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | sparse sampling; different task structure in controls (two repetition trials per listening trial) raises concerns about comparisons between groups |
### Conditions

| Are the conditions clearly described? | No (paradigm was different in patients and controls, and is not described in sufficient detail for patients) |

| Condition                                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------------------------------------|---------------|-------------|-----------------------|---------------------------|
| listening to sentences                        | None          | aphasia: not stated; control: 40 | N/A | N/A |
| repeating sentences (sentence from previous trial) | Sentence (overt) | aphasia: not stated; control: 40 | Yes | No |
| listening to noise vocoded sentences (control only) | None | 40 (control) | N/A | N/A |
| repeating noise vocoded sentences (control only) | Sentence (overt) | 80 (control) | Yes | Unknown |
| listening to segmented white noise             | None          | aphasia: not stated; control: 40 | N/A | N/A |

**Conditions notes**

In two patients, only single words were produced

### Contrasts

| Are the contrasts clearly described? | Yes |

**Contrast 1: listening to sentences vs listening to segmented white noise**

**Language condition**

- Listening to sentences

**Control condition**

- Listening to segmented white noise

| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |

| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task |

**Behavioral data notes**

- —

| Are control data reported in this paper or another that is referenced? | No |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data? | Unknown |
| Control activation notes | — |
| Contrast notes | — |

**Contrast 2: listening to sentences (patients) or listening to noise vocoded sentences (controls) vs listening to segmented white noise**

**Language condition**

- Listening to sentences (patients) or listening to noise vocoded sentences (controls)

**Control condition**

- Listening to segmented white noise

| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |

| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task |
### Behavioral data notes
- Are control data reported in this paper or another that is referenced? **No**
- Does the contrast selectively activate plausible relevant language regions in the control group? **Unknown**
- Are activations lateralized in the control data? **Unknown**

### Analyses
#### Are the analyses clearly described? **Yes**

### Voxelwise analysis 1

| First level contrast | Listening to sentences vs listening to segmented white noise |
|----------------------|------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                         |
| Group(s)             | Aphasia (T2 and T3) vs control (T1 and T2)                 |
| Covariate            | —                                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | **Yes** |
| Is accuracy matched across the second level contrast? | **No, different** |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

**Behavioral data notes**
- Significant difference in accuracy of subsequent repetition

**Type of analysis**
- Voxelwise

**Search volume**
- Whole brain

**Correction for multiple comparisons**
- Clusterwise correction with with GRFT and lenient voxelwise $p$

**Software**
- FSL (FEAT 5.98)

**Voxelwise $p$**
- $< .01$ (z $> 2.3$)

**Cluster extent**
- Based on GRFT

**Statistical details**
- —

**Findings**
- ↑ L insula
- ↑ L anterior cingulate
- ↑ R insula
- ↑ R anterior cingulate
- ↓ L SMA/medial prefrontal
- ↓ L precuneus
- ↓ L posterior cingulate
- ↓ R SMA/medial prefrontal
- ↓ R precuneus
- ↓ R posterior cingulate

**Findings notes**
- Findings are approximate since description is partially in terms of networks; at the earlier time point only, patients also showed reduced activity in left ventral prefrontal cortex and right medial planum temporale

### Voxelwise analysis 2

| First level contrast | Listening to sentences (patients) or listening to noise vocoded sentences (controls) vs listening to segmented white noise |
|----------------------|-------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                                                                  |
| Group(s)             | Aphasia (T2 and T3) vs control (T1 and T2)                                                                         |
| Covariate            | —                                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | **Yes** |
| Is accuracy matched across the second level contrast? | **Yes, matched** |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |

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Behavioral data notes: No significant difference in accuracy of subsequent repetition.

**Type of analysis**: Voxelwise

**Search volume**: Whole brain

**Correction for multiple comparisons**: Clusterwise correction with GRFT and lenient voxelwise p

**Software**: FSL (FEAT 5.98)

**Voxelwise p**: ~.01 (z > 2.3)

**Cluster extent**: Based on GRFT

No findings reported.

**Findings notes**: Referring to accuracy of subsequent repetition; correlation with picture description is not reported.

**ROI analysis 1**

**First level contrast**: Listening to sentences vs listening to segmented white noise

**Analysis class**: Cross-sectional correlation with language or other measure

**Group(s)**: Aphasia mean of T1, T2, T3

**Covariate**: Picture description score (CAT), mean of T1, T2, T3

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**: Yes

**Is accuracy matched across the second level contrast?**: Unknown, not reported

**Is reaction time matched across the second level contrast?**: N/A, no timeable task

**Behavioral data notes**: Referring to accuracy of subsequent repetition; correlation with picture description is not reported.

**Type of analysis**: Region of interest (ROI)

**ROI type**: Functional

**How many ROIs are there?**: 1

**What are the ROI(s)?**: Dorsal anterior cingulate cortex/midline superior frontal gyrus

**How are the ROI(s) defined?**: Contrast of listening to vocoded speech and listening to normal speech in controls

**Correction for multiple comparisons**: One only

**Statistical details**: Same result obtained with age and lesion volume included in the model

**Findings**:

- ↑ L SMA/medial prefrontal
- ↑ L anterior cingulate
- ↑ R SMA/medial prefrontal
- ↑ R anterior cingulate

**Findings notes**: Increased activation of dACC/SFG was correlated with higher scores on picture description.

**Notes**

Excluded analyses: Longitudinal analyses, since these were null findings that were not the focus of this paper.

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**Mattioli et al. (2014)**

**Reference**

**Authors**: Mattioli F, Ambrosi C, Mascaro L, Scarpazza C, Pasquali P, Frugoni M, Magoni M, Biagi L, Gasparotti R

**Title**: Early aphasia rehabilitation is associated with functional reactivation of the left inferior frontal gyrus: a pilot study

**Reference**: Stroke 2014; 45: 545-552

**PMID**: 24309584

**DOI**: 10.1161/strokeaha.113.003192

**Participants**

**Language**: Italian
### Inclusion criteria

| Inclusion criteria                          | L MCA; comprehension mildly impaired |
|--------------------------------------------|-------------------------------------|

### Number of individuals with aphasia

| Number of individuals with aphasia | 12 |

### Number of control participants

| Number of control participants | 10 |

### Were any of the participants included in any previous studies?

| Were any of the participants included in any previous studies? | No |

### Is age reported for patients and controls, and matched?

| Is age reported for patients and controls, and matched? | No (range 37-79 years; control ages not reported, though reported to be matched) |

### Is sex reported for patients and controls, and matched?

| Is sex reported for patients and controls, and matched? | No (males: 7; females: 5; control sex not stated, but reported to be matched) |

### Is handedness reported for patients and controls, and matched?

| Is handedness reported for patients and controls, and matched? | Yes (right: 12; left: 0) |

### Is time post stroke onset reported and appropriate to the study design?

| Is time post stroke onset reported and appropriate to the study design? | Yes (T1: mean 2.2 ± 1.3 days; T2: mean 16.2 ± 1.3 days; T3: mean 190 ± 25.5 days) |

### To what extent is the nature of aphasia characterized?

| To what extent is the nature of aphasia characterized? | Comprehensive battery |

### Language evaluation

| Language evaluation | AAT, TT |

### Aphasia severity

| Aphasia severity | T1: TT range 2-45; T2: TT range 6-48; T3: TT range 21-48 |

### Aphasia type

| Aphasia type | T1: 8 Broca's, 3 anomic, 1 Wernicke's; T2: not stated |

### First stroke only?

| First stroke only? | Yes |

### Stroke type

| Stroke type | Not stated |

### To what extent is the lesion distribution characterized?

| To what extent is the lesion distribution characterized? | Individual lesions |

### Lesion extent

| Lesion extent | Range 4.4-158.3 cc (possibly; units stated do not seem correct) |

### Lesion location

| Lesion location | L MCA; lesions seem very small in Supplementary Figure 1, but are described as more extensive in Supplementary Table 1 |

### Participants notes

| Participants notes | Treated and untreated groups differed in severity at baseline, albeit not significantly |

### Imaging

#### Modality

| Modality | fMRI |

#### Is the study cross-sectional or longitudinal?

| Is the study cross-sectional or longitudinal? | Longitudinal—mixed |

#### If longitudinal, at what time point(s) were imaging data acquired?

| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment, mean 2.2 ± 1.3 days post onset; T2: post-treatment, mean 16.2 ± 1.3 days post onset; T3: mean 190 ± 25.5 days post onset |

#### If longitudinal, was there any intervention between the time points?

| If longitudinal, was there any intervention between the time points? | 6 patients were randomized to receive treatment focusing on verbal comprehension and lexical retrieval for 1 hour/day, 5 days/week between T1 and T2; no patient received treatment after T2 |

#### Is the scanner described?

| Is the scanner described? | Yes (Siemens Avanto 1.5 Tesla) |

#### Is the timing of stimulus presentation and image acquisition clearly described and appropriate?

| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (timing of stimuli not clearly described) |

#### Design type

| Design type | Event-related |

#### Total images acquired

| Total images acquired | 504 |

#### Are the imaging acquisition parameters, including coverage, adequately described and appropriate?

| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | No (unclear; number of slices not stated) |

#### Is preprocessing and intrasubject coregistration adequately described and appropriate?

| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |

#### Is first level model fitting adequately described and appropriate?

| Is first level model fitting adequately described and appropriate? | No (model fitting of noise "bip" not clearly described) |

#### Is intersubject normalization adequately described and appropriate?

| Is intersubject normalization adequately described and appropriate? | Yes |

#### Imaging notes

| Imaging notes | — |

### Conditions

#### Are the conditions clearly described?

| Are the conditions clearly described? | No (there is also mention of a noise "bip" that preceded each sentence but details are lacking) |

#### Condition

| Condition                     | Response type | Repetitions | All groups could do? | All individuals could do? |
|------------------------------|---------------|-------------|----------------------|---------------------------|
| listening to sentences and making a plausibility judgment | Button press | 56          | Yes                  | Unknown                   |
| Conditions notes | None |
|------------------|------|
| N/A              | N/A  |

**Contrasts**

**Contrast 1: listening to sentences and making a plausibility judgment vs listening to reversed speech**

| Language condition | Listening to sentences and making a plausibility judgment |
|--------------------|----------------------------------------------------------|
| Control condition  | Listening to reversed speech                            |

Are the conditions matched for visual demands? Yes

Are the conditions matched for auditory demands? Yes

Are the conditions matched for motor demands? No

Are the conditions matched for cognitive/executive demands? No

Is accuracy matched between the language and control tasks for all relevant groups? N/A, tasks not comparable

Is reaction time matched between the language and control tasks for all relevant groups? N/A, tasks not comparable

Behavioral data notes

Does the contrast selectively activate plausible relevant language regions in the control group? Somewhat

Are activations lateralized in the control data? Yes

Control activation notes

10 participants; quite lateralized activity centered on the anterior Sylvian fissure

Contrast notes

It is mentioned that “noise” was also included on the negative side of the contrast; it is unclear if this refers to the noise “bip”, which would be inappropriate

**Analyses**

Are the analyses clearly described? No* (moderate limitation) (see specific limitation(s) below)

**Voxelwise analysis 1**

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia                                         |
| Group(s)             | Aphasia treated T2 (n = 6) vs untreated T2 (n = 6)                                      |
| Covariate            | —                                                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (groups were different but not due to treatment) |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Behavioral data notes

Type of analysis | Voxelwise

Search volume | Whole brain

Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent

Software | BrainVoyager QX 1.9

Voxelwise p | .001

Cluster extent | 0.16 cc

Statistical details

Methods report cluster extent threshold (we assume this was done), but figure caption states uncorrected

Findings

↑ L IFG pars opercularis
↑ L IFG pars triangularis
↑ L SMA/medial prefrontal
↑ L angular gyrus
### Voxelwise analysis 2

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|-----------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia treated T3 (n = 6) vs untreated T3 (n = 6) |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (groups were different but not due to treatment) |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Search volume        | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software             | BrainVoyager QX 1.9 |
| Voxelwise p          | .001 |
| Cluster extent       | 0.16 cc |
| Statistical details  | Methods report cluster extent threshold (we assume this was done), but figure caption states uncorrected |
| Findings             | ↑ L IFG pars triangularis |
|                      | ↑ L insula |
|                      | ↑ L supramarginal gyrus |
| Findings notes       | Based on coordinates in Table 2; also increases in R IFG and R supramarginal gyrus but only uncorrected |

### Voxelwise analysis 3

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|-----------------------------------------------|
| Analysis class       | Longitudinal between two groups with aphasia |
| Group(s)             | (Aphasia treated (n = 6) T2 vs T1) vs (untreated (n = 6) T2 vs T1) |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect) |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Search volume        | Whole brain |
| Correction for multiple comparisons | No direct comparison |
| Software             | BrainVoyager QX 1.9 |
| Voxelwise p          | — |
| Cluster extent       | — |
| Statistical details  | Qualitative comparison on p. 548 |
| Findings             | ↑ L IFG |
|                      | ↑ R posterior STG |
|                      | ↓ L inferior parietal lobule |
|                      | ↓ R IFG |
| Findings notes       | Treated patients showed increases in L IFG and R STG, while untreated patients showed increases in L IPL and R IFG |
### Voxelwise analysis 4

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|--------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal between two groups with aphasia                                                |
| Group(s)             | (Aphasia treated (n = 6) T3 vs T2) vs (untreated (n = 6) T3 vs T2)                         |
| Covariate            | —                                                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect)                                                             |
| Is accuracy matched across the second level contrast? | Yes, matched                                                                               |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                       |
| Behavioral data notes | —                                                                                           |
| Type of analysis     | Voxelwise                                                                                  |
| Search volume        | Whole brain                                                                                 |
| Correction for multiple comparisons | No direct comparison                                                                       |
| Software             | BrainVoyager QX 1.9                                                                         |
| Voxelwise p          | —                                                                                           |
| Cluster extent       | —                                                                                           |
| Statistical details  | Qualitative comparison on p. 548                                                            |
| Findings             | None                                                                                        |
| Findings notes       | The two groups were reported to have comparable increases in L hemisphere language areas  |

### Voxelwise analysis 5

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|--------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                                             |
| Group(s)             | Aphasia treated (n = 6) T2 vs T1                                                           |
| Covariate            | —                                                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                       |
| Is accuracy matched across the second level contrast? | Yes, matched                                                                               |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                       |
| Behavioral data notes | —                                                                                           |
| Type of analysis     | Voxelwise                                                                                  |
| Search volume        | Whole brain                                                                                 |
| Correction for multiple comparisons | No correction                                                                            |
| Software             | BrainVoyager QX 1.9                                                                         |
| Voxelwise p          | .005                                                                                        |
| Cluster extent       | None                                                                                       |
| Statistical details  | Qualitative comparison on p. 548                                                            |
| Findings             | ↑ L IFG pars opercularis                                                                    |
| Findings notes       | ↑ R posterior STG                                                                            |

### Voxelwise analysis 6

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|--------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                                             |
| Group(s)             | Aphasia untreated (n = 6) T2 vs T1                                                          |
| Covariate            | —                                                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                       |
| Is accuracy matched across the second level contrast? | Yes, matched                                                                               |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                       |
### Voxelwise analysis 7

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|—————————————————————————————————|
| Analysis class       | Longitudinal change in aphasia                            |
| Group(s)             | Aphasia treated (n = 6) T3 vs T2                           |
| Covariate            | —                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

| Type of analysis | Voxelwise |
|------------------|-----------|
| Search volume    | Whole brain |
| Correction for multiple comparisons | No correction |
| Software | BrainVoyager QX 1.9 |
| Voxelwise p | .005 |
| Cluster extent | None |
| Statistical details | — |
| Findings | ↑ L inferior parietal lobule  
↑ R insula |
| Findings notes | — |

### Voxelwise analysis 8

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|—————————————————————————————————|
| Analysis class       | Longitudinal change in aphasia                            |
| Group(s)             | Aphasia untreated (n = 6) T3 vs T2                           |
| Covariate            | —                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

| Type of analysis | Voxelwise |
|------------------|-----------|
| Search volume    | Whole brain |
| Correction for multiple comparisons | No correction |
| Software | BrainVoyager QX 1.9 |
| Voxelwise p | .005 |
| Cluster extent | None |
|----------------|------|
| Statistical details | — |
| Findings | ↑ L IFG pars opercularis  
↑ L IFG pars triangularis  
↑ L IFG pars orbitalis  
↑ L angular gyrus  
↑ L superior parietal  
↑ L posterior STG/STS/MTG  
↑ R IFG pars opercularis  
↑ R angular gyrus |
| Findings notes | — |

### ROI analysis 1

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal between two groups with aphasia                                            |
| Group(s)             | (Aphasia treated (n = 6) T1 ≠ T2 ≠ T3) vs (untreated (n = 6) T1 ≠ T2 ≠ T3)             |
| Covariate            | —                                                                                        |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect) |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                                                      |
| Type of analysis     | Regions of interest (ROI)                                                              |
| ROI type             | Functional                                                                               |
| How many ROIs are there? | 4                                                                                   |
| What are the ROI(s)? | (1) L IFG; (2) R IFG; (3) L STG; (4) R STG                                             |
| How are the ROI(s) defined? | Based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used |
| Correction for multiple comparisons | No correction                                                                       |
| Statistical details  | —                                                                                      |
| Findings             | ↑ L IFG                                                                                |
| Findings notes       | Interaction of time by treatment: treated group showed greater L IFG activity at T2   |

### ROI analysis 2

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                  |
| Group(s)             | Aphasia treated (n = 6) T2 vs T1                                                        |
| Covariate            | Δ written language (AAT)                                                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                                                      |
| Type of analysis     | Regions of interest (ROI)                                                              |
| ROI type             | Functional                                                                               |
| How many ROIs are there? | 4                                                                                   |
| What are the ROI(s)? | (1) L IFG; (2) R IFG; (3) L STG; (4) R STG                                             |
| How are the ROI(s) defined? | Based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used |
| Correction for multiple comparisons | No correction                                                                       |
| Statistical details  | —                                                                                      |
| Findings             | None                                                                                    |

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### ROI analysis 3

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                      |
| Group(s)             | Aphasia treated (n = 6) T2 vs T1                                                            |
| Covariate            | $\Delta$ naming (AAT)                                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                       |
| Is accuracy matched across the second level contrast? | Yes, matched                                                                              |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                       |

#### Behavioral data notes

- **Type of analysis**: Regions of interest (ROI)
- **ROI type**: Functional
- **How many ROIs are there?**: 4
- **What are the ROI(s)?**: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG
- **How are the ROI(s) defined?**: Based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used
- **Correction for multiple comparisons**: No correction

### ROI analysis 4

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                      |
| Group(s)             | Aphasia untreated (n = 6) T2 vs T1                                                            |
| Covariate            | $\Delta$ written language (AAT)                                                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                       |
| Is accuracy matched across the second level contrast? | Yes, matched                                                                              |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                       |

#### Behavioral data notes

- **Type of analysis**: Regions of interest (ROI)
- **ROI type**: Functional
- **How many ROIs are there?**: 4
- **What are the ROI(s)?**: (1) L IFG; (2) R IFG; (3) L STG; (4) R STG
- **How are the ROI(s) defined?**: Based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used
- **Correction for multiple comparisons**: No correction

### ROI analysis 5

| First level contrast | Listening to sentences and making a plausibility judgment vs listening to reversed speech |
|----------------------|------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                      |
| Group(s)             | Aphasia untreated (n = 6) T2 vs T1                                                            |
| Covariate            | $\Delta$ naming (AAT)                                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                       |
| Question                                                                 | Yes, matched                                                                 |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Is reaction time matched across the second level contrast?               | Unknown, not reported                                                          |
| Is accuracy matched across the second level contrast?                   |                                                                               |
| Behavioral data notes                                                   | —                                                                             |
| Type of analysis                                                        | Regions of interest (ROI)                                                     |
| ROI type                                                                | Functional                                                                    |
| How many ROIs are there?                                                | 4                                                                             |
| What are the ROI(s)?                                                   | (1) L IFG; (2) R IFG; (3) L STG; (4) R STG                                    |
| How are the ROI(s) defined?                                             | Based on functional data from patients and controls, but details not stated; a different set of ROIs are mentioned in the results so it is not really clear which set were actually used |
| Correction for multiple comparisons                                     | No correction                                                                 |
| Statistical details                                                     | —                                                                             |
| Findings                                                                | ↑ R IFG                                                                       |
| Findings notes                                                          | —                                                                             |

**Notes**

| Excluded analyses                                                                 | (1) a visual comparison between all patients at T1, and controls, because there are no specific claims apart from "markedly reduced cortical activation" in patients; (2) pre-treatment comparison between treated and untreated groups |
|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------|

**Mohr et al. (2014)**

**Reference**

| Authors                      | Mohr B, Difrancesco S, Harrington K, Evans S, Pulvermüller F |
|------------------------------|-------------------------------------------------------------|
| Title                        | Changes of right-hemispheric activation after constraint-induced, intensive language action therapy in chronic aphasia: fMRI evidence from auditory semantic processing |
| Reference                    | Front Hum Neurosci 2014; 8: 919                             |
| PMID                         | 25452721                                                   |
| DOI                          | 10.3389/fnhum.2014.00919                                   |

**Participants**

| Language                     | UK English                                                  |
|------------------------------|-------------------------------------------------------------|
| Inclusion criteria           | MCA; mild-moderate non-fluent aphasia; no severe comprehension deficit |
| Number of individuals with aphasia | 6 (plus 6 excluded: 4 for health risks; 2 for technical problems and data loss) |
| Number of control participants | 0                                                          |
| Were any of the participants included in any previous studies? | No                                                          |
| Is age reported for patients and controls, and matched? | Yes (range 41-76 years)                                     |
| Is sex reported for patients and controls, and matched? | Yes (males: 5; females: 1)                                  |
| Is handedness reported for patients and controls, and matched? | Yes (right: 6; left: 0)                                     |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 17-234 months (including excluded patients)) |
| To what extent is the nature of aphasia characterized? | Severity only                                              |
| Language evaluation          | BDAE, TT                                                    |
| Aphasia severity             | Mild-moderate; T1: TT range 15-49 errors (including 2 excluded patients) |
| Aphasia type                 | Not stated                                                  |
| First stroke only?           | Yes                                                         |
| Stroke type                  | Mixed etiologies                                            |
To what extent is the lesion distribution characterized? | Lesion overlay
---|---
Lesion extent | Not stated
Lesion location | L MCA
Participants notes | Patient numbers in tables 1 and 2 appear not to correspond with patient numbers later in the paper

### Imaging

| Modality | fMRI |
| --- | --- |
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic, T2: post-treatment, ~2 weeks later |
| If longitudinal, was there any intervention between the time points? | CIAT, 3-4 hours/day, 5 days/week, 2 weeks |
| Is the scanner described? | Yes (Siemens Trio 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | Event-related |
| Total images acquired | 76 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed) |
| Imaging notes | sparse sampling |

### Conditions

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
| --- | --- | --- | --- | --- |
| listening to high ambiguity sentences | None | 19 | N/A | N/A |
| listening to low ambiguity sentences | None | 19 | N/A | N/A |
| listening to signal-correlated noise | None | 19 | N/A | N/A |
| rest | None | 19 | N/A | N/A |

### Contrasts

| Contrast 1: listening to sentences (high and low ambiguity) vs listening to signal-correlated noise |
| --- | --- |
| Language condition | Listening to sentences (high and low ambiguity) |
| Control condition | Listening to signal-correlated noise |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | No |
|---|---|
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data? | Unknown |
| Control activation notes | Some control data in Rodd et al. (2005), but half of the participants were performing a probe judgment task, unlike in the present study |
| Contrast notes | — |

**Contrast 2: listening to high ambiguity sentences vs listening to low ambiguity sentences**

| Language condition | Listening to high ambiguity sentences |
|---|---|
| Control condition | Listening to low ambiguity sentences |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task |
| Behavioral data notes | — |
| Do the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data? | Unknown |
| Control activation notes | Some control data in Rodd et al. (2005), but half of the participants were performing a probe judgment task, unlike in the present study |
| Contrast notes | — |

**Analyses**

| Are the analyses clearly described? | No* (moderate limitation) (see specific limitation(s) below) |

**Voxelwise analysis 1**

| First level contrast | Listening to sentences (high and low ambiguity) vs listening to signal-correlated noise |
|---|---|
| Analysis class | Longitudinal change in aphasia |
| Group(s) | Aphasia T2 vs T1 |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Voxelwise |
| Search volume | Whole brain |
| Correction for multiple comparisons | No direct comparison |
| Software | SPM8 |
| Voxelwise p | — |
| Cluster extent | — |
| Statistical details | Qualitative generalization across individuals on pp. 8-9 |
| Findings | None |
| Findings notes | — |
ROI analysis 1

| First level contrast | Listening to high ambiguity sentences vs listening to low ambiguity sentences |
|----------------------|--------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                                  |
| Group(s)             | Aphasia T2 vs T1                                                               |
| Covariate            | —                                                                               |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | —                                                                               |
| Type of analysis     | Regions of interest (ROI)                                                      |
| ROI type             | Functional                                                                     |
| How many ROIs are there? | 4                                                                               |
| What are the ROI(s)? | (1) L IFG; (2) R IFG; (3) L ITG; (4) R ITG; the temporal ROIs are described as STG but they seem to be in the ITG |
| How are the ROI(s) defined? | Defined based on control data from Rodd et al. (2005) but the coordinates do not match so it is not clear exactly how they were defined |
| Correction for multiple comparisons | No correction |
| Statistical details | ANOVA of timepoint by hemisphere by site, with a significant interaction of timepoint by hemisphere |
| Findings             | ↑ R IFG                                                                         |
| Findings notes       | All signal changes were negative (i.e. less activation for ambiguous sentences), making interpretation challenging |

Notes

Excluded analyses
Noise vs rest (not language); individual patient analyses

Robson et al. (2014)

Reference

Authors
Robson H, Zahn R, Keidel JL, Binney RJ, Sage K, Lambon Ralph MA

Title
The anterior temporal lobes support residual comprehension in Wernicke's aphasia

Reference
Brain 2014; 137: 931-943
PMID
24519979
DOI
10.1093/brain/awt373

Participants

Language
UK English

Inclusion criteria
Wernicke's aphasia (impaired spoken single word comprehension, impaired single word repetition, fluent, sentence-like speech with phonological/neologistic errors)

Number of individuals with aphasia
12
Number of control participants
12
Were any of the participants included in any previous studies?
No
Is age reported for patients and controls, and matched?
Yes (mean 70.1 ± 8.7 years, range 59-87 years)
Is sex reported for patients and controls, and matched?
Yes (males: 10; females: 2)
Is handedness reported for patients and controls, and matched?
Yes (right: 12; left: 0)
Is time post stroke onset reported and appropriate to the study design? Yes (range 7-84 months)

To what extent is the nature of aphasia characterized? Comprehensive battery

Language evaluation BDAE, PPT, word-to-picture matching test from Cambridge Semantic Battery, single word reading aloud from PALPA

Aphasia severity BDAE comprehension range 6-26 (out of 32); BDAE comprehension scores and percentiles do not seem entirely commensurate

Aphasia type All Wernicke’s

First stroke only? Yes

Stroke type Mixed etiologies

To what extent is the lesion distribution characterized? Lesion overlay

Lesion extent Not stated

Lesion location L MCA; all involved STG extending into IPL and temporoparietal junction; 8 extending into MTL; 4 extending into inferior frontal

Participants notes —

Imaging

Modality fMRI

Is the study cross-sectional or longitudinal? Cross-sectional

If longitudinal, at what time point(s) were imaging data acquired? —

If longitudinal, was there any intervention between the time points? —

Is the scanner described? Yes (Philips Achieva 3 Tesla)

Is the timing of stimulus presentation and image acquisition clearly described and appropriate? No* (moderate limitation) (each condition was acquired in a separate run, which is suboptimal)

Design type Block

Total images acquired 417

Are the imaging acquisition parameters, including coverage, adequately described and appropriate? Yes (whole brain)

Is preprocessing and intrasubject coregistration adequately described and appropriate? Yes

Is first level model fitting adequately described and appropriate? Yes

Is intersubject normalization adequately described and appropriate? Yes

Imaging notes spin echo fMRI to minimize ATL dropout

Conditions

Are the conditions clearly described? Yes

Condition Response type Repetitions All groups could do? All individuals could do?

semantic decision (written word) Button press 16 Yes No

semantic decision (picture) Button press 16 Yes No

visual decision Button press 16 Yes No

rest None 48 N/A N/A

Conditions notes —

Contrasts

Are the contrasts clearly described? No (see specific limitation(s) below)

Contrast 1: semantic decision (written word and picture) vs visual decision and rest

Language condition Semantic decision (written word and picture)
| Control condition | Visual decision and rest |
|-------------------|-------------------------|
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes | Not comparable because the control condition includes rest |
| Are control data reported in this paper or another that is referenced? | Somewhat |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat |
| Are activations lateralized in the control data? | No |

**Control activation notes**
Control data are provided in Table 6 for contrasts of written word semantic decision vs dual baseline, and picture semantic decision vs dual baseline, but not for the main effect of semantic decision; these data suggest that the contrast activates ventral temporal regions bilaterally.

**Contrast notes**
Two contrasts are described: (1) written word judgment versus a dual baseline of visual judgment and rest; (2) picture judgment versus a dual baseline of visual judgment and rest; these two primary contrasts are reported in patients and controls separately, but no between-group contrasts are reported, so these contrasts are excluded from our review; rather, the between-groups analyses in the paper take the form of ANOVAs; the main effect of group in these ANOVAs collapses across the two described contrasts, therefore we have coded the contrast as the average of the two described contrasts; the exact nature of the computation of dual baseline contrasts is not described.

### Analyses

**Are the analyses clearly described?** No* (moderate limitation) (see specific limitation(s) below)

#### Voxelwise analysis 1

| First level contrast | Semantic decision (written word and picture) vs visual decision and rest |
|----------------------|-------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia vs control |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | No, different |

**Behavioral data notes**
Patients also less accurate on control condition, but control condition includes rest so coded based on language condition only.

**Type of analysis**
Voxelwise

**Search volume**
Whole brain

**Correction for multiple comparisons**
Clusterwise correction based on arbitrary cluster extent

**Software**
SPM8

**Voxelwise p**
.005

**Cluster extent**
4 voxels (size not stated)

**Statistical details**
Dual baseline computation not explained

**Findings**
- ↑ L IFG pars orbitalis
- ↑ L mid temporal
- ↑ L anterior temporal
- ↑ L cerebellum
- ↑ L hippocampus/MTL

417
| Findings notes |
|---------------|
| — |

### ROI analysis 1

| First level contrast | Semantic decision (written word and picture) vs visual decision and rest |
|----------------------|-------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                      |
| Group(s)             | Aphasia vs control                                                      |
| Covariate            | —                                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | No, different |

**Behavioral data notes**

Patients also less accurate on control condition, but control condition includes rest so coded based on language condition only

**Type of analysis**

Regions of interest (ROI)

**ROI type**

Functional

**How many ROIs are there?**

10

**What are the ROI(s)?**

(1) L anterior fusiform gyrus; (2) L temporal pole; (3) L anterior STS; (4) L IFG; (5) L ventral occipito-temporal; (6-10) homotopic counterparts

**How are the ROI(s) defined?**

Spheres around functional peaks from literature

**Correction for multiple comparisons**

No correction

**Statistical details**

Dual baseline computation not explained

| Findings notes |
|---------------|
| — |

**Notes**

Excluded analyses

(1) main effect of condition (written words vs pictures); (2) interactions of condition by group (all of which were non-significant); (3) additional analyses were run including only participants who performed above chance, and only correct responses from all participants, but these gave essentially similar results

### Szaflarski et al. (2014)

**Reference**

Szaflarski JP, Allendorfer JB, Byars AW, Vannest J, Dietz A, Hernando KA, Holland SK

**Title**

Age at stroke determines post-stroke language lateralization

**Reference**

*Restor Neurol Neurosci* 2014; 32: 733-742

**PMID**

25159870

**DOI**

10.3233/rnn-140402

**Participants**

| Language |
|----------|
| US English |

| Inclusion criteria |
|-------------------|
| — |

| Number of individuals with aphasia |
|-----------------------------------|
| 32 |

| Number of control participants |
|-------------------------------|
| 32 |
Were any of the participants included in any previous studies? | Yes (some participants included in Allendorfer et al. (2012))
---|---
Is age reported for patients and controls, and matched? | Yes (mean 51.8 ± 15.1 years)
Is sex reported for patients and controls, and matched? | Yes (males: 18; females: 14)
Is handedness reported for patients and controls, and matched? | No
Is time post stroke onset reported and appropriate to the study design? | Yes (mean 3.2 ± 3.1 years, > 6 months)
To what extent is the nature of aphasia characterized? | Not at all
Language evaluation | Not stated
Aphasia severity | "complete or almost complete" recovery in a "substantial proportion" of the patients
Aphasia type | Not stated
First stroke only? | Not stated
Stroke type | Not stated
To what extent is the lesion distribution characterized? | Lesion overlay
Lesion extent | 60.1 ± 57.5 cc
Lesion location | L MCA
Participants notes | One participant was < 18 years old at time of stroke; there was also a perinatal stroke group, not relevant for this review; 3 participants were excluded but it is not stated whether they were adult or perinatal patients.

### Imaging

| Modality | fMRI
| Is the study cross-sectional or longitudinal? | Cross-sectional
| If longitudinal, at what time point(s) were imaging data acquired? | —
| If longitudinal, was there any intervention between the time points? | —
| Is the scanner described? | Yes (Philips Achieva 3 Tesla, except for 1 patient and 1 control on a Bruker 3 Tesla)
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes
| Design type | Block
| Total images acquired | 165
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes
| Is first level model fitting adequately described and appropriate? | Yes
| Is intersubject normalization adequately described and appropriate? | Yes
| Imaging notes | —

### Conditions

| Are the conditions clearly described? | Yes
| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|---|---|---|---|---|
| verb generation | Multiple words (covert) | 5 | Yes | Unknown |
| finger tapping | Other | 6 | Yes | Yes |

### Conditions notes

---

---
### Contrasts

Are the contrasts clearly described? Yes

**Contrast 1: verb generation vs finger tapping**

| Language condition          | Verb generation |
|-----------------------------|-----------------|
| Control condition           | Finger tapping  |

| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands?   | No |
| Are the conditions matched for cognitive/executive demands? | No |

| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

Behavioral data notes —

Are control data reported in this paper or another that is referenced? Yes

Does the contrast selectively activate plausible relevant language regions in the control group? Yes

Are activations lateralized in the control data? Somewhat

**Control activation notes**

Control data in Szafirski et al. (2008); frontal activation L-lateralized, temporal less so

### Analyses

Are the analyses clearly described? Yes

**Voxelwise analysis 1**

| First level contrast | Verb generation vs finger tapping |
|----------------------|----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia vs control |
| Covariate            | |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Behavioral data notes —

Type of analysis Voxelwise

Search volume Whole brain

Correction for multiple comparisons No direct comparison

Software CCHIPS

Voxelwise p —

Cluster extent —

Statistical details Qualitative comparison on pp. 5-6 (page numbers refer to PMC author manuscript)

| Findings |
|----------|
| ↓ L inferior parietal lobule |
| ↓ L superior parietal |
| ↓ L posterior STG/STS/MTG |
| ↓ L occipital |
| ↓ R occipital |

Findings notes —

**ROI analysis 1**

| First level contrast | Verb generation vs finger tapping |
|----------------------|----------------------------------|
| Analysis class | Cross-sectional aphasia vs control |
|----------------|----------------------------------|
| Group(s)       | Aphasia vs control               |
| Covariate      | —                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                |
| Type of analysis | Regions of interest (ROI)         |
| ROI type       | Laterality indices               |
| How many ROIs are there? | 3                                |
| What are the ROI(s)? | (1) frontal LI; (2) temporal LI; (3) language network LI |
| How are the ROI(s) defined? | No correction |
| Statistical details | —                                |
| Findings       | ↓ LI (language network)          |
| Findings notes | ↓ LI (frontal)                   |
| Notes          | Temporal LI was also marginally significantly reduced (p = .08) |
| Excluded analyses | All analyses involving perinatal stroke group; distribution of language lateralization categories (derived from LI) also differed between patients and controls |

van Hees et al. (2014)

Reference

| Authors | van Hees S, McMahon K, Angwin A, de Zubicaray G, Copland DA |
|---------|-------------------------------------------------------------|
| Title   | Neural activity associated with semantic versus phonological anomia treatments in aphasia |
| Reference | Brain Lang 2014; 129: 47-57 |
| PMID    | 24556337                                                     |
| DOI     | 10.1016/j.bandl.2013.12.004                                 |

Participants

| Language | Australian English |
|----------|--------------------|
| Inclusion criteria | —                  |
| Number of individuals with aphasia | 8                  |
| Number of control participants | 14                 |
| Were any of the participants included in any previous studies? | No                |
| Is age reported for patients and controls, and matched? | Yes (mean 56.4 + 9.2 years; range 41-69 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 3; females: 5) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 8; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 52.3 + 49.8 months; range 17-170 months) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |
| Language evaluation | WAB, BNT, PPT, CAT, picture naming from International Picture Naming Project Database |
| Aphasia severity | AQ range 57.3-91.6; 5 mild, 2 moderate, 1 mild-moderate |
| Aphasia type                  | 6 anomic, 2 conduction |
|------------------------------|------------------------|
| First stroke only?           | Yes                    |
| Stroke type                  | Not stated              |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent                | Not stated              |
| Lesion location              | L hemisphere            |
| Participants notes           | —                      |

**Imaging**

| Modality            | fMRI                    |
|---------------------|-------------------------|
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment, 5-6 weeks later; note that "immediate improvement" was measured at the end of SLT, a week or two prior to T2 scan |
| If longitudinal, was there any intervention between the time points? | SLT with alternating semantic and phonological sessions, 3 days/week, 4 weeks |
| Is the scanner described? | Yes (Bruker MedSpec 4 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type          | Event-related           |
| Total images acquired | 610                     |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed) |
| Imaging notes        | slow event-related design; sparse sampling |

**Conditions**

| Condition                                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|------------------------------------------------|---------------|-------------|-----------------------|---------------------------|
| picture naming (phonological trained items)    | Word (overt)  | 30          | Yes                   | No                        |
| picture naming (semantic trained items)        | Word (overt)  | 30          | Yes                   | No                        |
| picture naming (known items)                   | Word (overt)  | 30          | Yes                   | Yes                       |
| viewing scrambled images                        | None          | 30          | N/A                   | N/A                       |

**Conditions notes**

Some patients named < 10% correct at T1

**Contrasts**

| Are the contrasts clearly described? | No (see specific limitation(s) below) |

**Contrast 1: picture naming (phonological trained items, correct trials) vs viewing scrambled images**

| Language condition                          | Picture naming (phonological trained items, correct trials) |
|---------------------------------------------|------------------------------------------------------------|
| Control condition                           | Viewing scrambled images                                    |

| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |

| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Question                                                                 | Answer |
|-------------------------------------------------------------------------|--------|
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes                                                  | —      |
| Are control data reported in this paper or another that is referenced? | Somewhat |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data?                      | Unknown |
| Control activation notes                                               | Control data are described for naming untrained items; the data are reported only briefly in the text; it is notable that no speech motor, visual, or auditory activations are reported, as might be expected in a picture naming task |
| Contrast notes                                                         | Correct and incorrect trials were apparently modeled separately, but this is not clearly stated, nor are the criteria for deciding whether trials were correct; it is generally not clear which contrasts exactly were run |
| Contrast 2: picture naming (semantic trained items, correct trials) vs viewing scrambled images | |
| Language condition                                                    | Picture naming (semantic trained items, correct trials) |
| Control condition                                                     | Viewing scrambled images |
| Are the conditions matched for visual demands?                        | Yes |
| Are the conditions matched for auditory demands?                      | No |
| Are the conditions matched for motor demands?                         | No |
| Are the conditions matched for cognitive/executive demands?           | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes                                                  | —      |
| Are control data reported in this paper or another that is referenced? | Unknown |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data?                      | Unknown |
| Control activation notes                                               | Control data are described for naming untrained items; the data are reported only briefly in the text; it is notable that no speech motor, visual, or auditory activations are reported, as might be expected in a picture naming task |
| Contrast notes                                                         | Correct and incorrect trials were apparently modeled separately, but this is not clearly stated, nor are the criteria for deciding whether trials were correct; it is generally not clear which contrasts exactly were run |
| Analyses                                                               | Yes |
| Voxelwise analysis 1                                                   | |
| First level contrast                                                  | Picture naming (phonological trained items, correct trials) vs viewing scrambled images |
| Analysis class                                                        | Cross-sectional correlation with language or other measure |
| Group(s)                                                              | Aphasia T1 |
| Covariate                                                             | Subsequent Δ (T2 vs T1) picture naming (phonological treated items) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (T1 behavioral measure should be included in model) |
| Is accuracy matched across the second level contrast?                 | Yes, correct trials only |
| Is reaction time matched across the second level contrast?             | Unknown, not reported |
| Behavioral data notes                                                 | —      |
| Type of analysis                                                      | Voxelwise |
| Search volume                                                         | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on 3dClustSim |
|-----------------------------------|-------------------------------------------|
| Software                          | AFNI                                      |
| Voxelwise p                       | .005                                      |
| Cluster extent                    | 0.999 cc                                  |
| Statistical details               | —                                         |
| Findings                          | None                                      |
| Findings notes                    | —                                         |

**Voxelwise analysis 2**

| First level contrast              | Picture naming (semantic trained items, correct trials) vs viewing scrambled images |
| Analysis class                    | Cross-sectional correlation with language or other measure |
| Group(s)                          | Aphasia T1 |
| Covariate                         | Subsequent $\Delta$ (T2 vs T1) picture naming (semantic treated items) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (T1 behavioral measure should be included in model) |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes             | —                                         |
| Type of analysis                  | Voxelwise |
| Search volume                     | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on 3dClustSim |
| Software                          | AFNI                                      |
| Voxelwise p                       | .005                                      |
| Cluster extent                    | 0.999 cc                                  |
| Statistical details               | —                                         |
| Findings                          | ↑ L basal ganglia                         |
| Findings notes                    | —                                         |

**Voxelwise analysis 3**

| First level contrast              | Picture naming (phonological trained items, correct trials) vs viewing scrambled images |
| Analysis class                    | Cross-sectional correlation with language or other measure |
| Group(s)                          | Aphasia T2 |
| Covariate                         | Previous $\Delta$ (T2 vs T1) picture naming (phonological treated items) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | No (T2 activation not an appropriate measure of treatment-induced recovery because it reflects T2 performance) |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes             | —                                         |
| Type of analysis                  | Voxelwise |
| Search volume                     | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on 3dClustSim |
| Software                          | AFNI                                      |
| Voxelwise p                       | .005                                      |
| Cluster extent                    | 0.999 cc                                  |
| Statistical details               | —                                         |
| Findings                          | ↑ L supramarginal gyrus                  |
| Findings notes                    | ↑ R precuneus                             |

**Voxelwise analysis 4**

| First level contrast              | Picture naming (semantic trained items, correct trials) vs viewing scrambled images |
| Analysis class | Cross-sectional correlation with language or other measure |
|---------------|----------------------------------------------------------|
| Group(s)      | Aphasia T2                                               |
| Covariate     | Previous \(\Delta\) (T2 vs T1) picture naming (semantic treated items) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | No (T2 activation not an appropriate measure of treatment-induced recovery because it reflects T2 performance) |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Voxelwise |
| Search volume | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on 3dClustSim |
| Software | AFNI |
| Voxelwise p | .005 |
| Cluster extent | 0.999 cc |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

**Voxelwise analysis 5**

| First level contrast | Picture naming (phonological trained items, correct trials) vs viewing scrambled images |
|----------------------|-------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia T1 |
| Covariate            | Subsequent outcome (T2) picture naming |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | No (not appropriate to correlate T1 imaging with T2 behavior without T1 behavior in model) |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Search volume        | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on 3dClustSim |
| Software             | AFNI |
| Voxelwise p          | .005 |
| Cluster extent       | 0.999 cc |
| Statistical details  | — |
| Findings             | None |
| Findings notes       | — |

**Voxelwise analysis 6**

| First level contrast | Picture naming (semantic trained items, correct trials) vs viewing scrambled images |
|----------------------|-------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia T1 |
| Covariate            | Subsequent outcome (T2) picture naming |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | No (not appropriate to correlate T1 imaging with T2 behavior without T1 behavior in model) |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Analysis | First level contrast | Analysis class | Group(s) | Covariate | Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Is accuracy matched across the second level contrast? | Is reaction time matched across the second level contrast? | Behavioral data notes | Type of analysis | Search volume | Correction for multiple comparisons | Software | Voxelwise p | Cluster extent | Statistical details | Findings | Findings notes |
|----------|----------------------|----------------|----------|-----------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|----------------------|----------------|--------------|---------------------------------|----------|-------------|---------------|----------------|---------|---------------|
| 7        | Picture naming (phonological trained items, correct trials) vs viewing scrambled images | Cross-sectional correlation with language or other measure | Aphasia T2 | Picture naming T2 | Yes | Yes, correct trials only | Unknown, not reported | — | Voxelwise | Whole brain | Clusterwise correction based on 3dClustSim | AFNI | .005 | 0.999 cc | — | None | — |
| 8        | Picture naming (semantic trained items, correct trials) vs viewing scrambled images | Cross-sectional correlation with language or other measure | Aphasia T2 | Picture naming T2 | Yes | Yes, correct trials only | Unknown, not reported | — | Voxelwise | Whole brain | Clusterwise correction based on 3dClustSim | AFNI | .005 | 0.999 cc | — | None | — |

**Notes**

Excluded analyses: Individual patient analyses
## Abel et al. (2015)

### Reference

| Authors | Abel S, Weiller C, Huber W, Willmes K, Specht K |
| Title | Therapy-induced brain reorganization patterns in aphasia |
| Reference | *Brain* 2015; 138: 1097-1112 |
| PMID | 25688082 |
| DOI | 10.1093/brain/awv022 |

### Participants

| Language | German |
| Inclusion criteria | Anomia; no severe AoS or dysarthria |
| Number of individuals with aphasia | 14 (plus 9 excluded: 4 for ceiling performance; 5 for technical problems) |
| Number of control participants | 14 |
| Were any of the participants included in any previous studies? | Yes (same dataset as Abel et al. (2014)) |
| Is age reported for patients and controls, and matched? | Yes (median 48 years, range 35-74 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 10; females: 4) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 14; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (median 41 months, range 11-72 months) |
| To what extent is the nature of aphasia characterized? | Type only |
| Language evaluation | AAT |
| Aphasia severity | Not stated |
| Aphasia type | 8 Broca's, 3 Wernicke's, 1 fluent non-classifiable, 1 global, 1 transcortical sensory |
| First stroke only? | Yes |
| Stroke type | Mixed etiologies |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Not stated |
| Lesion location | L MCA; 2 also had ACA |
| Participants notes | — |

### Imaging

| Modality | fMRI |
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment, ~6 weeks later (labeled T2 and T3 in paper) |
| If longitudinal, was there any intervention between the time points? | Lexical therapy, alternating between weeks with phonological and semantic treatment, 4 weeks; 60 out of the 132 items were trained |
| Is the scanner described? | Yes (Philips Achieva 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (trials too close together (~8 s) and insufficient jitter (1-3 s) for event-related design) |
| Design type | Event-related |
| Total images acquired | 560 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
Is first level model fitting adequately described and appropriate?  
Yes

Is intersubject normalization adequately described and appropriate?  
No (lesion impact not addressed)

Imaging notes  
—

Conditions

Are the conditions clearly described?  
Yes

| Condition          | Response type | Repetitions | All groups could do? | All individuals could do? |
|--------------------|---------------|-------------|----------------------|---------------------------|
| picture naming     | Word (overt)  | 132         | Yes                  | Yes                       |
| rest               | None          | implicit    | N/A                  | N/A                       |

Conditions notes  
—

Contrasts

Are the contrasts clearly described?  
Yes

Contrast 1: picture naming vs rest

| Language condition | Control condition | Are the conditions matched for visual demands? | Are the conditions matched for auditory demands? | Are the conditions matched for motor demands? | Are the conditions matched for cognitive/executive demands? | Is accuracy matched between the language and control tasks for all relevant groups? | Is reaction time matched between the language and control tasks for all relevant groups? | Behavioral data notes | Does the contrast selectively activate plausible relevant language regions in the control group? | Are activations lateralized in the control data? | Control activation notes | Contrast notes |
|--------------------|-------------------|-----------------------------------------------|-------------------------------------------------|-----------------------------------------------|---------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-----------------------------------------------|-------------------------------------------------|-----------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| Picture naming     | Rest              | No                                            | No                                              | No                                            | No                                                | N/A, tasks not comparable                      | N/A, tasks not comparable                      | —                                             | No                                              | No                                             | Bilateral somato-motor, auditory and to a lesser extent higher level visual regions; finite impulse analysis only | —                                             |

Behavioral data notes  
RT shorter at T2

Analyses

Are the analyses clearly described?  
Yes

Voxelwise analysis 1

| First level contrast | Analysis class               | Group(s)       | Covariate | Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Is accuracy matched across the second level contrast? | Is reaction time matched across the second level contrast? | Behavioral data notes |
|----------------------|------------------------------|----------------|-----------|------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|------------------------|
| Picture naming vs rest | Longitudinal change in aphasia | Aphasia T2 vs T1 | —         | Yes                                                                                          | No, different                                       | No, different                                       | RT shorter at T2        |
| Type of analysis          | Voxelwise                  |
|--------------------------|----------------------------|
| Search volume            | Whole brain                |
| Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta |
| Software                 | SPM8                       |
| Voxelwise p              | .01                        |
| Cluster extent           | 11 voxels (size not stated) |
| Statistical details      | —                          |
| Findings                 |                            |
|                          | ↓ L IFG pars triangularis  |
|                          | ↓ L dorsolateral prefrontal cortex |
|                          | ↓ L ventral precentral/inferior frontal junction |
|                          | ↓ L dorsal precentral      |
|                          | ↓ L SMA/medial prefrontal  |
|                          | ↓ L somato-motor           |
|                          | ↓ L inferior parietal lobule |
|                          | ↓ L precuneus              |
|                          | ↓ L posterior cingulate    |
|                          | ↓ L cerebellum             |
|                          | ↓ R SMA/medial prefrontal  |
|                          | ↓ R somato-motor           |
|                          | ↓ R precuneus              |
|                          | ↓ R posterior STS           |
|                          | ↓ R posterior MTG           |
|                          | ↓ R posterior cingulate     |
|                          | ↓ R cerebellum             |
|                          | ↓ R thalamus               |
|                          | ↓ R hippocampus/MTL         |
| Findings notes           | —                          |

### Voxelwise analysis 2

| First level contrast     | Picture naming vs rest    |
|--------------------------|----------------------------|
| Analysis class           | Cross-sectional aphasia vs control |
| Group(s)                 | Aphasia T1 vs control T1   |
| Covariate                | —                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | No, different |
| Behavioral data notes    | Controls responded more quickly |
| Type of analysis         | Voxelwise                  |
| Search volume            | Whole brain                |
| Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta |
| Software                 | SPM8                       |
| Voxelwise p              | .01                        |
| Cluster extent           | 11 voxels (size not stated) |
| Statistical details      | —                          |
| Findings                 |                            |
|                          | ↑ R precuneus              |
|                          | ↓ L somato-motor           |
|                          | ↓ L Heschl's gyrus         |
|                          | ↓ L anterior cingulate     |
|                          | ↓ L posterior cingulate    |
|                          | ↓ L thalamus               |
|                          | ↓ L basal ganglia          |
|                          | ↓ R insula                 |
|                          | ↓ R somato-motor           |
|                          | ↓ R mid temporal           |
| Findings notes           | —                          |
Voxelwise analysis 3

| First level contrast | Picture naming vs rest |
|----------------------|------------------------|
| Analysis class       | Longitudinal aphasia vs control |
| Group(s)             | (Aphasia T2 vs T1) vs (control T2 vs T1) |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Appear mismatched** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |
| Behavioral data notes | RT not reported for controls |
| Type of analysis     | Voxelwise |
| Search volume        | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta |
| Software              | SPM8 |
| Voxelwise p           | .01 |
| Cluster extent        | 11 voxels (size not stated) |
| Statistical details   | — |
| Findings              | ↓ L precuneus |
|                       | ↓ L anterior cingulate |
|                       | ↓ L posterior cingulate |
|                       | ↓ L basal ganglia |
|                       | ↓ R precuneus |
|                       | ↓ R posterior STS |
|                       | ↓ R posterior MTG |
|                       | ↓ R posterior cingulate |
|                       | ↓ R thalamus |
|                       | ↓ R hippocampus/MTL |
| Findings notes        | — |

Voxelwise analysis 4

| First level contrast | Picture naming vs rest |
|----------------------|------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia T1 vs control T1 |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Appear mismatched** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |
| Behavioral data notes | RT not reported for controls |
| Type of analysis     | Voxelwise |
| Search volume        | Whole brain |
| Correction for multiple comparisons | No direct comparison |
| Software              | SPM8 |
| Voxelwise p           | — |
| Cluster extent        | — |
| Statistical details   | Qualitative comparison between activation in the first 5 TRs after each stimulus on p. 1101 |
| Findings              | None |
| Findings notes        | The time course of response is stated to be similar in patients and controls, however the response in patients appears like it could be a couple of seconds slower |

Complex analysis 1

| First level contrast | Picture naming vs rest |
### Analysis class
Cross-sectional aphasia vs control

### Group(s)
Aphasia vs control

### Covariate
—

### Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?
Yes

### Is accuracy matched across the second level contrast?
No, different

### Is reaction time matched across the second level contrast?
Unknown, not reported

### Behavioral data notes
RT not reported for controls

### Type of analysis
Complex

### Statistical details
Joint ICA was performed on structural and functional contrast images using FIT 1.2c. Three of the 7 components differed between groups in their loadings. Components were thresholded at $z > 3.09$, not corrected for multiple comparisons.

### Findings
Three structural-functional components are described in Figure 5 and Table 4. Functional activations are generally small and do not obviously relate to language processing. It is mentioned in the supplementary results that "the lesion maps may dominate estimation of the mixing parameter" (p. 10).

### Notes
Excluded analyses
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### Kiran et al. (2015)

#### Reference

| Authors           | Kiran S, Meier EL, Kapse Kj, Glynn PA |
|-------------------|-------------------------------------|
| Title             | Changes in task-based effective connectivity in language networks following rehabilitation in post-stroke patients with aphasia |
| Reference         | Front Hum Neurosci 2015; 9: 316 |
| PMID              | 26106314 |
| DOI               | 10.3389/fnhum.2015.00316 |

#### Participants

| Language          | US English |
|-------------------|------------|
| Inclusion criteria| Impaired naming |
| Number of individuals with aphasia | 8 |
| Number of control participants | 8 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (mean 58 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 7; females: 1) |
| Is handedness reported for patients and controls, and matched? | No |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 15-157 months) |
| To what extent is the nature of aphasia characterized? | Severity only |
| Language evaluation | WAB, BNT, PPT, CLQT |
| Aphasia severity   | AQ range 48.0-97.2 |
| Aphasia type       | Not stated |
| First stroke only? | Yes |
Stroke type | Not stated
---|---
To what extent is the lesion distribution characterized? | Lesion overlay
Lesion extent | 24.2-431.6 cc
Lesion location | L MCA except for one patient with R MCA and aphasia
Participants notes | —

### Imaging

| Modality | fMRI |
|---|---|
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment, ~10 weeks later |
| If longitudinal, was there any intervention between the time points? | Semantic feature-based treatment, 10 weeks |
| Is the scanner described? | Yes (Philips Achieva 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (picture and scrambled conditions have different durations; ITI 2-4 s seems too short; total images acquired not stated) |
| Design type | Event-related |
| Total images acquired | not stated |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | controls were run on two different sets of parameters, neither of which was the same as the patients |

### Conditions

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|---|---|---|---|---|
| picture naming (trained) | Word (overt) | 40 | Unknown | Unknown |
| picture naming (untrained) | Word (overt) | 40 | Unknown | Unknown |
| viewing scrambled images and saying "skip" | Word (overt) | 80 | Unknown | Unknown |
| semantic feature decision | Button press | 40 | Unknown | Unknown |
| visual decision | Button press | 40 | Unknown | Unknown |

Conditions notes | — |

### Contrasts

| Contrast 1: picture naming (trained) vs viewing scrambled images and saying "skip" |
|---|---|
| Language condition | Picture naming (trained) |
| Control condition | Viewing scrambled images and saying "skip" |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Is reaction time matched between the language | Unknown, not reported |

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and control tasks for all relevant groups?

Behavioral data notes

- Are control data reported in this paper or another that is referenced? Somewhat
- Does the contrast selectively activate plausible relevant language regions in the control group? No
- Are activations lateralized in the control data? Somewhat

Control activation notes

- Overlap of individual participant activation maps; somewhat lateralized frontal and temporal, but also bilateral occipito-temporal

Contrast notes

- Overlap of individual participant activation maps; somewhat lateralized frontal and temporal, but also bilateral occipito-temporal

**Contrast 2: semantic feature decision vs visual decision**

| Language condition          | Semantic feature decision |
|-----------------------------|---------------------------|
| Control condition           | Visual decision           |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |

Behavioral data notes

- Are control data reported in this paper or another that is referenced? Somewhat

Contrast notes

- Overlap of individual participant activation maps; somewhat lateralized frontal and temporal, but also bilateral occipito-temporal

**Analyses**

Are the analyses clearly described? Yes

**Voxelwise analysis 1**

- First level contrast: Picture naming (trained) vs viewing scrambled images and saying "skip"
- Analysis class: Longitudinal change in aphasia
- Group(s): Aphasia T2 vs T1
- Covariate: —
- Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes
- Is accuracy matched across the second level contrast? Unknown, not reported
- Is reaction time matched across the second level contrast? Unknown, not reported

Behavioral data notes

- Type of analysis: Voxelwise
- Search volume: Whole brain
- Correction for multiple comparisons: No direct comparison
- Software: SPM8
- Voxelwise p: —
- Cluster extent: —
- Statistical details: Analyses were carried out in individual patients at p < .001, uncorrected; regions were considered activated when they were found in 6 or more (out of 8) patients
### Findings

| ↑ L IFG                      |
| ↑ L dorsolateral prefrontal cortex |
| ↑ L ventral precentral/inferior frontal junction |
| ↑ L dorsal precentral |
| ↑ L SMA/medial prefrontal |
| ↑ L supramarginal gyrus |
| ↑ L angular gyrus |
| ↑ L posterior MTG |
| ↑ R IFG                      |
| ↑ R dorsolateral prefrontal cortex |
| ↑ R SMA/medial prefrontal |
| ↑ R supramarginal gyrus |
| ↑ R posterior STG |
| ↑ R posterior MTG |
| ↑ R posterior inferior temporal gyrus/fusiform gyrus |

### Findings notes

Regions are approximate since only broad regions are described in Table 6

### Voxelwise analysis 2

| First level contrast | Semantic feature decision vs visual decision |
|----------------------|---------------------------------------------|
| Analysis class       | Longitudinal change in aphasia               |
| Group(s)             | Aphasia T2 vs T1                            |
| Covariate            | —                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

| Behavioral data notes | — |
| Type of analysis      | Voxelwise |
| Search volume         | Whole brain |
| Correction for multiple comparisons | No direct comparison |
| Software              | SPM8 |
| Voxelwise p           | — |
| Cluster extent        | — |
| Statistical details   | Analyses were carried out in individual patients at p < .001, uncorrected; regions were considered activated when they were found in 6 or more (out of 8) patients |

### Findings

| ↑ L ventral precentral/inferior frontal junction |
| ↑ L dorsal precentral |
| ↑ L posterior MTG |
| ↑ R IFG                      |
| ↑ R dorsolateral prefrontal cortex |
| ↑ R SMA/medial prefrontal |
| ↑ R supramarginal gyrus |
| ↑ R angular gyrus |
| ↑ R posterior STG |
| ↑ R posterior MTG |

### Findings notes

Regions are approximate since only broad regions are described in Table 7

### Notes

- **Excluded analyses**: (1) DCM analyses; (2) activation for untrained categories, since this is reported only for individual patients in supplementary material

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Sandberg et al. (2015)

Reference
Sandberg CW, Bohland JW, Kiran S

Changes in functional connectivity related to direct training and generalization effects of a word finding treatment in chronic aphasia

Brain Lang 2015; 150: 103-116

26398158 10.1016/j.bandl.2015.09.002

| Participants | | |
|--------------|-----------------|-----------------|
| Language     | US English      | | |
| Inclusion criteria | | | |
| Number of individuals with aphasia | 10 | | |
| Number of control participants | 0 | | |
| Were any of the participants included in any previous studies? | No | | |
| Is age reported for patients and controls, and matched? | Yes (mean 59 years, range 47-75 years) | | |
| Is sex reported for patients and controls, and matched? | Yes (males: 7; females: 3) | | |
| Is handedness reported for patients and controls, and matched? | Yes (right: 10; left: 0) | | |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 7-134 months) | | |
| To what extent is the nature of aphasia characterized? | Comprehensive battery | | |
| Language evaluation | WAB, BNT, subtests from PALPA, PPT, CLQT | | |
| Aphasia severity | AQ range 41.7-99.2 | | |
| Aphasia type | 6 anomic, 2 conduction, 1 Broca’s, 1 transcortical motor | | |
| First stroke only? | Not stated | | |
| Stroke type | Not stated | | |
| To what extent is the lesion distribution characterized? | Lesion overlay | | |
| Lesion extent | Range 0.3-256.0 cc | | |
| Lesion location | L MCA | | |
| Participants notes | — | | |

| Imaging | | |
|----------|------|------|
| Modality | fMRI | Longitudinal—chronic treatment |
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment | |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment, up to 10 weeks later | |
| If longitudinal, was there any intervention between the time points? | Semantic feature-based treatment, 2 hours/day, 2 days/week, up to 10 weeks (depending on when criterion reached) | |
| Is the scanner described? | Yes (Philips Achieva 3 Tesla) | |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (total images acquired not stated; ITI of 1-3 s seems short) | |
| Design type | Event-related | | |
| Total images acquired | not stated | | |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) | | |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes | | |
| Is first level model fitting adequately described and appropriate? | Yes | | |
| Is intersubject normalization adequately described and appropriate? | Yes | | |
| Imaging notes | — | | |
## Conditions

Are the conditions clearly described? Yes

| Condition                        | Response type | Repetitions | All groups could do? | All individuals could do? |
|----------------------------------|---------------|-------------|----------------------|---------------------------|
| concreteness judgment (abstract words) | Button press  | 60          | Yes                  | No                        |
| concreteness judgment (concrete words)  | Button press  | 60          | Yes                  | Yes                      |
| letter string judgment  | Button press  | 60          | Unknown              | Unknown                   |
| rest                             | None          | implicit baseline | N/A                  | N/A                      |

Conditions notes 2 patients below chance on abstract words per supplementary table 2

## Contrasts

Are the contrasts clearly described? No (see specific limitation(s) below)

### Contrast 1: concreteness judgment (abstract words, correct trials) vs rest

| Language condition                        | Concreteness judgment (abstract words, correct trials) | Rest |
|-------------------------------------------|-------------------------------------------------------|------|
| Control condition                         | Concreteness judgment (abstract words, correct trials) | Rest |
| Are the conditions matched for visual demands? | No                                                      |     |
| Are the conditions matched for auditory demands? | Yes                                                     |     |
| Are the conditions matched for motor demands? | No                                                      |     |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                               |     |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                               |     |
| Behavioral data notes                     | —                                                      |     |
| Are control data reported in this paper or another that is referenced? | No                                                      |     |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                                                |     |
| Are activations lateralized in the control data? | Unknown                                                |     |
| Control activation notes                  | —                                                      |     |
| Contrast notes                            | The concreteness judgment task was compared to the letter string judgment task to define ROIs for connectivity analysis, but the group analysis meeting criteria for this review appears to be based only on comparisons between time points on the concreteness judgment conditions |

### Contrast 2: concreteness judgment (concrete words, correct trials) vs rest

| Language condition                        | Concreteness judgment (concrete words, correct trials) | Rest |
|-------------------------------------------|-------------------------------------------------------|------|
| Control condition                         | Concreteness judgment (concrete words, correct trials) | Rest |
| Are the conditions matched for visual demands? | No                                                      |     |
| Are the conditions matched for auditory demands? | Yes                                                     |     |
| Are the conditions matched for motor demands? | No                                                      |     |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                               |     |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                               |     |
| Behavioral data notes                     | —                                                      |     |
| Are control data reported in this paper or another that is referenced? | No                                                      |     |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                                                |     |
Are activations lateralized in the control data? | Unknown
---|---
Control activation notes | —
Contrast notes | The concreteness judgment task was compared to the letter string judgment task to define ROIs for connectivity analysis, but the group analysis meeting criteria for this review appears to be based only on comparisons between time points on the concreteness judgment conditions

**Analyses**

Are the analyses clearly described? | **No**** (major limitation) (see specific limitation(s) below)**

**Voxelwise analysis 1**

| First level contrast | Concreteness judgment (abstract words, correct trials) vs rest |
| Analysis class | Longitudinal change in aphasia |
| Group(s) | Aphasia with response to treatment ($n = 9$) T2 vs T1 |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Yes, matched |
| Behavioral data notes | — |
| Type of analysis | Voxelwise |
| Search volume | Whole brain |
| Correction for multiple comparisons | No correction |
| Software | SPM8 |
| Voxelwise p | .001 |
| Cluster extent | None |
| Statistical details | Images show peaks instead of activations |
| Findings | ↑ L IFG pars opercularis, ↑ L dorsolateral prefrontal cortex, ↑ L SMA/medial prefrontal, ↑ L inferior parietal lobule, ↑ L supramarginal gyrus, ↑ L angular gyrus, ↑ L precuneus, ↑ L posterior inferior temporal gyrus/fusiform gyrus, ↑ L posterior cingulate, ↑ L basal ganglia, ↑ R orbitofrontal, ↑ R supramarginal gyrus, ↑ R angular gyrus, ↑ R anterior temporal, ↑ R occipital |
| Findings notes | — |

**Voxelwise analysis 2**

| First level contrast | Concreteness judgment (concrete words, correct trials) vs rest |
| Analysis class | Longitudinal change in aphasia |
| Group(s) | Aphasia with generalization of treatment effects to concrete words ($n = 7$) T2 vs T1 |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Yes, matched |
**Behavioral data notes**

- Type of analysis: Voxelwise
- Search volume: Whole brain
- Correction for multiple comparisons: **No correction**
- Software: SPM8
- Voxelwise p: .001
- Cluster extent: None

**Statistical details**

- Images show peaks instead of activations

**Findings**

| Findings                             |
|--------------------------------------|
| ↑ L insula                          |
| ↑ L inferior parietal lobule         |
| ↑ L supramarginal gyrus             |
| ↑ L precuneus                       |
| ↑ L occipital                       |
| ↑ R dorsolateral prefrontal cortex  |
| ↑ R ventral precentral/inferior frontal junction |
| ↑ R posterior STG                    |
| ↑ R posterior cingulate              |

**Findings notes**

- —

**Notes**

- Excluded analyses: Connectivity analyses due to degree of complexity, which precluded assessment

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**Geranmayeh et al. (2016)**

**Reference**

| Authors    | Geranmayeh F, Leech R, Wise RJ |
|------------|--------------------------------|
| Title      | Network dysfunction predicts speech production after left hemisphere stroke |
| Reference  | *Neurology* 2016; 86: 1296-1305 |
| PMID       | 26962070                        |
| DOI        | 10.1212/wnl.0000000000002537    |

**Participants**

| Language | UK English |
|----------|------------|
| Inclusion criteria | No severe receptive aphasia |
| Number of individuals with aphasia | 53 |
| Number of control participants | 24 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (mean 62 ± 14 years, range 26-83 years) |
| Is sex reported for patients and controls, and matched? | No (males: 32; females: 21; controls were mostly female, unlike patients) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 50; left: 3) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 111 ± 27 days, range 84-200 days) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |
| Language evaluation | CAT, QPA |
| Aphasia severity | “relatively mild stroke”; 17 patients were so mild that they were not aphasic per the CAT |
| Aphasia type | Not stated |
| First stroke only? | No |
| Stroke type | Not stated |
To what extent is the lesion distribution characterized? | Lesion overlay
---|---
Lesion extent | Mean 25.4 ± 13.5 cc, range 0.3-168.0 cc
Lesion location | L; modest R involvement in 7 cases
Participants notes | Prior strokes were allowed only if no aphasia resulted

**Imaging**

| Modality | fMRI
---|---
Is the study cross-sectional or longitudinal? | Cross-sectional
If longitudinal, at what time point(s) were imaging data acquired? | —
If longitudinal, was there any intervention between the time points? | —
Is the scanner described? | Yes (Siemens Trio 3 Tesla)
Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes
Design type | Event-related
Total images acquired | 213
Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)
Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes
Is first level model fitting adequately described and appropriate? | Yes
Is intersubject normalization adequately described and appropriate? | Yes
Imaging notes | sparse sampling; mini-blocks of 2-4 trials

**Conditions**

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
---|---|---|---|---|
propositional speech production | Sentence (overt) | 60 | Yes | No |
counting | Multiple words (overt) | 48 | Yes | Unknown |
target decision | Button press | 48 | Yes | Unknown |
rest | None | 45 | N/A | N/A |

Conditions notes | —

**Contrasts**

Are the contrasts clearly described? | Yes

**Contrast 1: propositional speech production vs rest**

| Language condition | Propositional speech production
---|---
Control condition | Rest
Are the conditions matched for visual demands? | No
Are the conditions matched for auditory demands? | No
Are the conditions matched for motor demands? | No
Are the conditions matched for cognitive/executive demands? | No
Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable
Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable
Behavioral data notes | —
Are control data reported in this paper or another | Somewhat
### Contrast 2: propositional speech production vs counting

| Language condition          | Propositional speech production |
|-----------------------------|---------------------------------|
| Control condition           | Counting                        |
| Are the conditions matched for visual demands? | No                              |
| Are the conditions matched for auditory demands? | Yes                             |
| Are the conditions matched for motor demands? | Yes                             |
| Are the conditions matched for cognitive/executive demands? | No                              |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes       |                                  |
| Are control data reported in this paper or another that is referenced? | Somewhat                       |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes                             |
| Are activations lateralized in the control data? | Yes                             |
| Control activation notes    | Control data for univariate analysis in Geranmayeh et al. (2014), but note that the present paper does not describe a univariate analysis; control activations reflect speech rather than language |
| Contrast notes              |                                  |

### Contrast 3: propositional speech production vs target decision

| Language condition          | Propositional speech production |
|-----------------------------|---------------------------------|
| Control condition           | Target decision                 |
| Are the conditions matched for visual demands? | No                              |
| Are the conditions matched for auditory demands? | No                              |
| Are the conditions matched for motor demands? | No                              |
| Are the conditions matched for cognitive/executive demands? | No                              |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes       |                                  |
| Are control data reported in this paper or another that is referenced? | No                              |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                        |
| Are activations lateralized in the control data? | Unknown                        |
| Control activation notes    |                                  |
| Contrast notes              |                                  |

### Analyses

| Are the analyses clearly described? | No (see specific limitation(s) below) |
## ROI analysis 1

| First level contrast | Propositional speech production vs rest |
|----------------------|-----------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control     |
| Group(s)             | Aphasia vs control                      |
| Covariate            | —                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Difference in AICW/trial               |
| Type of analysis     | Regions of interest (ROI)              |
| ROI type             | Functional                              |
| How many ROIs are there? | 4                                      |
| What are the ROI(s)? | (1) L fronto-temporo-parietal network; (2) R fronto-temporo-parietal network; (3) cingulo-opercular network; (4) default mode network |
| How are the ROI(s) defined? | Identified using ICA in controls |
| Correction for multiple comparisons | No correction |
| Statistical details  | Circular because ROIs defined in one group |
| Findings             | ↑ L insula                              |
|                      | ↑ L anterior cingulate                  |
|                      | ↑ R insula                              |
|                      | ↑ R anterior cingulate                  |
| Findings notes       | —                                       |

## ROI analysis 2

| First level contrast | Propositional speech production vs counting |
|----------------------|--------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control         |
| Group(s)             | Aphasia vs control                         |
| Covariate            | —                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Difference in AICW/trial                   |
| Type of analysis     | Regions of interest (ROI)                 |
| ROI type             | Functional                                |
| How many ROIs are there? | 4                                      |
| What are the ROI(s)? | (1) L fronto-temporo-parietal network; (2) R fronto-temporo-parietal network; (3) cingulo-opercular network; (4) default mode network |
| How are the ROI(s) defined? | Identified using ICA in controls |
| Correction for multiple comparisons | No correction |
| Statistical details  | Circular because ROIs defined in one group |
| Findings             | ↑ L insula                                |
|                      | ↑ L anterior cingulate                    |
|                      | ↑ R insula                                |
|                      | ↑ R anterior cingulate                    |
|                      | ↓ L IFG                                   |
|                      | ↓ L inferior parietal lobule              |
|                      | ↓ L posterior inferior temporal gyrus/fusiform gyrus |
| Findings notes       | —                                        |

## ROI analysis 3
### Complex analysis 1

| First level contrast | Propositional speech production vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control     |
| Group(s)             | Aphasia vs control                     |
| Covariate            | —                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Difference in AICW/trial               |
| Type of analysis     | Regions of interest (ROI)              |
| ROI type             | Functional                              |
| How many ROIs are there? | 4                                      |
| What are the ROI(s)? | (1) L fronto-temporo-parietal network; (2) R fronto-temporo-parietal network; (3) cingulo-opercular network; (4) default mode network |
| How are the ROI(s) defined? | Identified using ICA in controls |
| Correction for multiple comparisons | No correction |
| Statistical details  | Circular because ROIs defined in one group |
| Findings             | None                                    |
| Findings notes       | —                                       |

**Findings**

Patients showed greater differential activation than controls between (1) L fronto-temporo-parietal network and the DMN; (2) R fronto-temporo-parietal network and the DMN; (3) cingulo-opercular network and the DMN.

### Complex analysis 2

| First level contrast | Propositional speech production vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                                |
| Covariate            | Appropriate information-carrying words |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                      |
| Type of analysis     | Complex                                |
| Statistical details  | Multiple regression was used to determine whether differential activation between networks |

**Findings**

Patients showed greater differential activation than controls between (1) L fronto-temporo-parietal network and the DMN; (2) R fronto-temporo-parietal network and the DMN; (3) cingulo-opercular network and the DMN.
was predictive of the behavioral measure: appropriate information-carrying words. There is no issue of circularity with this analysis since it involved only individuals with aphasia.

Findings | Other
--- | ---
Findings notes | Differential activation between L fronto-temporo-parietal network and the DMN was positively correlated with AICW. Differential activation between R fronto-temporo-parietal network and the DMN was negatively correlated with AICW.

### Complex analysis 3

| First level contrast | Propositional speech production vs rest |
|---------------------|---------------------------------------|
| Analysis class      | Cross-sectional aphasia vs control    |
| Group(s)            | Aphasia vs control                    |
| Covariate           | —                                     |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Difference in AICW/trial |
| Type of analysis    | Complex                               |
| Statistical details | PPI analyses were used to investigate how the speech condition modulated functional connectivity between (1) L fronto-temporo-parietal network and the DMN; (2) R fronto-temporo-parietal network and the DMN. However, circularity was introduced because the networks were defined based on the control group. |

Findings | Other
--- | ---
Findings notes | In controls, the L FTP network reduced connectivity with the DMN during speech, while the R FTP network increased connectivity with the DMN during speech. Both of these interactions were significantly decreased in patients. This was also true for contrasts 2 and 3.

### Notes

**Excluded analyses**

It is mentioned that LFTP and DMN activation did not correlate with speech performance, but insufficient details are provided regarding this analysis.

---

**Griffis et al. (2016)**

### Reference

| Authors          | Griffis JC, Nenert R, Allendorfer JB, Szafarski JP |
|------------------|--------------------------------------------------|
| Title            | Interhemispheric plasticity following intermittent theta burst stimulation in chronic poststroke aphasia |
| Reference        | *Neural Plast* 2016; 2016: 4796906               |
| PMID             | 26881111                                         |
| DOI              | 10.1155/2016/4796906                             |

### Participants

| Language   | US English |
|------------|------------|
| Inclusion criteria | Moderate aphasia, L MCA |
| Number of individuals with aphasia | 8 (plus 3 excluded: 2 metallic artifact; 1 seizure at time of stroke) |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | Yes (same patients as Szafarski et al. (2011); different fMRI paradigm acquired in the same sessions) |
| Is age reported for patients and controls, and matched? | Yes (mean 54.4 ± 12.7 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 4; females: 4) |
Is handedness reported for patients and controls, and matched?
Yes (right: 8; left: 0)

Is time post stroke onset reported and appropriate to the study design?
Yes (mean 5.3 ± 3.6 years)

To what extent is the nature of aphasia characterized?
Severity and type

Language evaluation
BNT; phonemic fluency, semantic fluency, complex ideation from BDAE, PPVT, communicative activities log

Aphasia severity
Moderate
Aphasia type
4 Broca’s, 3 anomic, 1 anomic/conduction
First stroke only?
Not stated
Stroke type
Not stated

To what extent is the lesion distribution characterized?
Individual lesions

Lesion extent
Range 1.4-52.5 cc
Lesion location
L MCA
Participants notes
—

Imaging

Modality
fMRI

Is the study cross-sectional or longitudinal?
Longitudinal—chronic treatment

If longitudinal, at what time point(s) were imaging data acquired?
T1: pre-treatment/chronic; T2: post-treatment, ~2 weeks later

If longitudinal, was there any intervention between the time points?
RTMS to residual activation near Broca’s area, 5 sessions/week, 2 weeks

Is the scanner described?
Yes (Varian Unity INOVA 4 Tesla)

Is the timing of stimulus presentation and image acquisition clearly described and appropriate?
Yes

Design type
Block
Total images acquired
140
Are the imaging acquisition parameters, including coverage, adequately described and appropriate?
Yes (whole brain)

Is preprocessing and intrasubject coregistration adequately described and appropriate?
Yes

Is first level model fitting adequately described and appropriate?
Yes

Is intersubject normalization adequately described and appropriate?
No (lesion impact not addressed)

Imaging notes
—

Conditions

Are the conditions clearly described?
Yes

| Condition          | Response type            | Repetitions | All groups could do? | All individuals could do? |
|--------------------|--------------------------|-------------|-----------------------|---------------------------|
| verb generation    | Multiple words (covert)  | 7           | Yes                   | Yes                       |
| finger tapping     | Other                    | 7           | Unknown               | Unknown                   |

Conditions notes
—

Contrasts

Are the contrasts clearly described?
Yes

Contrast 1: verb generation vs finger tapping

Language condition
Verb generation
Control condition
Finger tapping
Are the conditions matched for visual demands?
Yes
| Question                                                                 | Answer                                      |
|------------------------------------------------------------------------|---------------------------------------------|
| Are the conditions matched for auditory demands?                       | Yes                                         |
| Are the conditions matched for motor demands?                          | No                                          |
| Are the conditions matched for cognitive/executive demands?           | No                                          |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                   |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                   |
| Behavioral data notes                                                  | ---                                         |
| Are control data reported in this paper or another that is referenced? | Yes                                         |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes                                         |
| Are activations lateralized in the control data?                      | Somewhat                                    |
| Control activation notes                                               | Control data in Szafranski et al. (2008); frontal activation L-lateralized, temporal less so |
| Contrast notes                                                         | ---                                         |

**Analyses**

| Question                                                                 | Answer                                      |
|------------------------------------------------------------------------|---------------------------------------------|
| Are the analyses clearly described?                                     | No (see specific limitation(s) below)       |

**Voxelwise analysis 1**

| Question                                                                 | Answer                                      |
|------------------------------------------------------------------------|---------------------------------------------|
| First level contrast                                                   | Verb generation vs finger tapping           |
| Analysis class                                                         | Longitudinal change in aphasia              |
| Group(s)                                                               | Aphasia T2 vs T1                           |
| Covariate                                                              | ---                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (patients improved only on semantic fluency) |
| Is accuracy matched across the second level contrast?                  | Unknown, not reported                       |
| Is reaction time matched across the second level contrast?             | Unknown, not reported                       |
| Behavioral data notes                                                  | ---                                         |
| Type of analysis                                                       | Voxelwise                                   |
| Search volume                                                          | Whole brain                                 |
| Correction for multiple comparisons                                    | No correction                              |
| Software                                                               | SPM12                                       |
| Voxelwise p                                                            | .001                                        |
| Cluster extent                                                         | None                                        |
| Statistical details                                                    | ---                                         |
| Findings                                                               | ↑ L IFG pars opercularis                    |
|                                                                     | ↑ R cerebellum                              |
|                                                                     | ↑ R thalamus                                |
|                                                                     | ↓ R anterior temporal                        |
|                                                                     | ↓ R cerebellum                              |
| Findings notes                                                         | Based on description in text; it is noted that no regions survived FDR correction |

**ROI analysis 1**

| Question                                                                 | Answer                                      |
|------------------------------------------------------------------------|---------------------------------------------|
| First level contrast                                                   | Verb generation vs finger tapping           |
| Analysis class                                                         | Longitudinal change in aphasia              |
| Group(s)                                                               | Aphasia T2 vs T1                           |
| Covariate                                                              | ---                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (patients improved only on semantic fluency) |
| Is accuracy matched across the second level contrast?                  | Unknown, not reported                       |
| Is reaction time matched across the second level contrast?             | Unknown, not reported                       |
| **Behavioral data notes** | — |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | Mixed |
| **How many ROIs are there?** | 3 |
| **What are the ROI(s)?** | (1) L IFG; (2) R IFG; (3) frontal LI |
| **How are the ROI(s) defined?** | First principal component of 8 mm spheres defined based on previously reported control peaks |
| **Correction for multiple comparisons** | False discovery rate (FDR) |
| **Statistical details** | Lesion volume included in model |
| **Findings** | ↑ L IFG ↓ R IFG ↓ LI (frontal) |
| **Findings notes** | — |

### ROI analysis 2

| **First level contrast** | Verb generation vs finger tapping |
| **Analysis class** | Longitudinal correlation with language or other measure |
| **Group(s)** | Aphasia T2 vs T1 |
| **Covariate** | Δ semantic fluency |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Somewhat (patients improved only on semantic fluency) |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | Mixed |
| **How many ROIs are there?** | 3 |
| **What are the ROI(s)?** | (1) L IFG; (2) R IFG; (3) frontal LI |
| **How are the ROI(s) defined?** | First principal component of 8 mm spheres defined based on previously reported control peaks |
| **Correction for multiple comparisons** | False discovery rate (FDR) |
| **Statistical details** | Lesion volume included in model |
| **Findings** | ↓ R IFG |
| **Findings notes** | Decreased R IFG activation was correlated with improved semantic fluency |

### Complex analysis 1

| **First level contrast** | Verb generation vs finger tapping |
| **Analysis class** | Longitudinal change in aphasia |
| **Group(s)** | Aphasia T2 vs T1 |
| **Covariate** | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Somewhat (patients improved only on semantic fluency) |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Complex |
| **Statistical details** | PPI analyses were used to investigate change over time in modulation by verb generation of functional connectivity between L IFG and R IFG. |
| **Findings** | Other |
| **Findings notes** | There was a significant decrease in modulation by verb generation of functional connectivity between L IFG and R IFG (p = 0.03). Prior to TMS, connectivity increased during verb
generation compared to finger tapping, while after TMS, connectivity decreased during verb generation compared to finger tapping.

### Complex analysis 2

| First level contrast | Verb generation vs finger tapping |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T2 vs T1 |
| Covariate            | Δ semantic fluency in association with modulation of interhemispheric IFG connectivity by verb generation |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (patients improved only on semantic fluency) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Complex |
| Statistical details  | PPI analyses were used to investigate whether change over time in modulation by verb generation of functional connectivity between L IFG and R IFG was associated with changes in semantic fluency scores, which are limited as a measure of language improvement. |

#### Findings

None

#### Findings notes

None

### Complex analysis 3

| First level contrast | Verb generation vs finger tapping |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal change in aphasia |
| Group(s)             | Aphasia T2 vs T1 |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (patients improved only on semantic fluency) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Complex |
| Statistical details  | PPI analyses were used to investigate change over time in modulation by verb generation of functional connectivity between R IFG and all other brain regions. Voxelwise \( p < .001 \), not corrected for multiple comparisons. |

#### Findings

Other

#### Findings notes

Reduced connectivity was observed in the L IFG pars opercularis, L anterior temporal lobe, L occipital lobe, L basal ganglia, R SMA and pre-SMA, R somato-motor cortex, R posterior MTG, and R cerebellum. It is noted that no regions survived FDR correction.

#### Notes

Excluded analyses

(1) correlations between lesion volume and functional measures, not described in sufficient detail; (2) ad hoc analyses in section 3.4

### Sims et al. (2016)

#### Reference

| Authors            | Sims JA, Kapse K, Glynn P, Sandberg C, Tripodis Y, Kiran S |
|--------------------|----------------------------------------------------------|
| Title              | The relationships between the amount of spared tissue, percent signal change, and accuracy in semantic processing in aphasia |
### Participants

| Language | US English |
| Number of individuals with aphasia | 14 (plus 2 excluded: 1 had no spared tissue in the L IFG; 1 had a R hemisphere stroke) |
| Number of control participants | 8 |
| Were any of the participants included in any previous studies? | Yes (although not stated, it is apparent that many of the patients were included in Sandberg et al. (2015)) |
| Is age reported for patients and controls, and matched? | Yes (mean 59.7 years, range 48-75 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 10; females: 4) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 14; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 6 years, range 6 months-13 years) |
| To what extent is the nature of aphasia characterized? | Severity and type |
| Language evaluation | WAB, BNT, PPT, CLQT |
| Aphasia severity | AQ range 48.0-99.2 |
| Aphasia type | 4 anomic, 2 Broca's, 2 conduction, 2 transcortical motor, 1 anomic or transcortical motor, 1 Broca's or conduction, 1 "N/A", 1 Wernicke's or conduction |
| First stroke only? | Not stated |
| Stroke type | Not stated |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Not stated |
| Lesion location | L MCA |
| Participants notes | — |

### Imaging

| Modality | fMRI |
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Philips Achieva 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No (total images acquired not stated) |
| Design type | Event-related |
| Total images acquired | not stated |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | no smoothing |

### Conditions
Are the conditions clearly described? No (number of visual decision trials not reported)

| Condition                        | Response type | Repetitions | All groups could do? | All individuals could do? |
|----------------------------------|---------------|-------------|-----------------------|--------------------------|
| semantic feature decision        | Button press  | 64          | Yes                   | Unknown                  |
| visual decision                  | Button press  | not stated  | Yes                   | Unknown                  |
| semantic relatedness decision    | Button press  | 50          | Yes                   | Unknown                  |
| pseudoword identity decision     | Button press  | 50          | Yes                   | Unknown                  |
| rest                             | None          | implicit    | N/A                   | N/A                      |

Conditions notes —

Contrasts

Are the contrasts clearly described? Yes

**Contrast 1: semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision**

| Language condition               | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) |
|----------------------------------|----------------------------------------------------------------------------------------------------------|
| Control condition                | Visual decision or pseudoword identity decision                                                          |
| Are the conditions matched for visual demands? | Yes                                                                                                 |
| Are the conditions matched for auditory demands? | Yes                                                                                                 |
| Are the conditions matched for motor demands? | Yes                                                                                                 |
| Are the conditions matched for cognitive/executive demands? | Yes                                                                                                 |
| Is accuracy matched between the language and control tasks for all relevant groups? | No, different                                                                                      |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported                                                                               |
| Behavioral data notes            | —                                                                                                       |
| Are control data reported in this paper or another that is referenced? | No                                                                                                 |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                                                                                             |
| Are activations lateralized in the control data? | Unknown                                                                                             |
| Control activation notes         | —                                                                                                       |
| Contrast notes                   | 8 patients and 4 controls performed one paradigm, while 6 patients and 4 controls performed another; the data were combined based on the assumption that similar processes were implicated by the two contrasts |

Analyses

Are the analyses clearly described? No* (moderate limitation) (see specific limitation(s) below)

**ROI analysis 1**

| First level contrast             | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Analysis class                   | Cross-sectional correlation with language or other measure                                                                        |
| Group(s)                         | Aphasia                                                                                                                         |
| Covariate                        | Semantic feature decision accuracy                                                                                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                 |
| Is accuracy matched across the second level contrast? | Accuracy is covariate                                                                                                          |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                          |
| Behavioral data notes            | —                                                                                                                               |
| Type of analysis | Regions of interest (ROI) |
|-----------------|---------------------------|
| ROI type        | Anatomical                |
| How many ROIs are there? | 16                      |
| What are the ROI(s)? | (1) L IFG pars orbitalis; (2) L IFG pars opercularis; (3) L IFG pars triangularis; (4) L SFG; (5) L MFG; (6) L MTG; (7) L AG/SMG; (8) L ACC; (9-16) homotopic counterparts |
| How are the ROI(s) defined? | AAL                      |
| Correction for multiple comparisons | No correction            |
| Statistical details | —                       |
| Findings | ↑ L IFG pars opercularis |
| Findings notes | —                       |

**ROI analysis 2**

| First level contrast | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision |
|----------------------|-------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                        |
| Group(s)             | Aphasia                                                             |
| Covariate            | WAB AQ                                                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                 |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                               |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                               |
| Behavioral data notes | —                                                                   |
| Type of analysis     | Regions of interest (ROI)                                          |
| ROI type             | Anatomical                                                         |
| How many ROIs are there? | 16                      |
| What are the ROI(s)? | (1) L IFG pars orbitalis; (2) L IFG pars opercularis; (3) L IFG pars triangularis; (4) L SFG; (5) L MFG; (6) L MTG; (7) L AG/SMG; (8) L ACC; (9-16) homotopic counterparts |
| How are the ROI(s) defined? | AAL                      |
| Correction for multiple comparisons | No correction            |
| Statistical details | —                                                                   |
| Findings             | None                                                                |
| Findings notes       | —                                                                   |

**ROI analysis 3**

| First level contrast | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision |
|----------------------|-------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                        |
| Group(s)             | Aphasia                                                             |
| Covariate            | BNT                                                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                 |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                               |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                               |
| Behavioral data notes | —                                                                   |
| Type of analysis     | Regions of interest (ROI)                                          |
| ROI type             | Anatomical                                                         |
| How many ROIs are there? | 16                      |
| What are the ROI(s)? | (1) L IFG pars orbitalis; (2) L IFG pars opercularis; (3) L IFG pars triangularis; (4) L SFG; (5) L MFG; (6) L MTG; (7) L AG/SMG; (8) L ACC; (9-16) homotopic counterparts |
| How are the ROI(s) defined? | AAL                      |
| Correction for multiple comparisons | No correction            |
| ROI analysis 4 |  |  |
| --- | --- | --- |
| **First level contrast** | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision |  |
| **Analysis class** | Cross-sectional correlation with language or other measure |  |
| **Group(s)** | Aphasia |  |
| **Covariate** | PPT |  |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |  |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |  |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |  |
| **Behavioral data notes** |  |  |
| **Type of analysis** | Regions of interest (ROI) |  |
| **ROI type** | Anatomical |  |
| **How many ROIs are there?** | 16 |  |
| **What are the ROI(s)?** | (1) L IFG pars orbitalis; (2) L IFG pars opercularis; (3) L IFG pars triangularis; (4) L SFG; (5) L MFG; (6) L MTG; (7) L AG/SMG; (8) L ACC; (9-16) homotopic counterparts |  |
| **How are the ROI(s) defined?** | AAL |  |
| **Correction for multiple comparisons** | No correction |  |
| **Statistical details** | None |  |
| **Findings** |  |  |
| **Findings notes** | MTG included anterior too; SMG/AG was single ROI |  |

| ROI analysis 5 |  |  |
| --- | --- | --- |
| **First level contrast** | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision |  |
| **Analysis class** | Cross-sectional correlation with language or other measure |  |
| **Group(s)** | Aphasia |  |
| **Covariate** | Lesion volume |  |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |  |
| **Is accuracy matched across the second level contrast?** | Yes, matched |  |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |  |
| **Behavioral data notes** | No correlation between lesion volume and accuracy, not clear whether control condition accuracy was also tested |  |
| **Type of analysis** | Regions of interest (ROI) |  |
| **ROI type** | Anatomical |  |
| **How many ROIs are there?** | 8 |  |
| **What are the ROI(s)?** | As above but only in the R hemisphere |  |
| **How are the ROI(s) defined?** | AAL |  |
| **Correction for multiple comparisons** | No correction |  |
| **Statistical details** | None |  |
| **Findings** | ↑ R supramarginal gyrus ↑ R angular gyrus ↑ R posterior MTG |  |
| **Findings notes** | MTG included anterior too; SMG/AG was single ROI |  |

| Complex analysis 1 |  |  |
| --- | --- | --- |
| **First level contrast** | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision |  |
| Analysis class       | Cross-sectional correlation with language or other measure |
|----------------------|----------------------------------------------------------|
| Group(s)             | Aphasia                                                  |
| Covariate            | Lesion status of 8 ROIs                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                        |
| Type of analysis     | Complex                                                  |
| Statistical details  | Multivariate mixed-effects linear regression analyses were used to identify relationships between structural damage to 8 regions, and functional activation in 16 regions. Results were corrected for multiple comparisons based on FDR. This analysis was not described in sufficient detail. |
| Findings             | Other                                                    |
| Findings notes       | Sparing of the L ACC and L SFG was associated with more functional activation in many regions, however this is difficult to interpret since these regions were largely or completely spared in many patients. Damage to the L IFG pars orbitalis, L MTG and L AG/SMG was associated with activation of the L ACC, L SFG (and other regions) potentially indicative of compensatory processing. |

**Complex analysis 2**

| First level contrast | Semantic feature decision (6 patients, 4 controls) or semantic relatedness decision (8 patients, 4 controls) vs visual decision or pseudoword identity decision |
|----------------------|-------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                                                                  |
| Group(s)             | Aphasia vs control                                                                                                |
| Covariate            | —                                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                                  |
| Type of analysis     | Complex                                                              |
| Statistical details  | Correlations were computed between functional activation in 16 regions, and qualitatively compared between patients and controls (p. 123). There was no correction for multiple comparisons. |
| Findings             | Other                                                                |
| Findings notes       | In controls, all regions were generally correlated with one another. This was largely true in patients too, with the exception of the R IFG pars orbitalis, which was negatively correlated with the L IFG. |

**Notes**

| Excluded analyses | PCA analysis (section 3.4.1) |

**Darkow et al. (2017)**

**Reference**

| Authors          | Darkow R, Martin A, Würtz A, Flöel A, Meinzer M |
|------------------|-------------------------------------------------|
| Title            | Transcranial direct current stimulation effects on neural processing in post-stroke aphasia |
| Reference        | *Hum Brain Mapp* 2017; 38: 1518-1531 |
**PMID** | 27859982  
**DOI**  | 10.1002/hbm.23469  

### Participants

| Language | German  
| Inclusion criteria | L hand motor area spared; mild aphasia  
| Number of individuals with aphasia | 16  
| Number of control participants | 16  
| Were any of the participants included in any previous studies? | No  
| Is age reported for patients and controls, and matched? | Yes (mean 56.7 ± 10.1 years)  
| Is sex reported for patients and controls, and matched? | Yes (males: 10; females: 6)  
| Is handedness reported for patients and controls, and matched? | Yes (right: 16; left: 0)  
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 54.3 ± 45.3 months, range 12-169 months)  
| To what extent is the nature of aphasia characterized? | Comprehensive battery  
| Language evaluation | AAT  
| Aphasia severity | Mild  
| Aphasia type | Not stated  
| First stroke only? | Not stated  
| Stroke type | Not stated  
| To what extent is the lesion distribution characterized? | Lesion overlay  
| Lesion extent | Range 9.7-165.1 cc  
| Lesion location | L MCA not including hand motor area  
| Participants notes | —  

### Imaging

| Modality | fMRI  
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment  
| If longitudinal, at what time point(s) were imaging data acquired? | T1/T2: chronic; tDCS and sham sessions in randomized order  
| If longitudinal, was there any intervention between the time points? | —  
| Is the scanner described? | Yes (Siemens Trio 3 Tesla)  
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes  
| Design type | Event-related  
| Total images acquired | 100  
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)  
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes  
| Is first level model fitting adequately described and appropriate? | Yes  
| Is intersubject normalization adequately described and appropriate? | Yes  
| Imaging notes | sparse sampling  

### Conditions

| Are the conditions clearly described? | Yes
| Condition       | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------|---------------|-------------|----------------------|--------------------------|
| picture naming  | Word (overt)  | 80          | Yes                  | Yes                      |
| rest            | None          | 20          | N/A                  | N/A                      |

**Conditions notes**
—

**Contrasts**

Are the contrasts clearly described? Yes

**Contrast 1: picture naming vs rest**

| Language condition | Control condition | Are the conditions matched for visual demands? | Are the conditions matched for auditory demands? | Are the conditions matched for motor demands? | Are the conditions matched for cognitive/executive demands? | Is accuracy matched between the language and control tasks for all relevant groups? | Is reaction time matched between the language and control tasks for all relevant groups? | Behavioral data notes | Does the contrast selectively activate plausible relevant language regions in the control group? | Are activations lateralized in the control data? | Control activation notes | Contrast notes |
|-------------------|-------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------|----------------|
| Picture naming    | Rest              | No                                            | No                                            | No                                            | No                                                          | N/A, tasks not comparable                                                   | N/A, tasks not comparable                                                   | —                 | Unknown                                                                                                                                  | Unknown                                                              |

**Analyses**

Are the analyses clearly described? Yes

**Voxelwise analysis 1**

| First level contrast | Analysis class | Group(s)                                              | Covariate | Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Is accuracy matched across the second level contrast? | Is reaction time matched across the second level contrast? | Behavioral data notes | Type of analysis | Search volume | Correction for multiple comparisons | Software | Voxelwise p | Cluster extent | Statistical details | Findings |
|---------------------|----------------|-------------------------------------------------------|-----------|-----------------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|-------------------|----------------|---------------|----------------------|----------|---------------|----------------|------------------|----------|
| Picture naming vs rest | Cross-sectional between two groups with aphasia | Aphasia after tDCS (n = 16) vs aphasia after sham stimulation (n = 16); same patients, order counterbalanced, repeated measures | —         | Somewhat (no behavioral difference) | Yes, matched                                           | Yes, matched                                           | —                 | Voxelwise       | Whole brain | Clusterwise correction with with GRFT and stringent voxelwise p | SPM8     | .001          | Based on GRFT | Repeated measures | ↓ L insula |
|                     |                |                                                       |           |                                                                  |                                                      |                                                      |                   |                |               |                                 |          |               |               |                | ↓ L anterior cingulate |
### ROI analysis 1

| First level contrast | Picture naming vs rest |
|----------------------|------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia after sham stimulation (n = 16) vs control |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear similar |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Patients named > 90% correctly in all sessions; control RT not reported |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 3 |
| What are the ROI(s)? | (1) bilateral anterior cingulate; (2) L insula; (3) R lingual gyrus |
| How are the ROI(s) defined? | Regions that were less active in patients with tDCS vs sham |
| Correction for multiple comparisons | No correction |
| Findings             | ↑ L insula |
|                      | ↑ L anterior cingulate |
|                      | ↑ R anterior cingulate |

### ROI analysis 2

| First level contrast | Picture naming vs rest |
|----------------------|------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia after tDCS (n = 16) vs control |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear similar |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Patients named > 90% correctly in all sessions; control RT not reported |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 3 |
| What are the ROI(s)? | (1) bilateral anterior cingulate; (2) L insula; (3) R lingual gyrus |
| How are the ROI(s) defined? | Regions that were less active in patients with tDCS vs sham |
| Correction for multiple comparisons | No correction |
| Statistical details  | Circular because ROIs defined in one group |
| Findings             | None |
| Findings notes       | — |

### Complex analysis 1

| First level contrast | Picture naming vs rest |
|----------------------|------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia after tDCS (n = 16) vs aphasia after sham stimulation (n = 16); same patients, order counterbalanced, repeated measures |
| Covariate                                                                 | —                                                                 |
|--------------------------------------------------------------------------|-------------------------------------------------------------------|
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no behavioral difference)                                |
| Is accuracy matched across the second level contrast?                    | Yes, matched                                                      |
| Is reaction time matched across the second level contrast?               | Yes, matched                                                      |
| Behavioral data notes                                                    | —                                                                 |
| Type of analysis                                                         | Complex                                                          |
| Statistical details                                                      | ICA was used to derive three task-relevant components: language, motor and visual. Thresholding of the functional maps is not described, but they appear to reflect coherent components of a picture naming network. These components were compared between stimulation conditions in terms of mean activity and power in three frequency bins. It should be noted that the language component is left-lateralized, unlike the model-based picture naming contrast. |
| Findings                                                                 | Other                                                             |
| Findings notes                                                           | Activity in the language component was greater in the tDCS condition. In the frequency domain, the tDCS condition showed reduced power in the highest frequency bin, and increased power in the lowest frequency bin. |

**Complex analysis 2**

| First level contrast                                  | Picture naming vs rest                                           |
|-------------------------------------------------------|------------------------------------------------------------------|
| Analysis class                                         | Cross-sectional aphasia vs control                               |
| Group(s)                                               | Aphasia after sham stimulation (n = 16) vs control               |
| Covariate                                              | —                                                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                              |
| Is accuracy matched across the second level contrast?  | Unknown, not reported                                             |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                             |
| Behavioral data notes                                  | —                                                                |
| Type of analysis                                       | Complex                                                          |
| Statistical details                                    | ICA was used to derive three task-relevant components: language, motor and visual. Thresholding of the functional maps is not described, but they appear to reflect coherent components of a picture naming network. These components were compared between stimulation conditions in terms of mean activity and power in three frequency bins. It should be noted that the language component is left-lateralized, unlike the model-based picture naming contrast. |
| Findings                                               | Other                                                             |
| Findings notes                                         | Mean activity of these components did not differ between patients and controls. However, patients showed increased power in the middle frequency bin of the visual component. |

**Complex analysis 3**

| First level contrast                                  | Picture naming vs rest                                           |
|-------------------------------------------------------|------------------------------------------------------------------|
| Analysis class                                         | Cross-sectional aphasia vs control                               |
| Group(s)                                               | Aphasia after tDCS (n = 16) vs control                           |
| Covariate                                              | —                                                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                              |
| Is accuracy matched across the second level contrast?  | Unknown, not reported                                             |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                             |
| Behavioral data notes                                  | —                                                                |
| Type of analysis                                       | Complex                                                          |
| Statistical details                                    | ICA was used to derive three task-relevant components: language, motor and visual. |
Thresholding of the functional maps is not described, but they appear to reflect coherent components of a picture naming network. These components were compared between stimulation conditions in terms of mean activity and power in three frequency bins. It should be noted that the language component is left-lateralized, unlike the model-based picture naming contrast.

| Findings         | None |
|------------------|------|
| Findings notes   | —    |

**Notes**

| Excluded analyses | — |

**Geranmayeh et al. (2017)**

**Reference**

| Authors          | Geranmayeh F, Chau TW, Wise RJS, Leech R, Hampshire A |
|------------------|------------------------------------------------------|
| Title            | Domain-general subregions of the medial prefrontal cortex contribute to recovery of language after stroke |
| Reference        | Brain 2017; 140: 1947-1958                           |
| PMID             | 29177494                                             |
| DOI              | 10.1093/brain/awx134                                  |

**Participants**

| Language         | UK English |
|------------------|------------|
| Inclusion criteria | —         |
| Number of individuals with aphasia | 27         |
| Number of control participants       | 0          |
| Were any of the participants included in any previous studies? | Yes (patients are a subset of those in Geranmayeh et al. (2016)) |
| Is age reported for patients and controls, and matched? | Yes (mean 59.1 ± 10.8 years, range 39-77 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 18; females: 9) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 26; left: 1) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (T1: 15 ± 7.6 days (range 5-35 days); T2: 108 ± 26 days (range 87-200 days)) |
| To what extent is the nature of aphasia characterized? | Not at all |
| Language evaluation | CAT, QPA |
| Aphasia severity | Not stated |
| Aphasia type       | Not stated |
| First stroke only? | No         |
| Stroke type        | Not stated |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent      | Mean 41.4 ± 44.4 cc, range 3.8-173.9 cc |
| Lesion location    | L; modest R involvement in 3 cases |
| Participants notes | 24 control participants are described, but no imaging data from the controls are analyzed in this paper |

**Imaging**

| Modality       | fMRI |
|----------------|------|
| Is the study cross-sectional or longitudinal? | Longitudinal—recovery |
If longitudinal, at what time point(s) were imaging data acquired?  
T1: 15 ± 7.6 days (range 5-35 days); T2: 108 ± 26 days (range 87-200 days)

If longitudinal, was there any intervention between the time points?  
Variable modest amounts of SLT (range 0-18 hours) reported in Supplementary Table 1

Is the scanner described?  
Yes (Siemens Trio 3 Tesla)

Is the timing of stimulus presentation and image acquisition clearly described and appropriate?  
Yes

Design type  
Event-related

Total images acquired  
213

Are the imaging acquisition parameters, including coverage, adequately described and appropriate?  
Yes (whole brain)

Is preprocessing and intrasubject coregistration adequately described and appropriate?  
Yes

Is first level model fitting adequately described and appropriate?  
Yes

Is intersubject normalization adequately described and appropriate?  
Yes

Imaging notes  
sparse sampling; mini-blocks of 2-4 trials

### Conditions

Are the conditions clearly described?  
Yes

| Condition                  | Response type       | Repetitions | All groups could do? | All individuals could do? |
|----------------------------|---------------------|-------------|----------------------|---------------------------|
| propositional speech production | Sentence (overt)     | 60         | Yes                  | Yes                       |
| counting                   | Multiple words (overt) | 48         | Yes                  | Unknown                  |
| target decision            | Button press        | 48         | Yes                  | No                        |
| rest                       | None                | 45         | N/A                  | N/A                      |

Conditions notes  
All participants could do the target decision task except for one who was at chance

### Contrasts

Are the contrasts clearly described?  
Yes (see specific limitation(s) below)

**Contrast 1: propositional speech production vs rest**

| Language condition | Control condition |
|--------------------|-------------------|
| Proppositional speech production | Rest |

Are the conditions matched for visual demands?  
No

Are the conditions matched for auditory demands?  
No

Are the conditions matched for motor demands?  
No

Are the conditions matched for cognitive/executive demands?  
No

Is accuracy matched between the language and control tasks for all relevant groups?  
N/A, tasks not comparable

Is reaction time matched between the language and control tasks for all relevant groups?  
N/A, tasks not comparable

Behavioral data notes  
—

Are control data reported in this paper or another that is referenced?  
Yes

Does the contrast selectively activate plausible relevant language regions in the control group?  
No

Are activations lateralized in the control data?  
No

Control activation notes  
Control data in Geranmayeh et al. (2014); speech not language; relevant activations are bilateral

Contrast notes  
Not entirely clear that the whole brain analysis is indeed propositional speech production vs rest; a contrast of target decision vs mean of propositional speech and counting is also used to define the preSMA/dACC ROI
## Analyses

| Are the analyses clearly described? | Yes |

### Voxelwise analysis 1

| First level contrast | Propositional speech production vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia mean of T1, T2 |
| Covariate            | Simultaneous Δ (T2 vs T1) number of appropriate information-carrying words |

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** Somewhat (potentially confounded by T1 and T2 language function; language function at T1 was predictive of change in language function)

**Is accuracy matched across the second level contrast?** Appear mismatched

**Behavioral data notes**

T1 AICW correlated with change in AICW, but not stated whether T2 AICW correlated with change in AICW

| Type of analysis | Voxelwise |
|------------------|-----------|
| Search volume    | Voxels spared in all patients |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software         | FSL |
| Voxelwise p      | .05 |
| Cluster extent   | 1.6 cc |

**Statistical details**

| Findings | ↑ L SMA/medial prefrontal |
|----------|---------------------------|
|          | ↑ L anterior cingulate    |
|          | ↑ R SMA/medial prefrontal |
|          | ↑ R somato-motor          |
|          | ↑ R posterior STS         |
|          | ↑ R anterior cingulate    |

**Findings notes**

Findings based on figures and coordinates; the pre-SMA/dACC peak noted to survive FWE correction at p < .001

### ROI analysis 1

| First level contrast | Propositional speech production vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Longitudinal change in aphasia |
| Group(s)             | Aphasia T2 vs T1 |

**Behavioral data notes**

Number of AICW increased

| Type of analysis | Region of interest (ROI) |
|------------------|--------------------------|
| ROI type         | Functional |

| How many ROIs are there? | 1 |
|--------------------------|---|
| What are the ROI(s)?     | L pre-SMA |
| How are the ROI(s) defined? | Peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia |

**Correction for multiple comparisons**

One only

**Statistical details**

No main effect of session in session by language recovery ANOVA

| Findings | None |
|----------|------|
| Findings notes | —   |

### ROI analysis 2

| How many ROIs are there? | 1 |
|--------------------------|---|
| What are the ROI(s)?     | L pre-SMA |
| How are the ROI(s) defined? | Peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia |

**Correction for multiple comparisons**

One only

**Statistical details**

No main effect of session in session by language recovery ANOVA

| Findings | None |
|----------|------|
| Findings notes | —   |
| First level contrast | Propositional speech production vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T2 vs T1 |
| Covariate            | Δ number of appropriate information-carrying words |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L pre-SMA |
| How are the ROI(s) defined? | Peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia |
| Correction for multiple comparisons | One only |
| Statistical details | No interaction of session by language recovery in ANOVA |
| Findings | None |
| Findings notes | — |

**ROI analysis 3**

| First level contrast | Propositional speech production vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia mean of T1, T2 |
| Covariate            | Simultaneous Δ (T2 vs T1) number of appropriate information-carrying words |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (potentially confounded by T1 and T2 language function; language function at T1 was predictive of change in language function) |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | T1 AICW correlated with change in AICW, but not stated whether T2 AICW correlated with change in AICW |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L pre-SMA |
| How are the ROI(s) defined? | Peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia |
| Correction for multiple comparisons | One only |
| Statistical details | — |
| Findings | † L SMA/medial prefrontal |
| Findings notes | Patients with more pre-SMA activity improved more |

**ROI analysis 4**

| First level contrast | Propositional speech production vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia mean of T1, T2 |
| Covariate            | Simultaneous Δ (T2 vs T1) number of appropriate information-carrying words |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (potentially confounded by T1 and T2 language function; language function at T1 was predictive of change in language function) |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| **ROI analysis 5** |  |
| --- | --- |
| First level contrast | Propositional speech production vs rest |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia mean of T1, T2 |
| Covariate | Simultaneous Δ(T2 vs T1) number of appropriate information-carrying words |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes (this analysis is appropriate because T1 behavior is included in model) |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Behavioral data notes

T1 AICW correlated with change in AICW, but not stated whether T2 AICW correlated with change in AICW

Type of analysis

Region of interest (ROI)

ROI type

Functional

How many ROIs are there?

1

What are the ROI(s)?

L pre-SMA

How are the ROI(s) defined?

Peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia

Correction for multiple comparisons

One only

Statistical details

Lesion size covariate

Findings

† L SMA/medial prefrontal

Findings notes

Patients with more pre-SMA activity improved more

---

| **ROI analysis 6** |  |
| --- | --- |
| First level contrast | Propositional speech production vs rest |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia mean of T1, T2 |
| Covariate | Subsequent outcome (T2) number of appropriate information-carrying words |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | No (mathematically equivalent to the previous analysis, because of the inclusion of T1 performance as a covariate) |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

Behavioral data notes

T1 AICW correlated with change in AICW, but not stated whether T2 AICW correlated with change in AICW

Type of analysis

Region of interest (ROI)

ROI type

Functional

How many ROIs are there?

1

What are the ROI(s)?

L pre-SMA

How are the ROI(s) defined?

Peak voxel of the contrast of target decision vs mean of propositional speech and counting in...
| ROI analysis 7 | ROI analysis 8 |
|---------------|---------------|
| **First level contrast** | Propositional speech production vs rest |
| **Analysis class** | Cross-sectional correlation with language or other measure |
| **Group(s)** | Aphasia T1 |
| **Covariate** | Subsequent Δ (T2 vs T1) number of appropriate information-carrying words |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Somewhat (potentially confounded by T1 language function; language function at T1 was predictive of change in language function) |
| **Is accuracy matched across the second level contrast?** | No, different |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | T1 AICW correlated with change in AICW |
| **Type of analysis** | Region of interest (ROI) |
| **ROI type** | Functional |
| **How many ROIs are there?** | 1 |
| **What are the ROI(s)?** | L pre-SMA |
| **How are the ROI(s) defined?** | Peak voxel of the contrast of target decision vs mean of propositional speech and counting in people with aphasia |
| **Correction for multiple comparisons** | One only |
| **Statistical details** | — |
| **Findings** | ↑ L SMA/medial prefrontal |
| **Findings notes** | — |

**Notes**

Excluded analyses: It is mentioned that activity for other tasks did not correlate with language recovery, but no
Griffis, Nenert, Allendorfer, & Szafarski (2017)

| Reference |
|-----------|
| Authors   | Griffis JC, Nenert R, Allendorfer JB, Szafarski JP |
| Title     | Linking left hemispheric tissue preservation to fMRI language task activation in chronic stroke patients |
| Reference | Cortex 2017; 96: 1-18 |
| PMID      | 28961522 |
| DOI       | 10.1016/j.cortex.2017.08.031 |

| Participants |
|--------------|
| Language     | US English |
| Inclusion criteria | — |
| Number of individuals with aphasia | 43 |
| Number of control participants | 43 |
| Were any of the participants included in any previous studies? | Yes (same dataset as Griffis et al. (2017) Hum Brain Mapp) |
| Is age reported for patients and controls, and matched? | Yes (mean 53 ± 15 years, range 23-90 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 25; females: 18) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 41; left: 2) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 1-14 years) |
| To what extent is the nature of aphasia characterized? | Not at all |
| Language evaluation | BNT, semantic fluency, phonemic fluency |
| Aphasia severity | Not stated |
| Aphasia type | Not stated |
| First stroke only? | Yes |
| Stroke type | Not stated |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Mean 105.2 ± 76.3 cc |
| Lesion location | L |
| Participants notes | — |

| Imaging |
|---------|
| Modality | fMRI |
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | No (Siemens Allegra 3 Tesla or Philips 3 Tesla; model not stated) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | Block |
| Total images acquired | 165 |
| Are the imaging acquisition parameters, including | Yes (whole brain) |
coverage, adequately described and appropriate? Yes
Is preprocessing and intrasubject coregistration adequately described and appropriate? Yes
Is first level model fitting adequately described and appropriate? Yes
Is intersubject normalization adequately described and appropriate? Yes
Imaging notes —

Conditions
Are the conditions clearly described? Yes

| Condition            | Response type | Repetitions | All groups could do? | All individuals could do? |
|----------------------|---------------|-------------|----------------------|---------------------------|
| semantic decision    | Button press  | 5           | No                   | No                        |
| tone decision        | Button press  | 6           | Unknown              | Unknown                   |

Conditions notes Group performance below chance; several patients at 0 which is difficult to understand in a 2AFC task

Contrasts
Are the contrasts clearly described? Yes

Contrast 1: semantic decision vs tone decision
Language condition Semantic decision
Control condition Tone decision
Are the conditions matched for visual demands? Yes
Are the conditions matched for auditory demands? Yes
Are the conditions matched for motor demands? Yes
Are the conditions matched for cognitive/executive demands? Yes
Is accuracy matched between the language and control tasks for all relevant groups? Unknown, not reported
Is reaction time matched between the language and control tasks for all relevant groups? Unknown, not reported
Behavioral data notes Tone decision accuracy not reported
Are control data reported in this paper or another that is referenced? Yes
Does the contrast selectively activate plausible relevant language regions in the control group? Yes
Are activations lateralized in the control data? Yes
Control activation notes Temporal activation is mid MTG and AG rather than pSTS
Contrast notes —

Analyses
Are the analyses clearly described? Yes

ROI analysis 1
First level contrast Semantic decision vs tone decision
Analysis class Cross-sectional correlation with language or other measure
Group(s) Aphasia
Covariate Semantic decision accuracy
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes
Is accuracy matched across the second level contrast? Accuracy is covariate
Is reaction time matched across the second level contrast? Unknown, not reported
### ROI analysis 2

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                            |
| Covariate            | Average of semantic and phonemic fluency |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

#### Behavioral data notes
- **Type of analysis**: Regions of interest (ROI)
- **ROI type**: Other
- **How many ROIs are there?**: 3
- **What are the ROI(s)?**: (1) L AG and bilateral midline components of the canonical semantic network, along with reduced activity in R frontal, temporal and parietal regions; (2) bilateral IFG pars orbitalis; (3) L IFG and DLPFC along with bilateral midline regions
- **How are the ROI(s) defined?**: ROIs are mixing coefficients of functional networks arising from mCCA + jICA that were differently represented in the patient and control groups
- **Correction for multiple comparisons**: Familywise error (FWE)

#### Statistical details
- **Findings**: ↑ L IFG
- **Findings notes**: All 3 networks were significantly correlated; analysis of networks so involvement of each individual region cannot be assured
### ROI analysis 3

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia |
| Covariate            | BNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Other |
| How many ROIs are there? | 3 |
| What are the ROI(s)? | (1) L AG and bilateral midline components of the canonical semantic network, along with reduced activity in R frontal, temporal and parietal regions; (2) bilateral IFG pars orbitalis; (3) L IFG and DLPFC along with bilateral midline regions |
| How are the ROI(s) defined? | ROIs are mixing coefficients of functional networks arising from mCCA + jICA that were differently represented in the patient and control groups |
| Correction for multiple comparisons | Familywise error (FWE) |
| Statistical details  | — |
| Findings             | ↑ L IFG |
|                      | ↑ L dorsolateral prefrontal cortex |
|                      | ↑ L SMA/medial prefrontal |
|                      | ↑ L angular gyrus |
|                      | ↑ L precuneus |
|                      | ↑ L posterior cingulate |
|                      | ↑ R SMA/medial prefrontal |
|                      | ↑ R precuneus |
|                      | ↑ R posterior cingulate |
|                      | ↓ L insula |
|                      | ↓ R IFG pars opercularis |
|                      | ↓ R IFG pars triangularis |
|                      | ↓ R insula |
|                      | ↓ R dorsal precentral |
|                      | ↓ R supramarginal gyrus |
|                      | ↓ R posterior STG |
|                      | ↓ R mid temporal |
| Findings notes       | Networks 1 and 3 were significantly correlated; analysis of networks so involvement of each individual region cannot be assured |
Complex analysis 1

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia vs control                |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Semantic decision accuracy not matched, but tone decision accuracy not reported |
| Type of analysis     | Complex                           |
| Statistical details  | Multimodal canonical correlation analysis (mCCA) and joint ICA were used to identify 3 joint ICs (structural/functional) that were differently represented in the patient and control groups. Although there was no correction for multiple comparisons when the functional maps were thresholded, the maps for the three networks each appeared to relate to coherent parts of the semantic network. |

Findings

Findings notes

The first joint IC comprised preservation of tissue in L posterior temporo-parietal region, activity in the L AG and bilateral midline components of the canonical semantic network, and reduced activity in R frontal, temporal and parietal regions. The second joint IC comprised preservation of tissue in the L basal ganglia/insula region, and activity predominantly in the IFG pars orbitalis bilaterally. The third joint IC comprised preservation of the L IFG and activity in the L IFG and DLPFC along with bilateral midline regions. The first joint IC was considered to provide more robust evidence for structure-function relationships than the other two, because it was the only one where individual structural and functional mixing coefficients remained correlated even when lesion volume was included as a covariate.

Notes

Excluded analyses

(1) group analyses that were described in a previous paper (Gris et al., 2017, Hum Brain Mapp); (2) ancillary analysis using different numbers of components per modality; (3) ancillary analysis using lesion masks instead of brain tissue maps; (4) ancillary analysis using multivariate lesion-symptom mapping, because these analyses yielded similar results to the main analysis

Griffis, Nenert, Allendorfer, Vannest, et al. (2017)

Reference

| Authors                     | Griffis JC, Nenert R, Allendorfer JB, Vannest J, Holland S, Dietz A, Szafarlski JP |
|-----------------------------|----------------------------------------------------------------------------------|
| Title                      | The canonical semantic network supports residual language function in chronic post-stroke aphasia |
| Reference                   | Hum Brain Mapp 2017; 38: 1636-1658                                                |
| PMID                        | 27981674                                                                          |
| DOI                         | 10.1002/hbm.23476                                                                |

Participants

| Language                  | US English                        |
|---------------------------|-----------------------------------|
| Inclusion criteria        | —                                 |
| Number of individuals with aphasia | 43                                |
| Number of control participants | 43                                |
| Were any of the participants included in any previous studies? | Yes (data were collected as part of “several separate studies”) |
| Is age reported for patients and controls, and | Yes (mean 53 ± 15 years, range 23-90 years) |
Is sex reported for patients and controls, and matched? Yes (males: 25; females: 18)

Is handedness reported for patients and controls, and matched? Yes (right: 41; left: 2)

Is time post stroke onset reported and appropriate to the study design? Yes (range 1-14 years)

To what extent is the nature of aphasia characterized? Not at all

Language evaluation BNT, semantic fluency, phonemic fluency

Aphasia severity Not stated

Aphasia type Not stated

First stroke only? Yes

Stroke type Not stated

To what extent is the lesion distribution characterized? Individual lesions

Lesion extent Mean 105.2 ± 76.3 cc

Lesion location L

Participants notes —

Imaging

Modality fMRI

Is the study cross-sectional or longitudinal? Cross-sectional

If longitudinal, at what time point(s) were imaging data acquired? —

If longitudinal, was there any intervention between the time points? —

Is the scanner described? No (Siemens Allegra 3 Tesla or Philips 3 Tesla; model not stated)

Is the timing of stimulus presentation and image acquisition clearly described and appropriate? Yes

Design type Block

Total images acquired 165

Are the imaging acquisition parameters, including coverage, adequately described and appropriate? Yes (whole brain)

Is preprocessing and intrasubject coregistration adequately described and appropriate? Yes

Is first level model fitting adequately described and appropriate? Yes

Is intersubject normalization adequately described and appropriate? Yes

Imaging notes —

Conditions

Are the conditions clearly described? Yes

| Condition                  | Response type | Repetitions | All groups could do? | All individuals could do? |
|----------------------------|---------------|-------------|-----------------------|---------------------------|
| semantic decision          | Button press  | 5           | No                    | No                        |
| tone decision              | Button press  | 6           | Unknown               | Unknown                   |

Conditions notes Group performance below chance; several patients at 0 which is difficult to understand in a 2AFC task

Contrasts

Are the contrasts clearly described? Yes

Contrast 1: semantic decision vs tone decision
| Language condition | Semantic decision |
|--------------------|------------------|
| Control condition  | Tone decision    |

| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |

| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |

**Behavioral data notes**
- Tone decision accuracy not reported

Are control data reported in this paper or another that is referenced? Yes

Does the contrast selectively activate plausible relevant language regions in the control group? Yes

Are activations lateralized in the control data? Yes

**Control activation notes**
- Temporal activation is mid MTG and AG rather than pSTS

**Contrast notes**

**Analyses**

Are the analyses clearly described? Yes

**Voxelwise analysis 1**

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                           |
| Covariate            | Semantic decision accuracy        |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Correction for multiple comparisons**
- Clusterwise correction based on cluster_threshold_beta

**Software**
- SPM12/in-house

| Voxelwise p | .01 |
| Cluster extent | 126 voxels (size not stated) |

**Statistical details**
- Lesion volume covariate

**Findings**
- ↑ L dorsolateral prefrontal cortex
- ↑ L angular gyrus
- ↑ L precuneus
- ↑ L mid temporal
- ↑ L anterior temporal
- ↑ L posterior cingulate
- ↑ L cerebellum
- ↑ L brainstem
- ↑ L hippocampus/MTL
- ↑ R IFG pars orbitalis
- ↑ R angular gyrus
- ↑ R precuneus
- ↑ R anterior temporal
- ↑ R occipital
- ↑ R brainstem
| Findings notes | Based on figure and table; larger activations are compelling; smaller activations are not due to lenient correction approach |

### Voxelwise analysis 2

| First level contrast | Semantic decision vs tone decision |
|---------------------|-----------------------------------|
| Analysis class      | Cross-sectional correlation with language or other measure |
| Group(s)            | Aphasia |
| Covariate           | Average of semantic and phonemic fluency |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis    | Voxelwise |
| Search volume       | Whole brain |
| Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta |
| Software            | SPM12/in-house |
| Voxelwise p         | .01 |
| Cluster extent      | 126 voxels (size not stated) |
| Statistical details | Lesion volume covariate |
| Findings            | ↑ L IFG  |
|                     | ↑ L dorsolateral prefrontal cortex |
|                     | ↑ L SMA/medial prefrontal |
|                     | ↑ L angular gyrus |
|                     | ↑ L precuneus |
|                     | ↑ L posterior STS |
|                     | ↑ L mid temporal |
|                     | ↑ L anterior temporal |
|                     | ↑ L posterior cingulate |
|                     | ↑ L brainstem |
|                     | ↑ L hippocampus/MTL |
|                     | ↑ R SMA/medial prefrontal |
|                     | ↑ R precuneus |
|                     | ↑ R anterior temporal |
|                     | ↑ R occipital |
|                     | ↑ R posterior cingulate |
|                     | ↑ R hippocampus/MTL |
|                     | ↓ R posterior STS |
| Findings notes      | Based on figure and table; larger activations are compelling; smaller activations are not due to lenient correction approach |

### Voxelwise analysis 3

| First level contrast | Semantic decision vs tone decision |
|---------------------|-----------------------------------|
| Analysis class      | Cross-sectional correlation with language or other measure |
| Group(s)            | Aphasia |
| Covariate           | BNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis    | Voxelwise |
| **Search volume** | Whole brain |
| **Correction for multiple comparisons** | Clusterwise correction based on cluster_threshold_beta |
| **Software** | SPM12/in-house |
| **Voxelwise p** | .01 |
| **Cluster extent** | 126 voxels (size not stated) |
| **Statistical details** | Lesion volume covariate |
| **Findings** | ↑ L IFG pars orbitalis  
↑ L SMA/medial prefrontal  
↑ L angular gyrus  
↑ L precuneus  
↑ L posterior cingulate  
↑ L hippocampus/MTL  
↑ R IFG pars orbitalis  
↑ R SMA/medial prefrontal  
↑ R precuneus  
↑ R anterior temporal  
↑ R posterior cingulate  
↑ R cerebellum |
| **Findings notes** | Based on figure and table; larger activations are compelling; smaller activations are not due to lenient correction approach |

**Voxelwise analysis 4**

| **First level contrast** | Semantic decision vs tone decision |
| **Analysis class** | Cross-sectional correlation with language or other measure |
| **Group(s)** | Aphasia |
| **Covariate** | Lesion volume |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Voxelwise |
| **Search volume** | R hemisphere |
| **Correction for multiple comparisons** | Clusterwise correction based on cluster_threshold_beta |
| **Software** | SPM12/in-house |
| **Voxelwise p** | .01 |
| **Cluster extent** | 126 voxels (size not stated) |
| **Statistical details** | — |
| **Findings** | ↑ R IFG pars opercularis  
↑ R dorsolateral prefrontal cortex  
↑ R dorsal precentral  
↑ R SMA/medial prefrontal  
↓ R orbitofrontal  
↓ R anterior temporal  
↓ R cerebellum  
↓ R thalamus |
| **Findings notes** | Based on figure and table; larger activations are compelling; smaller activations are not due to lenient correction approach |

**ROI analysis 1**

| **First level contrast** | Semantic decision vs tone decision |
| **Analysis class** | Cross-sectional aphasia vs control |
| **Group(s)** | Aphasia vs control |
| **Covariate** | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Question                                                                 | Answer                                                                 |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| Is accuracy matched across the second level contrast?                   | No, different                                                          |
| Is reaction time matched across the second level contrast?              | Unknown, not reported                                                   |
| Behavioral data notes                                                   | Semantic decision accuracy not matched, but tone decision accuracy not reported |
| Type of analysis                                                        | Regions of interest (ROI)                                              |
| ROI type                                                                | Functional                                                             |
| How many ROIs are there?                                                | 5                                                                     |
| What are the ROI(s)?                                                   | (1) overall canonical semantic network (CSN); (2) L CSN; (3) R CSN; (4) mirror L CSN in R; (5) out-of-network CSN in R |
| How are the ROI(s) defined?                                            | Control data                                                           |
| Correction for multiple comparisons                                     | Familywise error (FWE)                                                 |
| Statistical details                                                    | Circular because ROI defined in one group                              |
| Findings                                                                |                                                                        |
| L IFG                                                                   |                                                                        |
| L dorsolateral prefrontal cortex                                        |                                                                        |
| L SMA/medial prefrontal                                                |                                                                        |
| L angular gyrus                                                         |                                                                        |
| L precuneus                                                            |                                                                        |
| L mid temporal                                                          |                                                                        |
| L anterior temporal                                                     |                                                                        |
| L occipital                                                            |                                                                        |
| L posterior cingulate                                                   |                                                                        |
| L cerebellum                                                           |                                                                        |
| R IFG                                                                   |                                                                        |
| R dorsolateral prefrontal cortex                                        |                                                                        |
| R SMA/medial prefrontal                                                |                                                                        |
| R angular gyrus                                                         |                                                                        |
| R precuneus                                                            |                                                                        |
| R anterior temporal                                                     |                                                                        |
| R occipital                                                            |                                                                        |
| R posterior cingulate                                                   |                                                                        |
| R cerebellum                                                           |                                                                        |
| Findings notes                                                          | Results are for whole networks of regions, so individual regions cannot be assured; out-of-network R regions not listed since they were not significant in ROI 5 (only in ROI 4) |

**ROI analysis 2**

| Question                                                                 | Answer                                                                 |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| First level contrast                                                    | Semantic decision vs tone decision                                      |
| Analysis class                                                          | Cross-sectional correlation with language or other measure            |
| Group(s)                                                                | Aphasia                                                                |
| Covariate                                                               | Lesion volume                                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                   |
| Is accuracy matched across the second level contrast?                   | Unknown, not reported                                                   |
| Is reaction time matched across the second level contrast?              | Unknown, not reported                                                   |
| Behavioral data notes                                                   | —                                                                      |
| Type of analysis                                                        | Regions of interest (ROI)                                              |
| ROI type                                                                | Functional                                                             |
| How many ROIs are there?                                                | 5                                                                     |
| What are the ROI(s)?                                                   | (1) overall canonical semantic network (CSN); (2) L CSN; (3) R CSN; (4) mirror L CSN in R; (5) out-of-network CSN in R |
| How are the ROI(s) defined?                                            | Control data                                                           |
| Correction for multiple comparisons                                     | Familywise error (FWE)                                                 |
| Statistical details                                                    | —                                                                      |
| Findings                                                                | None                                                                   |
| Findings notes                                                          | —                                                                      |
### ROI analysis 3

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                           |
| Covariate            | Semantic decision accuracy        |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

- Type of analysis: Region of interest (ROI)
- ROI type: Functional
- How many ROIs are there? 1
- What are the ROI(s)? CSN
- How are the ROI(s) defined? Control data
- Correction for multiple comparisons: One only
- Statistical details: Lesion volume covariate

**Findings**

- ↑ L IFG
- ↑ L dorsolateral prefrontal cortex
- ↑ L SMA/medial prefrontal
- ↑ L angular gyrus
- ↑ L precuneus
- ↑ L mid temporal
- ↑ L anterior temporal
- ↑ L posterior cingulate
- ↑ L cerebellum
- ↑ R IFG
- ↑ R dorsolateral prefrontal cortex
- ↑ R SMA/medial prefrontal
- ↑ R angular gyrus
- ↑ R precuneus
- ↑ R anterior temporal
- ↑ R posterior cingulate
- ↑ R cerebellum

**Findings notes**

- Correlation calculated for the whole network of regions, so correlation of individual regions cannot be assured

### ROI analysis 4

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                           |
| Covariate            | Average of semantic and phonemic fluency |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

- Type of analysis: Region of interest (ROI)
- ROI type: Functional
- How many ROIs are there? 1
- What are the ROI(s)? CSN
- How are the ROI(s) defined? Control data
| Correction for multiple comparisons | One only |
|------------------------------------|----------|
| Statistical details               | Lesion volume covariate |
| Findings                           | ↑ L IFG  |
|                                   | ↑ L dorsolateral prefrontal cortex |
|                                   | ↑ L SMA/medial prefrontal |
|                                   | ↑ L angular gyrus |
|                                   | ↑ L precuneus |
|                                   | ↑ L mid temporal |
|                                   | ↑ L anterior temporal |
|                                   | ↑ L posterior cingulate |
|                                   | ↑ L cerebellum |
|                                   | ↑ R IFG  |
|                                   | ↑ R dorsolateral prefrontal cortex |
|                                   | ↑ R SMA/medial prefrontal |
|                                   | ↑ R angular gyrus |
|                                   | ↑ R precuneus |
|                                   | ↑ R anterior temporal |
|                                   | ↑ R posterior cingulate |
|                                   | ↑ R cerebellum |
| Findings notes                     | Correlation calculated for the whole network of regions, so correlation of individual regions cannot be assured |

**ROI analysis 5**

| First level contrast               | Semantic decision vs tone decision |
| Analysis class                     | Cross-sectional correlation with language or other measure |
| Group(s)                           | Aphasia |
| Covariate                          | BNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes              | — |
| Type of analysis                   | Region of interest (ROI) |
| ROI type                           | Functional |
| How many ROIs are there?           | 1 |
| What are the ROI(s)?              | CSN |
| How are the ROI(s) defined?        | Control data |
| Correction for multiple comparisons| One only |
| Statistical details               | Lesion volume covariate |
| Findings                           | ↑ L IFG  |
|                                   | ↑ L dorsolateral prefrontal cortex |
|                                   | ↑ L SMA/medial prefrontal |
|                                   | ↑ L angular gyrus |
|                                   | ↑ L precuneus |
|                                   | ↑ L mid temporal |
|                                   | ↑ L anterior temporal |
|                                   | ↑ L posterior cingulate |
|                                   | ↑ L cerebellum |
|                                   | ↑ R IFG  |
|                                   | ↑ R dorsolateral prefrontal cortex |
|                                   | ↑ R SMA/medial prefrontal |
|                                   | ↑ R angular gyrus |
|                                   | ↑ R precuneus |
|                                   | ↑ R anterior temporal |
|                                   | ↑ R posterior cingulate |
|                                   | ↑ R cerebellum |
| Findings notes                     | Correlation calculated for the whole network of regions, so correlation of individual regions cannot be assured |
### Complex analysis 1

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control|
| Group(s)             | Aphasia vs control                |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Semantic decision accuracy not matched, but tone decision accuracy not reported |
| Type of analysis     | Complex                           |
| Statistical details  | Correlations between activation magnitudes in the L and R canonical semantic network (CSN) were compared between groups. However, this analysis is circular because the CSN ROIs were defined based on controls only. |
| Findings             | None                              |
| Findings notes       | —                                 |

### Complex analysis 2

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control|
| Group(s)             | Aphasia vs control                |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Semantic decision accuracy not matched, but tone decision accuracy not reported |
| Type of analysis     | Complex                           |
| Statistical details  | Correlations between activation magnitudes in the L CSN and R mirrored CSN were compared between groups. However, this analysis is circular because the CSN ROIs were defined based on controls only. |
| Findings             | Other                             |
| Findings notes       | Correlations between activations in the L CSN and the mirrored L CSN in the R hemisphere were stronger in patients than controls. |

### Complex analysis 3

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control|
| Group(s)             | Aphasia vs control                |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Semantic decision accuracy not matched, but tone decision accuracy not reported |
| Type of analysis     | Complex                           |
| Statistical details  | Correlations between activation magnitudes in the L CSN and R out-of-network homotopic regions were compared between groups. However, this analysis is circular because the CSN ROIs were defined based on controls only. |

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Findings | Other
---|---
Findings notes | Correlations between activations in the L CSN and R out-of-network homotopic regions were stronger in patients than controls.

### Complex analysis 4

| First level contrast | Semantic decision vs tone decision |
|---|---|
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Semantic decision accuracy not matched, but tone decision accuracy not reported |
| Type of analysis | Complex |
| Statistical details | The difference in activation between the L CSN and R CSN was compared between patients and controls. However, this analysis is circular because the CSN ROIs were defined based on controls only. |
| Findings | None |
| Findings notes | — |

### Complex analysis 5

| First level contrast | Semantic decision vs tone decision |
|---|---|
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Semantic decision accuracy not matched, but tone decision accuracy not reported |
| Type of analysis | Complex |
| Statistical details | The difference in activation between the L CSN and mirror L CSN in the R was compared between patients and controls. However, this analysis is circular because the CSN ROIs were defined based on controls only. |
| Findings | Other |
| Findings notes | The difference was smaller in patients. |

### Complex analysis 6

| First level contrast | Semantic decision vs tone decision |
|---|---|
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Semantic decision accuracy not matched, but tone decision accuracy not reported |
| Type of analysis | Complex |

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### Statistical details
The difference in activation between the R CSN and out-of-network homotopic regions in the R was compared between patients and controls. However, this analysis is circular because the CSN ROIs were defined based on controls only.

### Findings
Other

### Findings notes
The difference was smaller in patients.

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### Complex analysis 7

| First level contrast | Semantic decision vs tone decision |
|----------------------|------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia |
| Covariate            | Interactions of semantic fluency and naming measures by lesion size |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes
—

### Type of analysis
Complex

### Statistical details
For the 4 R hemisphere regions that were more activated in patients with larger lesions (SPM analysis 4), analyses were carried out to determine whether the semantic fluency or naming measures were differentially impacted by activation depending on whether lesions were larger or smaller.

### Findings
Other

### Findings notes
For 1 of the 4 regions (R SMA), there were significant interactions such that in patients with larger lesions, more activation was associated with higher semantic fluency scores and higher BNT scores, while in patients with smaller lesions, more activation was associated with lower fluency and BNT scores. There was a similar relationship with semantic fluency in the R IFG pars opercularis but only at p(FDR) = 0.07.

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### Notes

| Excluded analyses |
|-------------------|
| Ancillary whole brain analyses without lesion volume covariate (Supporting Figure 3); Figure 3b and 3c, which are derivatives of included analyses |

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### Harvey et al. (2017)

**Reference**

**Authors**
Harvey DY, Poddell J, Turkeltaub PE, Faseyitan O, Coslett HB, Hamilton RH

**Title**
Functional reorganization of right prefrontal cortex underlies sustained naming improvements in chronic aphasia via repetitive transcranial magnetic stimulation

**Reference**
Cogn Behav Neurol 2017; 30: 133-144

**PMID**
29256908

**DOI**
10.1097/wnn.0000000000000141

**Participants**

| Language | US English |
|----------|------------|
| Inclusion criteria | Mild-moderate non-fluent aphasia; relatively intact comprehension; able to produce meaningful words and phrases |
| Number of individuals with aphasia | 6 |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (range 47-75 years) |
| Question                                                                 | Answer |
|-------------------------------------------------------------------------|--------|
| Is sex reported for patients and controls, and matched?                | Yes (males: 5; females: 1) |
| Is handedness reported for patients and controls, and matched?         | Yes (right: 6; left: 0) |
| Is time post stroke onset reported and appropriate to the study design?| Yes (range 6-102 months) |
| To what extent is the nature of aphasia characterized?                 | Comprehensive battery |
| Language evaluation                                                    | BDAE, BNT |
| Aphasia severity                                                       | Mild-moderate |
| Aphasia type                                                           | All non-fluent |
| First stroke only?                                                     | Yes |
| Stroke type                                                            | Ischemic only |
| To what extent is the lesion distribution characterized?               | Individual lesions |
| Lesion extent                                                          | Range 36.6-252.1 cc |
| Lesion location                                                        | L MCA |
| Participants notes                                                     | — |

**Imaging**

| Question                                                                 | Answer |
|-------------------------------------------------------------------------|--------|
| Modality                                                                | fMRI |
| Is the study cross-sectional or longitudinal?                           | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired?      | T1: pre-treatment/chronic; T2: post-treatment, 2 months after treatment; T3: 6 months after treatment (the 2-month time point was not included in analysis because there was no significant behavioral effect at that time) |
| If longitudinal, was there any intervention between the time points?    | Inhibitory rTMS to R IFG, 10 days |
| Is the scanner described?                                               | Yes (Siemens Trio 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type                                                             | Block |
| Total images acquired                                                   | 200 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate?      | Yes |
| Is intersubject normalization adequately described and appropriate?     | No (lesion impact not addressed) |
| Imaging notes                                                           | — |

**Conditions**

| Question                                                                 | Answer |
|-------------------------------------------------------------------------|--------|
| Are the conditions clearly described?                                   | Yes |

| Condition                  | Response type | Repetitions | All groups could do? | All individuals could do? |
|---------------------------|---------------|-------------|----------------------|--------------------------|
| picture naming            | Word (overt)  | 20          | Yes                  | Yes                      |
| viewing patterns           | None          | 20          | N/A                  | N/A                      |

**Conditions notes**

Assume all individuals could do based on inclusion criterion and BNT scores

**Contrasts**

| Question                                                                 | Answer |
|-------------------------------------------------------------------------|--------|
| Are the contrasts clearly described?                                    | Yes |

**Contrast 1: picture naming vs viewing patterns**

| Language condition | Picture naming |
|--------------------|----------------|

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| Control condition | Viewing patterns |
|-------------------|------------------|
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

**Behavioral data notes**
- Are control data reported in this paper or another that is referenced? No
- Does the contrast selectively activate plausible relevant language regions in the control group? Unknown
- Are activations lateralized in the control data? Unknown

**Control activation notes**
- Contrast notes —

**Analyses**

**Are the analyses clearly described?** Yes

**Voxelwise analysis 1**

| First level contrast | Picture naming vs viewing patterns |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal change in aphasia    |
| Group(s)             | Aphasia T3 vs T1                 |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**
- —

| Type of analysis | Voxelwise |
|-----------------|-----------|
| Search volume   | Voxels spared in all patients |
| Correction for multiple comparisons | No direct comparison |
| Software        | SPM8 |
| Voxelwise p     | — |
| Cluster extent  | — |
| Statistical details | Qualitative comparison on pp. 138-9 |

**Findings**

- ↑ L SMA/medial prefrontal
- ↑ L posterior inferior temporal gyrus/fusiform gyrus
- ↑ L occipital
- ↑ L anterior cingulate
- ↑ R IFG pars opercularis
- ↑ R ventral precentral/inferior frontal junction
- ↓ L dorsolateral prefrontal cortex
- ↓ R IFG pars triangularis
- ↓ R posterior inferior temporal gyrus/fusiform gyrus
- ↓ R occipital
- ↓ R hippocampus/MTL

**Findings notes**
- Based on Figure 5 and Table 4

**Notes**

| Excluded analyses | — |
Nardo et al. (2017)

Reference

| Authors      | Nardo D, Holland R, Leff AP, Price CJ, Crinion JT |
|--------------|--------------------------------------------------|
| Title        | Less is more: neural mechanisms underlying anomia treatment in chronic aphasic patients |
| Reference    | Brain 2017; 140: 3039-3054                      |
| PMID         | 29053773                                         |
| DOI          | 10.1093/brain/awx234                             |

Participants

| Language               | UK English                                      |
|------------------------|-------------------------------------------------|
| Inclusion criteria     | Anomia; good single word comprehension; relatively spared word and nonword repetition; no AoS; spared or partially spared L IFG |
| Number of individuals with aphasia | 18                                               |
| Number of control participants | 0                                                |
| Were any of the participants included in any previous studies? | No                                               |
| Is age reported for patients and controls, and matched? | Yes (mean 50 ± 12 years, range 21-67 years)       |
| Is sex reported for patients and controls, and matched? | Yes (males: 12; females: 6)                      |
| Is handedness reported for patients and controls, and matched? | Yes (right: 18; left: 0)                         |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 61 ± 58 months, range 5-264 months)     |
| To what extent is the nature of aphasia characterized? | Not at all                                       |
| Language evaluation    | BNT, one CAT subtest, two PALPA subtests         |
| Aphasia severity       | Not stated                                       |
| Aphasia type           | Not stated                                       |
| First stroke only?     | Yes                                              |
| Stroke type            | Not stated                                       |
| To what extent is the lesion distribution characterized? | Lesion overlay                                 |
| Lesion extent          | Not stated                                       |
| Lesion location        | L MCA                                            |
| Participants notes     | —                                                |

Imaging

| Modality               | fMRI                                             |
|------------------------|--------------------------------------------------|
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment                   |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment, ~6 weeks later |
| If longitudinal, was there any intervention between the time points? | Anomia treatment (computer-based practice), 2+ hours/day, 6 weeks |
| Is the scanner described? | Yes (Siemens Trio 3 Tesla)                        |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes                                             |
| Design type            | Event-related                                    |
| Total images acquired  | 696                                              |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)                               |
| Is preprocessing and intrasubject coregistration | Yes                                             |
adequately described and appropriate? Yes
Is rst level model fitting adequately described and appropriate? Yes
Is intersubject normalization adequately described and appropriate? Yes

**Imaging notes** —

**Conditions**

Are the conditions clearly described? Yes

| Condition                                           | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------------------------------------------|---------------|-------------|-----------------------|---------------------------|
| picture naming (untrained items, word cue)          | Word (overt)  | 54          | Yes                   | Unknown                   |
| picture naming (untrained items, initial phonemes cue) | Word (overt)  | 54          | Yes                   | Unknown                   |
| picture naming (untrained items, final phonemes cue) | Word (overt)  | 54          | Yes                   | Unknown                   |
| picture naming (untrained items, no cue)            | Word (overt)  | 54          | Yes                   | Unknown                   |
| picture naming (trained items, word cue)            | Word (overt)  | 53          | Yes                   | Unknown                   |
| picture naming (trained items, initial phonemes cue) | Word (overt)  | 53          | Yes                   | Unknown                   |
| picture naming (trained items, final phonemes cue)  | Word (overt)  | 53          | Yes                   | Unknown                   |
| picture naming (trained items, no cue)              | Word (overt)  | 53          | Yes                   | Unknown                   |
| rest                                                | None          | Implicit baseline | N/A                      | N/A                       |

**Conditions notes** Spectrally rotated noise vocoded auditory stimulus in no-cue conditions; one patient had a BNT of 1/60 so it is unclear whether that patient could do the task

**Contrasts**

Are the contrasts clearly described? No (see specific limitation(s) below)

**Contrast 1: picture naming (all conditions, correct trials) vs rest**

| Language condition | Control condition |
|--------------------|-------------------|
| Picture naming (all conditions, correct trials) | Rest |

Are the conditions matched for visual demands? No
Are the conditions matched for auditory demands? No
Are the conditions matched for motor demands? No
Are the conditions matched for cognitive/executive demands? No
Is accuracy matched between the language and control tasks for all relevant groups? N/A, tasks not comparable
Is reaction time matched between the language and control tasks for all relevant groups? N/A, tasks not comparable

**Behavioral data notes** —

Does the contrast selectively activate plausible relevant language regions in the control group? Unknown
Are activations lateralized in the control data? Unknown

**Contrast notes** It is difficult to determine exactly what contrasts were employed

**Contrast 2: picture naming (untrained items, no cue, correct trials) vs picture naming (trained items, no cue, correct trials)**

| Language condition | Control condition |
|--------------------|-------------------|
| Picture naming (untrained items, no cue, correct trials) | Picture naming (trained items, no cue, correct trials) |
| Question                                                                 | Answer          |
|-------------------------------------------------------------------------|-----------------|
| Are the conditions matched for visual demands?                         | Yes             |
| Are the conditions matched for auditory demands?                       | Yes             |
| Are the conditions matched for motor demands?                          | Yes             |
| Are the conditions matched for cognitive/executive demands?            | Yes             |
| Is accuracy matched between the language and control tasks for all relevant groups? | Yes, correct trials only |
| Is reaction time matched between the language and control tasks for all relevant groups? | No, different |
| Behavioral data notes                                                 | Untrained items significantly slower at T2 |
| Are control data reported in this paper or another that is referenced? | No              |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data?                       | Unknown         |
| Control activation notes                                               | —               |
| Contrast notes                                                         | It is difficult to determine exactly what contrasts were employed |

**Analyses**

| Question                                                                 | Answer                                                                                     |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Are the analyses clearly described?                                     | No* (moderate limitation) (see specific limitation(s) below)                               |

**Voxelwise analysis 1**

| First level contrast                                                   | Picture naming (all conditions, correct trials) vs rest                                    |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Analysis class                                                        | Longitudinal change in aphasia                                                           |
| Group(s)                                                               | Aphasia T2 vs T1                                                                         |
| Covariate                                                              | —                                                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                     |
| Is accuracy matched across the second level contrast?                  | Yes, correct trials only                                                                  |
| Is reaction time matched across the second level contrast?             | No, different                                                                             |
| Behavioral data notes                                                 | RT faster at T2                                                                            |
| Type of analysis                                                       | Voxelwise                                                                                 |
| Search volume                                                         | Whole brain                                                                               |
| Correction for multiple comparisons                                   | Voxelwise FWE correction                                                                   |
| Software                                                               | SPM12                                                                                     |
| Voxelwise p                                                           | FWE p < .05                                                                               |
| Cluster extent                                                        | —                                                                                         |
| Statistical details                                                   | —                                                                                         |
| Findings                                                              | None                                                                                      |
| Findings notes                                                        | —                                                                                         |

**ROI analysis 1**

| First level contrast                                                   | Picture naming (untrained items, no cue, correct trials) vs picture naming (trained items, no cue, correct trials) |
|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Analysis class                                                        | Cross-sectional correlation with language or other measure                                               |
| Group(s)                                                               | Aphasia T2                                                                                             |
| Covariate                                                              | "a change in un-cued naming RT" (exact measure unclear)                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (unclear whether behavioral measure is longitudinal)                                            |
| Is accuracy matched across the second level contrast?                  | Yes, correct trials only                                                                               |
| Is reaction time matched across the second level contrast?             | Unknown, not reported                                                                                    |
| Behavioral data notes                                                 | —                                                                                                       |
### Type of analysis
Regions of interest (ROI)

### ROI type
Functional

### How many ROIs are there?
4

### What are the ROI(s)?
(1) R anterior insula; (2) R IFG; (3) dorsal anterior cingulate; (4) L premotor cortex

### How are the ROI(s) defined?
Peaks (only with SVC) for the main effect of untrained (4 conditions) vs trained (4 conditions) in T2 aphasia

### Correction for multiple comparisons
No correction

### Statistical details
Unclear what the behavioral measure was exactly

### Findings
↑ R IFG pars opercularis
↑ R insula

### Findings notes
—

### Notes
Most analyses were between conditions in people with aphasia, so did not meet criteria for this review

### Excluded analyses
Most analyses were between conditions in people with aphasia, so did not meet criteria for this review

### Nenert et al. (2017)

#### Reference

| Authors          | Nenert R, Allendorfer JB, Martin AM, Banks C, Ball A, Vannest J, Dietz AR, Szafarski JP |
|------------------|---------------------------------------------------------------------------------------|
| Title            | Neuroimaging correlates of post-stroke aphasia rehabilitation in a pilot randomized trial of constraint-induced aphasia therapy |
| Reference        | Med Sci Monit 2017; 23: 3489-3507                                                     |
| PMID             | 28719572                                                                               |
| DOI              | 10.12659/msm.902301                                                                     |

#### Participants

| Language          | US English |
|-------------------|------------|
| Inclusion criteria| At least mild aphasia per TT |
| Number of individuals with aphasia | 19 |
| Number of control participants | 38 |
| Were any of the participants included in any previous studies? | Yes (patients are a subset of the 24 participants in Szafarski et al. (2015), a clinical trial on CIAT) |
| Is age reported for patients and controls, and matched? | Yes (CIAT group: mean 58.0 ± 10.6 years; untreated group: mean 50.3 ± 13.3 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 11; females: 8) |
| Is handedness reported for patients and controls, and matched? | No (right: 17; left: 0; other: 2; 2 patients "atypical": unclear whether L or mixed) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (CIAT group: mean 60.2 ± 48.9 months; untreated group: mean 41.9 ± 30.0 months; all > 1 year) |
| To what extent is the nature of aphasia characterized? | Severity only |
| Language evaluation | TT, PPVT, BNT, semantic fluency, phonemic fluency, communicative activities log |
| Aphasia severity | 6 mild (2 control, 4 CIAT); 5 moderate (3 control, 2 CIAT); 8 severe (3 control, 5 CIAT) |
| Aphasia type | Not stated |
| First stroke only? | Yes |
| Stroke type | Ischemic only |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Not stated |
| Lesion location | L MCA |
| Participants notes | — |
Imaging

| Modality         | fMRI |
|------------------|------|
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment, ~3 weeks later; T3: 3 months after the end of treatment |
| If longitudinal, was there any intervention between the time points? | CIAT, 4 hours/day, 5 days/week, 2 weeks |
| Is the scanner described? | No (Philips 3 Tesla or Siemens 3 Tesla; models not stated) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type      | Block |
| Total images acquired | 600 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed) |
| Imaging notes    | — |

Conditions

| Condition                  | Response type | Repetitions | All groups could do? | All individuals could do? |
|----------------------------|---------------|-------------|-----------------------|---------------------------|
| semantic decision          | Button press  | 10          | Unknown               | Unknown                   |
| tone decision              | Button press  | 10          | Unknown               | Unknown                   |
| verb generation            | Multiple words (covert) | 10 | Unknown               | Unknown                   |
| finger tapping             | Other         | 10          | Unknown               | Unknown                   |

| Conditions notes           | Behavioral data are provided for the semantic decision and tone decision tasks, but the denominator is unclear; a post-scan recognition test for verb generation is reported, but this cannot confirm verb generation performance |

Contrasts

| Contrast 1: semantic decision vs tone decision |
|-----------------------------------------------|
| Language condition                           | Semantic decision |
| Control condition                            | Tone decision     |
| Are the conditions matched for visual demands? | Yes                |
| Are the conditions matched for auditory demands? | Yes               |
| Are the conditions matched for motor demands?  | Yes               |
| Are the conditions matched for cognitive/executive demands? | Yes               |
| Is accuracy matched between the language and control tasks for all relevant groups? | Appear mismatched |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |

| Behavioral data notes | Appear mismatched at least in healthy controls in Table 3 |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes |
| Are activations lateralized in the control data? | Yes |
| Control activation notes | Lateralized frontal, temporal, and parietal |
|-------------------------|--------------------------------------------|
| Contrast notes          | —                                          |

**Contrast 2: verb generation vs finger tapping**

| Language condition | Verb generation |
|--------------------|-----------------|
| Control condition  | Finger tapping  |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |

| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | Yes |

| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes |
| Are activations lateralized in the control data? | Somewhat |

| Control activation notes | Control data in Szafirowski et al. (2008); frontal activation L-lateralized, temporal less so |
| Contrast notes | — |

**Analyses**

| Are the analyses clearly described? | Yes |

**Voxelwise analysis 1**

| First level contrast | Semantic decision vs tone decision |
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia CIAT T2 (n = 11) vs untreated T2 (n = 8) |
| Covariate            | — |

| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect) |
| Is accuracy matched across the second level contrast? | Appears similar |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

| Behavioral data notes | — |
| Type of analysis      | Voxelwise |
| Search volume         | Voxels spared in all patients |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software              | SPM12 |
| Voxelwise p           | .01 |
| Cluster extent        | 50 voxels (size not stated) |

| Statistical details   | — |
| Findings              | L somato-motor |
|                       | L superior parietal |
|                       | L brainstem |
|                       | L ventral precentral/inferior frontal junction |
|                       | R somato-motor |
|                       | R superior parietal |

| Findings notes | Based on coordinates in Table 4 |

**Voxelwise analysis 2**

| First level contrast | Semantic decision vs tone decision | 485 |
| Analysis class | Cross-sectional between two groups with aphasia |
|----------------|-----------------------------------------------|
| Group(s)       | Aphasia CIAT T3 (n = 11) vs untreated T3 (n = 8) |
| Covariate      | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect) |
| Is accuracy matched across the second level contrast? | Unknown, no test |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

**Type of analysis**

Voxelwise

**Search volume**

Voxels spared in all patients

**Correction for multiple comparisons**

Clusterwise correction based on arbitrary cluster extent

**Software**

SPM12

**Voxelwise p**

.01

**Cluster extent**

50 voxels (size not stated)

**Statistical details**

**Findings**

↑ L superior parietal
↑ L anterior temporal
↑ L hippocampus/MTL
↑ R orbitofrontal
↓ L dorsolateral prefrontal cortex
↓ L posterior inferior temporal gyrus/fusiform gyrus
↓ R IFG pars orbitalis
↓ R ventral precentral/inferior frontal junction
↓ R posterior STS

**Findings notes**

Based on coordinates in Table 4

---

**Voxelwise analysis 3**

**First level contrast**

Verb generation vs finger tapping

**Analysis class**

Cross-sectional between two groups with aphasia

**Group(s)**

Aphasia CIAT T2 (n = 11) vs untreated T2 (n = 8)

**Covariate**

—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**

Somewhat (no treatment effect)

**Is accuracy matched across the second level contrast?**

Unknown, not reported

**Is reaction time matched across the second level contrast?**

Unknown, not reported

**Behavioral data notes**

—

**Type of analysis**

Voxelwise

**Search volume**

Voxels spared in all patients

**Correction for multiple comparisons**

Clusterwise correction based on arbitrary cluster extent

**Software**

SPM12

**Voxelwise p**

.01

**Cluster extent**

50 voxels (size not stated)

**Statistical details**

—

**Findings**

↓ L precuneus
↓ R dorsolateral prefrontal cortex
↓ R posterior STS
↓ R anterior temporal
↓ R posterior inferior temporal gyrus/fusiform gyrus

**Findings notes**

Based on coordinates in Table 4

---

**Voxelwise analysis 4**

**First level contrast**

Verb generation vs finger tapping
### Analysis class
Cross-sectional between two groups with aphasia

### Group(s)
Aphasia CIAT T3 (n = 11) vs untreated T3 (n = 8)

### Covariate
—

| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect) |
|-------------------------------------------------|--------------------------------|
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes
—

| Type of analysis | Voxelwise |
|-----------------|-----------|
| Search volume   | Voxels spared in all patients |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software        | SPM12 |
| Voxelwise p     | .01 |
| Cluster extent  | 50 voxels (size not stated) |

### Statistical details
—

| Findings          |
|-------------------|
| ↑ L SMA/medial prefrontal |
| ↑ R basal ganglia  |
| ↓ L anterior temporal |
| ↓ R posterior STS   |
| ↓ R Heschl's gyrus |
| ↓ R posterior inferior temporal gyrus/fusiform gyrus |

### Findings notes
—

### Voxelwise analysis 5

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia CIAT T1 (n = 11) vs control |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appears mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

| Behavioral data notes |
|-----------------------|
| Patients less accurate than controls on both tasks, but more so on the tone decision task |

| Type of analysis | Voxelwise |
|-----------------|-----------|
| Search volume   | Voxels spared in all patients |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software        | SPM12 |
| Voxelwise p     | .01 |
| Cluster extent  | 50 voxels (size not stated) |

### Statistical details
—

| Findings          |
|-------------------|
| ↑ L orbitofrontal |
| ↑ L hippocampus/MTL |
| ↑ R IFG pars opercularis |
| ↑ R SMA/medial prefrontal |
| ↑ R supramarginal gyrus |
| ↑ R posterior STG/STS/MTG |
| ↑ R anterior temporal |
| ↑ R anterior cingulate |
| ↓ R dorsolateral prefrontal cortex |

### Findings notes
—

### Voxelwise analysis 6

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia CIAT T3 (n = 11) vs untreated T3 (n = 8) |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

| Behavioral data notes |
|-----------------------|
| —                     |

| Type of analysis | Voxelwise |
|-----------------|-----------|
| Search volume   | Voxels spared in all patients |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software        | SPM12 |
| Voxelwise p     | .01 |
| Cluster extent  | 50 voxels (size not stated) |

### Statistical details
—

| Findings          |
|-------------------|
| ↑ L orbitofrontal |
| ↑ L hippocampus/MTL |
| ↑ R IFG pars opercularis |
| ↑ R SMA/medial prefrontal |
| ↑ R supramarginal gyrus |
| ↑ R posterior STG/STS/MTG |
| ↑ R anterior temporal |
| ↑ R anterior cingulate |
| ↓ R dorsolateral prefrontal cortex |

### Findings notes
—
| Analysis class       | Cross-sectional aphasia vs control |
|---------------------|-----------------------------------|
| Group(s)            | Aphasia CIAT T2 (n = 11) vs control |
| Covariate           | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appears mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Patients less accurate than controls on both tasks, but more so on the tone decision task |
| Type of analysis    | Voxelwise                         |
| Search volume       | Voxel spared in all patients      |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software            | SPM12                             |
| Voxelwise p         | .01                               |
| Cluster extent      | 50 voxels (size not stated)       |
| Statistical details | —                                 |
| Findings            | ↑ L anterior cingulate             |
|                     | ↑ R IFG pars opercularis           |
|                     | ↑ R insula                         |
|                     | ↑ R ventral precentral/inferior frontal junction |
|                     | ↑ R supramarginal gyrus           |
|                     | ↑ R Heschl's gyrus                |
|                     | ↓ L dorsolateral prefrontal cortex |
|                     | ↓ L SMA/medial prefrontal         |
|                     | ↓ L cerebellum                    |
|                     | ↓ R dorsolateral prefrontal cortex |
| Findings notes      | —                                 |

**Voxelwise analysis 7**

| Analysis class       | Cross-sectional aphasia vs control |
|---------------------|-----------------------------------|
| Group(s)            | Aphasia CIAT T3 (n = 11) vs control |
| Covariate           | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appears mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Patients less accurate than controls on both tasks, but more so on the tone decision task |
| Type of analysis    | Voxelwise                         |
| Search volume       | Voxel spared in all patients      |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software            | SPM12                             |
| Voxelwise p         | .01                               |
| Cluster extent      | 50 voxels (size not stated)       |
| Statistical details | —                                 |
| Findings            | ↑ L orbitofrontal                 |
|                     | ↑ L anterior cingulate            |
|                     | ↑ L hippocampus/MTL               |
|                     | ↑ R superior parietal             |
|                     | ↓ L cerebellum                    |
|                     | ↓ R dorsolateral prefrontal cortex |
|                     | ↓ R anterior temporal             |
|                     | ↓ R cerebellum                    |
| Findings notes      | —                                 |
### Voxelwise analysis 8

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control|
| Group(s)             | Aphasia untreated T1 (n = 8) vs control |
| Covariate            | —                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Appear mismatched** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |
| Behavioral data notes | Patients less accurate than controls on both tasks, but more so on the tone decision task |
| Type of analysis     | Voxelwise                         |
| Search volume        | Voxels spared in all patients     |
| Correction for multiple comparisons | **Clusterwise correction based on arbitrary cluster extent** |
| Software              | SPM12                             |
| Voxelwise p           | .01                               |
| Cluster extent        | 50 voxels (size not stated)       |
| Statistical details   | —                                 |
| Findings              | ↑ L dorsolateral prefrontal cortex |
|                       | ↑ R dorsolateral prefrontal cortex |
|                       | ↑ R SMA/medial prefrontal         |
|                       | ↑ R somato-motor                  |
|                       | ↓ L IFG pars orbitalis            |
|                       | ↓ L dorsolateral prefrontal cortex|
|                       | ↓ L SMA/medial prefrontal         |
|                       | ↓ L angular gyrus                 |
|                       | ↓ L mid temporal                  |
|                       | ↓ L anterior temporal              |
|                       | ↓ R IFG pars orbitalis            |
|                       | ↓ R angular gyrus                 |
|                       | ↓ R anterior temporal              |
|                       | ↓ R posterior inferior temporal gyrus/fusiform gyrus |

### Voxelwise analysis 9

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control|
| Group(s)             | Aphasia untreated T2 (n = 8) vs control |
| Covariate            | —                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Appear mismatched** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |
| Behavioral data notes | Patients less accurate than controls on both tasks, but more so on the tone decision task |
| Type of analysis     | Voxelwise                         |
| Search volume        | Voxels spared in all patients     |
| Correction for multiple comparisons | **Clusterwise correction based on arbitrary cluster extent** |
| Software              | SPM12                             |
| Voxelwise p           | .01                               |
| Cluster extent        | 50 voxels (size not stated)       |
| Statistical details   | —                                 |
| Findings              | ↑ L posterior inferior temporal gyrus/fusiform gyrus |
|                       | ↑ R dorsolateral prefrontal cortex |
|                       | ↑ R orbitofrontal                 |
| Findings notes | — |

**Voxelwise analysis 10**

| First level contrast | Semantic decision vs tone decision |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia untreated T3 (n = 8) vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Patients less accurate than controls on both tasks, but not significantly for the semantic decision task, and more so on the tone decision task |
| Type of analysis | Voxelwise |
| Search volume | Voxels spared in all patients |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software | SPM12 |
| Voxelwise p | .01 |
| Cluster extent | 50 voxels (size not stated) |
| Statistical details | — |
| Findings | ↑ L dorsolateral prefrontal cortex |
| | ↑ R dorsolateral prefrontal cortex |
| | ↑ R SMA/medial prefrontal |
| | ↑ R orbitofrontal |
| | ↑ R superior parietal |
| | ↑ R cerebellum |
| | ↓ L orbitofrontal |
| | ↓ L mid temporal |
| | ↓ L anterior temporal |
| | ↓ L posterior cingulate |
| | ↓ L cerebellum |
| | ↓ L hippocampus/MTL |
| | ↓ R angular gyrus |
| | ↓ R anterior temporal |

**Voxelwise analysis 11**

| First level contrast | Verb generation vs finger tapping |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia CIAT T1 (n = 11) vs control |
| Covariate | — |
### Behavioral data notes

**Type of analysis**: Voxelwise  
**Search volume**: Voxels spared in all patients  
**Correction for multiple comparisons**: *Clusterwise correction based on arbitrary cluster extent*  
**Software**: SPM12  
**Voxelwise p**: .01  
**Cluster extent**: 50 voxels (size not stated)  
**Statistical details**: —  

#### Findings

- ↑ L dorsal precentral  
- ↑ L superior parietal  
- ↑ R cerebellum  
- ↑ L dorsolateral prefrontal cortex  
- ↓ L SMA/medial prefrontal  
- ↓ R posterior inferior temporal gyrus/fusiform gyrus  

### Voxelwise analysis 12

**First level contrast**: Verb generation vs finger tapping  
**Analysis class**: Cross-sectional aphasia vs control  
**Group(s)**: Aphasia CIAT T2 (n = 11) vs control  
**Covariate**: —  

#### Findings

- ↑ L dorsal precentral  
- ↑ L anterior cingulate  
- ↓ L IFG pars orbitalis  
- ↓ L dorsolateral prefrontal cortex  
- ↓ L SMA/medial prefrontal  
- ↓ L superior parietal  
- ↑ L posterior inferior temporal gyrus/fusiform gyrus  
- ↓ L occipital  
- ↓ R IFG pars orbitalis

### Voxelwise analysis 13

**First level contrast**: Verb generation vs finger tapping  
**Analysis class**: Cross-sectional aphasia vs control  
**Group(s)**: Aphasia CIAT T3 (n = 11) vs control  
**Covariate**: —
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

- Type of analysis: Voxelwise
- Search volume: Voxels spared in all patients
- Correction for multiple comparisons: *Clusterwise correction based on arbitrary cluster extent*
- Software: SPM12
- Voxelwise p: .01
- Cluster extent: 50 voxels (size not stated)

**Statistical details**

| Findings |
| --- |
| ↑ L somato-motor |
| ↑ L anterior cingulate |
| ↑ L posterior cingulate |
| ↓ L IFG pars orbitalis |
| ↓ L dorsolateral prefrontal cortex |
| ↓ L superior parietal |
| ↓ L posterior inferior temporal gyrus/fusiform gyrus |
| ↓ R dorsolateral prefrontal cortex |
| ↓ R mid temporal |

**Findings notes**

- Voxelwise analysis 14

**Voxelwise analysis 14**

| First level contrast | Verb generation vs finger tapping |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia untreated T1 (n = 8) vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

- Type of analysis: Voxelwise
- Search volume: Voxels spared in all patients
- Correction for multiple comparisons: *Clusterwise correction based on arbitrary cluster extent*
- Software: SPM12
- Voxelwise p: .01
- Cluster extent: 50 voxels (size not stated)

**Statistical details**

| Findings |
| --- |
| ↑ L superior parietal |
| ↑ L occipital |
| ↑ L cerebellum |
| ↑ R dorsolateral prefrontal cortex |
| ↑ R cerebellum |
| ↓ L IFG pars orbitalis |
| ↓ L SMA/medial prefrontal |
| ↓ L posterior inferior temporal gyrus/fusiform gyrus |
| ↓ L cerebellum |
| ↓ R superior parietal |

**Findings notes**

- Voxelwise analysis 15

**Voxelwise analysis 15**
| First level contrast                          | Verb generation vs finger tapping                                      |
|---------------------------------------------|------------------------------------------------------------------------|
| Analysis class                              | Cross-sectional aphasia vs control                                     |
| Group(s)                                    | Aphasia untreated T2 (n = 8) vs control                               |
| Covariate                                   |                                                                        |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                    |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                |
| Behavioral data notes                       |                                                                        |
| Type of analysis                            | Voxelwise                                                             |
| Search volume                               | Voxel spared in all patients                                          |
| Correction for multiple comparisons         | Clusterwise correction based on arbitrary cluster extent              |
| Software                                    | SPM12                                                                 |
| Voxelwise p                                 | .01                                                                   |
| Cluster extent                              | 50 voxels (size not stated)                                          |
| Statistical details                         |                                                                        |
| Findings                                    |                                                                        |
| ↑ L dorsolateral prefrontal cortex           |                                                                        |
| ↑ R SMA/medial prefrontal                   |                                                                        |
| ↑ R angular gyrus                           |                                                                        |
| ↑ R posterior STG                            |                                                                        |
| ↑ R posterior cingulate                      |                                                                        |
| ↑ R cerebellum                              |                                                                        |
| ↓ L dorsolateral prefrontal cortex           |                                                                        |
| ↓ L SMA/medial prefrontal                   |                                                                        |
| ↓ L superior parietal                        |                                                                        |
| ↓ L anterior temporal                        |                                                                        |
| ↓ L posterior inferior temporal gyrus/fusiform gyrus |                                                                |
| ↓ L occipital                               |                                                                        |
| ↓ R superior parietal                        |                                                                        |
| ↓ R occipital                               |                                                                        |
| ↓ R cerebellum                              |                                                                        |

Findings notes

Voxelwise analysis 16

| First level contrast                          | Verb generation vs finger tapping                                      |
|---------------------------------------------|------------------------------------------------------------------------|
| Analysis class                              | Cross-sectional aphasia vs control                                     |
| Group(s)                                    | Aphasia untreated T3 (n = 8) vs control                               |
| Covariate                                   |                                                                        |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                    |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                |
| Behavioral data notes                       |                                                                        |
| Type of analysis                            | Voxelwise                                                             |
| Search volume                               | Voxel spared in all patients                                          |
| Correction for multiple comparisons         | Clusterwise correction based on arbitrary cluster extent              |
| Software                                    | SPM12                                                                 |
| Voxelwise p                                 | .01                                                                   |
| Cluster extent                              | 50 voxels (size not stated)                                          |
| Statistical details                         |                                                                        |
| Findings                                    |                                                                        |
| ↑ L superior parietal                        |                                                                        |
| ↑ L anterior temporal                        |                                                                        |
| ↑ L occipital                                |                                                                        |
| Findings notes |
|----------------|
| — |

### Voxelwise analysis 17

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T2 vs T1 |
| Covariate            | Δ BNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Search volume        | Voxels spared in all patients |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software             | SPM12 |
| Voxelwise p          | .01 |
| Cluster extent       | 50 voxels (size not stated) |
| Statistical details  | — |
| Findings             | ↑ R insula |
|                      | ↑ R anterior cingulate |
|                      | ↑ R cerebellum |
|                      | ↑ R brainstem |
|                      | ↑ R basal ganglia |
| Findings notes       | — |

### Voxelwise analysis 18

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T3 vs T2 |
| Covariate            | Δ BNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Search volume        | Voxels spared in all patients |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software             | SPM12 |
### Voxelwise analysis 19

| Voxelwise p | .01 |
| --- | --- |
| Cluster extent | 50 voxels (size not stated) |
| Statistical details | — |
| Findings | ↑ R somato-motor  
↑ R posterior MTG  
↑ R thalamus |
| Findings notes | — |

#### Voxelwise analysis 20

| Voxelwise p | .01 |
| --- | --- |
| Cluster extent | 50 voxels (size not stated) |
| Statistical details | — |
| Findings | ↑ R orbitofrontal  
↑ R mid temporal |
| Findings notes | — |

### ROI analysis 1

| Voxelwise p | .01 |
| --- | --- |
| Cluster extent | 50 voxels (size not stated) |
| Statistical details | — |
| Findings | ↑ L dorsolateral prefrontal cortex  
↑ R dorsolateral prefrontal cortex  
↑ R orbitofrontal |
| Findings notes | — |
| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal change in aphasia    |
| Group(s)             | Aphasia ANOVA including T1, T2, T3 |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear similar |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                 |
| Type of analysis     | Regions of interest (ROI)         |
| ROI type             | Laterality indices                |
| How many ROIs are there? | 5                                |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) cerebellar LI; (4) fronto-parietal LI; (5) Broca’s LI |
| How are the ROI(s) defined? |                                   |
| Correction for multiple comparisons | No correction |
| Statistical details  | —                                 |
| Findings             | None                              |
| Findings notes       | —                                 |

**ROI analysis 2**

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal between two groups with aphasia |
| Group(s)             | (Aphasia CIAT (n = 11) T1 ≠ T2 ≠ T3) vs (untreated (n = 8) T1 ≠ T2 ≠ T3) |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect) |
| Is accuracy matched across the second level contrast? | Appear similar |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                 |
| Type of analysis     | Regions of interest (ROI)         |
| ROI type             | Laterality indices                |
| How many ROIs are there? | 5                                |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) cerebellar LI; (4) fronto-parietal LI; (5) Broca’s LI |
| How are the ROI(s) defined? |                                   |
| Correction for multiple comparisons | No correction |
| Statistical details  | —                                 |
| Findings             | None                              |
| Findings notes       | —                                 |

**ROI analysis 3**

| First level contrast | Verb generation vs finger tapping |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal change in aphasia    |
| Group(s)             | Aphasia ANOVA including T1, T2, T3 |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                 |

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| Type of analysis | Regions of interest (ROI) |
|------------------|---------------------------|
| ROI type         | Laterality indices        |
| How many ROIs are there? | 5                      |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) cerebellar LI; (4) fronto-parietal LI; (5) Broca's LI |
| How are the ROI(s) defined? |                           |
| Correction for multiple comparisons | No correction |
| Statistical details | None                       |
| Findings | None |
| Findings notes |                           |

### ROI analysis 4

| First level contrast | Verb generation vs finger tapping |
|----------------------|----------------------------------|
| Analysis class       | Longitudinal between two groups with aphasia |
| Group(s)             | (Aphasia CIAT (n = 11) T1 ≠ T2 ≠ T3) vs (untreated (n = 8) T1 ≠ T2 ≠ T3) |
| Covariate            |                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes |                                  |
| Type of analysis | Regions of interest (ROI) |
| ROI type         | Laterality indices        |
| How many ROIs are there? | 5                      |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) cerebellar LI; (4) fronto-parietal LI; (5) Broca's LI |
| How are the ROI(s) defined? |                           |
| Correction for multiple comparisons | No correction |
| Statistical details | None                       |
| Findings | None |
| Findings notes |                           |

### Notes

Excluded analyses: (1) pretreatment comparisons between CIAT and untreated groups; (2) Figure 4 caption states that LI values for control group are different to the aphasia groups, but there is no statistical test in support of this.

### Qiu et al. (2017)

#### Reference

| Authors | Qiu WH, Wu HX, Yang QL, Kang Z, Chen ZC, Li K, Qiu GR, Xie CQ, Wan GF, Chen SQ |
|---------|------------------------------------------------------------------------------|
| Title   | Evidence of cortical reorganization of language networks after stroke with subacute Broca's aphasia: a blood oxygenation level dependent-functional magnetic resonance imaging study |
| Reference | Neural Regen Res 2017; 128: 109-117 |
| PMID    | 28250756                       |
| DOI     | 10.4103/1673-5374.198996       |

#### Participants

| Language | Mandarin |
|----------|----------|
| Inclusion criteria | Broca's aphasia |
| Number of individuals with aphasia | 10 |
| Number of control participants | 10 |
Were any of the participants included in any previous studies? No
Is age reported for patients and controls, and matched? Yes (mean 55.9 ± 13.4 years, range 40-70 years)
Is sex reported for patients and controls, and matched? Yes (males: 7; females: 3)
Is handedness reported for patients and controls, and matched? Yes (right: 10; left: 0)
Is time post stroke onset reported and appropriate to the study design? Yes (range 1-3 months)
To what extent is the nature of aphasia characterized? Severity and type
Language evaluation WAB
Aphasia severity Moderate-severe
Aphasia type All Broca's
First stroke only? Yes
Stroke type Mixed etiologies
To what extent is the lesion distribution characterized? Not at all
Lesion extent Not stated
Lesion location L
Participants notes —

Imaging

| Modality       | fMRI       |
|----------------|-----------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (GE Signa 1.5 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (only three pictures were named per 30-second block) |
| Design type    | Block     |
| Total images acquired | 186       |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | No (not described) |
| Is first level model fitting adequately described and appropriate? | No (no description of model fitting) |
| Is intersubject normalization adequately described and appropriate? | No (not described) |
| Imaging notes  | —         |

Conditions

| Condition       | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------|---------------|-------------|-----------------------|---------------------------|
| picture naming  | Word (overt)  | 9           | Unknown               | Unknown                   |
| rest            | None          | 9           | N/A                   | N/A                       |

Conditions notes —

Contrasts

| Condition       | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------|---------------|-------------|-----------------------|---------------------------|
| Condition notes | —             |             |                       |                           |

Contrasts

| Condition       | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------|---------------|-------------|-----------------------|---------------------------|
| Condition notes | —             |             |                       |                           |
### Contrast 1: picture naming vs rest

| Language condition          | Picture naming |
|----------------------------|----------------|
| Control condition           | Rest           |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes       | —              |
| Does the contrast selectively activate plausible relevant language regions in the control group? | No |
| Are activations lateralized in the control data? | Somewhat |

#### Contrast notes
- Somewhat L-lateralized frontal and anterior temporal language activations, but the majority of activation is in unexpected regions

#### Analyses

| Are the analyses clearly described? | No* (moderate limitation) (see specific limitation(s) below) |

#### Voxelwise analysis 1

| First level contrast | Picture naming vs rest |
|----------------------|------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia vs control |
| Covariate            | —                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                      |
| Type of analysis      | Voxelwise              |
| Search volume         | Whole brain            |
| Correction for multiple comparisons | Clusterwise correction based on arbitrary cluster extent |
| Software              | SPM8                   |
| Voxelwise p           | .05                    |
| Cluster extent        | 10 voxels (size not stated) |
| Statistical details   | In the footnote to Table 2, there is a reference to FWE correction with Monte Carlo simulation, but this is not described in the text, and the values in the table appear to be inconsistent with that |

#### Findings
- ↑ L intraparietal sulcus
- ↑ L posterior inferior temporal gyrus/fusiform gyrus
- ↑ L occipital
- ↑ L thalamus
- ↑ R inferior parietal lobule
- ↑ R intraparietal sulcus
- ↑ R precuneus
- ↑ R anterior temporal
- ↓ L IFG
- ↓ L orbitofrontal
Findings notes

Findings are based on coordinates, which in many cases do not match the labels assigned in the paper.

Notes

Excluded analyses

Comparisons between activation volumes in the left and right hemispheres in the two groups, because not described in sufficient detail.

Skipper-Kallal et al. (2017a)

Reference

| Authors     | Skipper-Kallal LM, Lacey EH, Xing S, Turkeltaub PE |
|-------------|---------------------------------------------------|
| Title       | Functional activation independently contributes to naming ability and relates to lesion site in post-stroke aphasia |
| Reference   | Hum Brain Mapp 2017a; 38: 2051-2066 |
| PMID        | 28083891 |
| DOI         | 10.1002/hbm.23504 |

Participants

| Language                | US English |
|-------------------------|------------|
| Inclusion criteria      | Able to name 20% of pictures correctly in the scanner |
| Number of individuals with aphasia | 32 (plus 14 excluded: < 20% accuracy in scanner) |
| Number of control participants | 25 |
| Were any of the participants included in any previous studies? | Yes (29 of the participants overlap with the other Skipper-Kallal et al. (2017) paper) |
| Is age reported for patients and controls, and matched? | Yes (mean 58.8 ± 8.6 years, range 45.7-78.2 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 19; females: 12; stated to be not matched, but difference not significant) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 26; left: 3; other: 2) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 40.9 ± 36.1 months, 4.9-151.0 months) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |
| Language evaluation     | WAB, PNT |
| Aphasia severity        | AQ mean 77.7 ± 21.0, range 22.8-99.2 |
| Aphasia type            | 21 anomic, 7 Broca’s, 3 conduction, 1 transcortical sensory |
| First stroke only?      | Not stated |
| Stroke type             | Not stated |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent           | Mean 27.5 ± 22.9 cc |
| Lesion location         | L MCA |
| Participants notes      | — |

Imaging

| Modality | fMRI |
|-----------|------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between | — |
the time points?
Is the scanner described? Yes (Siemens Trio 3 Tesla)
Is the timing of stimulus presentation and image acquisition clearly described and appropriate? No* (moderate limitation) (total images acquired not stated; separation of adjacent events (covert and overt naming) will be limited because of the small amount of jitter in their timing (only 1500 ms))
Design type Event-related
Total images acquired ~450 but not stated
Are the imaging acquisition parameters, including coverage, adequately described and appropriate? Yes (whole brain)
Is preprocessing and intrasubject coregistration adequately described and appropriate? Yes
Is first level model fitting adequately described and appropriate? No* (moderate limitation) (entire phases where picture was displayed modeled as covert and overt naming; difficult to separate phases due to timing)
Is intersubject normalization adequately described and appropriate? Yes
Imaging notes —

Conditions
Are the conditions clearly described? Yes

| Condition                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|-------------------------------|---------------|-------------|-----------------------|---------------------------|
| picture naming (silently name) | Word (covert) | 32          | Yes                   | Yes                       |
| picture naming (produce the name) | Word (overt) | 32          | Yes                   | Yes                       |
| rest                          | None          | implicit baseline | N/A                | N/A                       |

Conditions notes Covert and overt naming were modeled as two phases of each trial (there was a cue to produce the name after 7500-9000 ms); 5 participants who were more impaired were given easier pictures to name; patients who named less than 20% of items correctly were excluded

Contrasts
Are the contrasts clearly described? No (see specific limitation(s) below)

Contrast 1: picture naming (silently name, correct trials) vs rest
Language condition Picture naming (silently name, correct trials)
Control condition Rest
Are the conditions matched for visual demands? No
Are the conditions matched for auditory demands? Yes
Are the conditions matched for motor demands? Yes
Are the conditions matched for cognitive/executive demands? No
Is accuracy matched between the language and control tasks for all relevant groups? N/A, tasks not comparable
Is reaction time matched between the language and control tasks for all relevant groups? N/A, tasks not comparable
Behavioral data notes —
Are control data reported in this paper or another that is referenced? Yes
Does the contrast selectively activate plausible relevant language regions in the control group? No
Are activations lateralized in the control data? No
Control activation notes Bilateral frontal and occipito-temporal, but not posterior temporal
Contrast notes —

Contrast 2: picture naming (produce the name, correct trials) vs rest
Language condition Picture naming (produce the name, correct trials)
| Control condition | Rest |
|-------------------|------|
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

**Behavioral data notes**

- Are control data reported in this paper or another that is referenced? Yes
- Does the contrast selectively activate plausible relevant language regions in the control group? No
- Are activations lateralized in the control data? No

**Control activation notes**

- Bilateral frontal and occipito-temporal, but not posterior temporal; speech motor activation not readily apparent

**Contrast notes**

- It is unclear whether there were no-response trials and whether they were modeled as incorrect

**Analyses**

- Are the analyses clearly described? Yes

**Voxelwise analysis 1**

| First level contrast | Picture naming (silently name, correct trials) vs rest |
|----------------------|------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                  |
| Group(s)             | Aphasia vs control                                  |
| Covariate            |                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
**Behavioral data notes**

Covert phase but accuracy derived from overt phase

| Type of analysis          | Voxelwise                        |
|---------------------------|----------------------------------|
| Search volume             | Whole brain gray matter          |
| Correction for multiple comparisons | Clusterwise correction with with GRFT and lenient voxelwise p |
| Software                  | FSL 5.0.6                        |
| Voxelwise p               | ~.01 (z > 2.3)                   |
| Cluster extent            | Based on GRFT                    |
| Statistical details       | Threshold of z > 3.1 mentioned in results, but presume 2.3 based on methods and figure |

**Findings**

- ↑ R precuneus
- ↓ L occipital

**Findings notes**

Labels based largely on text with some adjustments based on figures; overall pattern of decreased L activity and increased R activity is quite convincing

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**Voxelwise analysis 2**

| First level contrast | Picture naming (produce the name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                       |
| Group(s)             | Aphasia vs control                                       |
| Covariate            |                                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

- 

**Type of analysis**

- Voxelwise

| Search volume             | Whole brain gray matter          |
|---------------------------|----------------------------------|
| Correction for multiple comparisons | Clusterwise correction with with GRFT and lenient voxelwise p |
| Software                  | FSL 5.0.6                        |
| Voxelwise p               | ~.01 (z > 2.3)                   |
| Cluster extent            | Based on GRFT                    |
| Statistical details       | Threshold of z > 3.1 mentioned in results, but presume 2.3 based on methods and figure |

**Findings**

- ↑ L SMA/medial prefrontal
- ↑ L orbitofrontal
- ↑ L precuneus
- ↑ R insula
- ↑ R ventral precentral/inferior frontal junction
- ↑ R SMA/medial prefrontal
- ↑ R orbitofrontal
- ↑ R somato-motor
- ↑ R supramarginal gyrus
- ↑ R posterior STS
- ↓ L IFG
- ↓ L insula
- ↓ L ventral precentral/inferior frontal junction
- ↓ L intraparietal sulcus
- ↓ L anterior temporal
- ↓ L hippocampus/MTL
- ↓ R intraparietal sulcus

**Findings notes**

Labels based largely on text with some adjustments based on figures; overall pattern of decreased L activity and increased R activity is quite convincing

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**Voxelwise analysis 3**

| First level contrast | Picture naming (silently name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia                                                  |
| Covariate            | PNT                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |

**Behavioral data notes**

- 

**Type of analysis**

- Voxelwise

| Search volume             | Whole brain gray matter          |
|---------------------------|----------------------------------|
| Correction for multiple comparisons | Clusterwise correction with with GRFT and lenient voxelwise p |
| Software                  | FSL 5.0.6                        |
| Voxelwise p               | ~.01 (z > 2.3)                   |
| Cluster extent            | Based on GRFT                    |
| Statistical details       | Threshold of z > 3.1 mentioned in results, but presume 2.3 based on methods and figure |

**Findings**

- ↑ L SMA/medial prefrontal
- ↑ L orbitofrontal
- ↑ L precuneus
- ↑ R insula
- ↑ R ventral precentral/inferior frontal junction
- ↑ R SMA/medial prefrontal
- ↑ R orbitofrontal
- ↑ R somato-motor
- ↑ R supramarginal gyrus
- ↑ R posterior STS
- ↓ L IFG
- ↓ L insula
- ↓ L ventral precentral/inferior frontal junction
- ↓ L intraparietal sulcus
- ↓ L anterior temporal
- ↓ L hippocampus/MTL
- ↓ R intraparietal sulcus

**Findings notes**

Labels based largely on text with some adjustments based on figures; overall pattern of decreased L activity and increased R activity is quite convincing
| group(s), time point(s), and measures involved? | Yes, correct trials only |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Covert phase but accuracy derived from overt phase |
| Type of analysis | Voxelwise |
| Search volume | Whole brain gray matter |
| Correction for multiple comparisons | Clusterwise correction with GRFT and lenient voxelwise p |
| Software | FSL 5.0.6 |
| Voxelwise p | ~.01 (z > 2.3) |
| Cluster extent | Based on GRFT |
| Statistical details | — |
| Findings | ↑ L anterior temporal |
| Findings notes | L anterior temporal correlation remained significant after accounting for lesion load and other factors |

**Voxelwise analysis 4**

| First level contrast | Picture naming (produce the name, correct trials) vs rest |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia |
| Covariate | PNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Voxelwise |
| Search volume | Whole brain gray matter |
| Correction for multiple comparisons | Clusterwise correction with GRFT and lenient voxelwise p |
| Software | FSL 5.0.6 |
| Voxelwise p | ~.01 (z > 2.3) |
| Cluster extent | Based on GRFT |
| Statistical details | — |
| Findings | ↑ L posterior STG |
| Findings notes | L IFG pars orbitalis, R pSTS, and R somato-motor correlations remained significant after accounting for lesion load and other factors; note that the pars orbitalis region is described as frontal pole in the paper but the coordinates and image support pars orbitalis |

**Voxelwise analysis 5**

| First level contrast | Picture naming (both phases, correct trials) vs picture naming (both phases, incorrect trials) |
| Analysis class | Cross-sectional performance-defined conditions |
| Group(s) | Aphasia with naming < 80% (n = 24) |
| Covariate | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | Yes |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |

**Behavioral data notes**

**Type of analysis**

Voxelwise

**Search volume**

Whole brain gray matter

**Correction for multiple comparisons**

Clusterwise correction with with GRFT and lenient voxelwise p

**Software**

FSL 5.0.6

**Voxelwise p**

~.01 (z > 2.3)

**Cluster extent**

Based on GRFT

**Statistical details**

---

**Findings**

None

**Findings notes**

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---

**ROI analysis 1**

**First level contrast**

Picture naming (produce the name, correct trials) vs rest

**Analysis class**

Cross-sectional correlation with language or other measure

**Group(s)**

Aphasia

**Covariate**

PNT

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**

Yes

**Is accuracy matched across the second level contrast?**

Yes, correct trials only

**Is reaction time matched across the second level contrast?**

Unknown, not reported

**Behavioral data notes**

---

**Type of analysis**

Regions of interest (ROI)

**ROI type**

Functional

**How many ROIs are there?**

11

**What are the ROI(s)?**

(1) right IPS; (2) left IPS; (3) left PTr; (4) left dPOp; (5) right superior motor cortex; (6) right ventral motor cortex; (7) right supramarginal sulcus; (8) left medial SMA; (9) right marginal sulcus; (10) left dorsal motor cortex; (11) right STS

**How are the ROI(s) defined?**

Regions that were activated for control > aphasia (ROIs 1-4) or aphasia > control (ROIs 5-11)

**Correction for multiple comparisons**

Familywise error (FWE)

**Statistical details**

---

**Findings**

↑ R ventral precentral/inferior frontal junction

↑ R posterior STS

↓ L IFG pars opercularis

**Findings notes**

The L IFG pars opercularis and the R posterior STS also contributed to predicting PNT scores even when lesion load on critical areas for picture naming, and several other variables, were included in multiple regression models

---

**ROI analysis 2**

**First level contrast**

Picture naming (silently name, correct trials) vs rest

**Analysis class**

Cross-sectional aphasia vs control

**Group(s)**

Aphasia vs control

**Covariate**

---

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**

Yes

**Is accuracy matched across the second level contrast?**

Yes, correct trials only

**Is reaction time matched across the second level contrast?**

Unknown, not reported
| Behavioral data notes | — |
| --- | --- |
| Type of analysis | Region of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L anterior temporal |
| How are the ROI(s) defined? | Activity for covert naming correlated with naming ability in patients, after controlling for lesion and demographic factors |
| Correction for multiple comparisons | One only |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

**ROI analysis 3**

| First level contrast | Picture naming (produce the name, correct trials) vs rest |
| --- | --- |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Complex analysis 1**

| First level contrast | Picture naming (produce the name, correct trials) vs rest |
| --- | --- |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia |
| Covariate | Lesion patterns identified with SVR-LSM |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Findings notes**

| Findings | Other |
| --- | --- |
| Findings notes | Damage to the L IFG pars opercularis was associated with more activity in the R pSTS. Damage to the L pSTS was associated with less activity in the R pSTS. |
Complex analysis 2

| First level contrast | Picture naming (produce the name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia without IFG POp damage (n = 26) |
| Covariate            | Lesion patterns identified with SVR-LSM |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Complex |
| Statistical details  | SVR-LSM was used to identify regions of damage associated with activation of L IFG pars opercularis ROI (defined based on SPM analysis 2). The results were thresholded at voxelwise p < .01 (CDT), cluster extent > 500 voxels. |
| Findings             | Other |
| Findings notes       | Damage to the L pSTG, L pSTS, and white matter underlying the L precuneus was associated with more activity in the L IFG pars opercularis. There were no regions associated with less activity. |

Notes

| Excluded analyses | Negative correlation between functional activation in the L IFG pars opercularis and R pSTS |

Skipper-Kallal et al. (2017b)

Reference

| Authors | Skipper-Kallal LM, Lacey EH, Xing S, Turkeltaub PE |
|---------|--------------------------------------------------|
| Title   | Right hemisphere remapping of naming functions depends on lesion size and location in poststroke aphasia |
| Reference | Neural Plast 2017b; 2017: 8740353 |
| PMID    | 28168061 |
| DOI     | 10.1155/2017/8740353 |

Participants

| Language | US English |
|----------|------------|
| Inclusion criteria | 10% accuracy on scanner task |
| Number of individuals with aphasia | 39 (plus 10 excluded: < 10% accuracy in scanner) |
| Number of control participants | 37 |
| Were any of the participants included in any previous studies? | Yes (29 of the participants overlap with the other Skipper-Kallal et al. (2017) paper) |
| Is age reported for patients and controls, and matched? | Yes (mean 59.8 ± 10.0 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 26; females: 13) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 33; left: 4; other: 2; missing for 2 participants) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 52.9 ± 51.4 months, range 6.3-255.7 months) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |
| Language evaluation | WAB, PNT |
| Aphasia severity | Not stated |
### Aphasia type
23 anomic, 11 Broca's, 3 conduction, 1 transcortical sensory, 1 Wernicke's

### First stroke only?
Not stated

### Stroke type
Not stated

### To what extent is the lesion distribution characterized?
Lesion overlay

### Lesion extent
Not stated

### Lesion location
L MCA

### Participants notes
—

### Imaging

| Modality | fMRI |
|----------|------|
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Siemens Trio 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (total images acquired not stated; separation of adjacent events (covert and overt naming) will be limited because of the small amount of jitter in their timing (only 1500 ms)) |
| Design type | Event-related |
| Total images acquired | ~450 but not stated |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | No* (moderate limitation) (not stated but see Skipper-Kallal et al. (2017b)) |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | at each voxel, individuals with lesions to that voxel were excluded from analysis |

### Conditions

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|---------------------------|
| picture naming (prepare to name) | Word (covert) | 32 | Yes | Yes |
| picture naming (produce the name) | Word (overt) | 32 | Yes | Yes |
| rest | None | implicit baseline | N/A | N/A |

### Conditions notes
Covert and overt naming were modeled as two phases of each trial (there was a cue to produce the name after 7500-9000 ms); 14 participants who were more impaired were given easier pictures to name; patients who named less than 10% of items correctly were excluded

### Contrasts

| Contrast 1: picture naming (prepare to name, correct trials) vs rest |
|---------------------------------------------------------------|
| Language condition | Picture naming (prepare to name, correct trials) |
| Control condition | Rest |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | No |
| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                               |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                               |
| Behavioral data notes                                                  | —                                                                      |
| Are control data reported in this paper or another that is referenced? | Yes                                                                    |
| Does the contrast selectively activate plausible relevant language regions in the control group? | No                                                                     |
| Are activations lateralized in the control data?                       | No                                                                     |
| Control activation notes                                               | Bilateral frontal and occipito-temporal, but not posterior temporal     |

**Contrast 2: picture naming (produce the name, correct trials) vs rest**

| Language condition          | Picture naming (produce the name, correct trials)                      |
|-----------------------------|------------------------------------------------------------------------|
| Control condition           | Rest                                                                    |
| Are the conditions matched for visual demands?                         | No                                                                     |
| Are the conditions matched for auditory demands?                       | No                                                                     |
| Are the conditions matched for motor demands?                          | No                                                                     |
| Are the conditions matched for cognitive/executive demands?            | No                                                                     |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                               |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                               |
| Behavioral data notes      | —                                                                      |
| Does the contrast selectively activate plausible relevant language regions in the control group? | No                                                                     |
| Are activations lateralized in the control data?                       | No                                                                     |
| Control activation notes   | Bilateral frontal and occipito-temporal, but not posterior temporal; speech motor activation not readily apparent |

**Analyses**

| Are the analyses clearly described? | Yes |

**Voxelwise analysis 1**

| First level contrast | Picture naming (prepare to name, correct trials) vs rest |
|----------------------|-----------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                       |
| Group(s)             | Aphasia vs control                                       |
| Covariate            | —                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Covert phase but accuracy derived from overt phase        |
| Type of analysis      | Voxelwise                                                |
| Search volume         | Whole brain                                              |
| Correction for multiple comparisons | Clusterwise correction with with GRFT and lenient voxelwise p |
| Software              | FSL 5.0.6                                                |
| Voxelwise p           | .01                                                      |
| Cluster extent        | Based on GRFT                                            |
### Statistical details

| Findings          |
|-------------------|
| ↑ L cerebellum    |
| ↑ L thalamus      |
| ↑ L basal ganglia |
| ↑ R IFG pars opercularis |
| ↑ R insula       |
| ↑ R cerebellum   |
| ↑ R basal ganglia |
| ↓ L dorsolateral prefrontal cortex |
| ↓ L orbitofrontal |
| ↓ L intraparietal sulcus |
| ↓ L anterior cingulate |
| ↓ R dorsolateral prefrontal cortex |

| Findings notes   |
|------------------|
| Based on Table 2 |

### Voxelwise analysis 2

| First level contrast         | Picture naming (produce the name, correct trials) vs rest |
|------------------------------|----------------------------------------------------------|
| Analysis class               | Cross-sectional aphasia vs control                       |
| Group(s)                     | Aphasia vs control                                       |
| Covariate                    |                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

| Behavioral data notes       |                                                           |
|-----------------------------|----------------------------------------------------------|
| Type of analysis            | Voxelwise                                               |
| Search volume               | Whole brain                                             |
| Correction for multiple comparisons | Clusterwise correction with lenient voxelwise p |
| Software                     | FSL 5.0.6                                               |
| Voxelwise p                 | .01                                                      |
| Cluster extent              | Based on GRFT                                           |
| Statistical details         |                                                           |
| Findings                     |                                                           |
| ↑ L somato-motor            |
| ↑ L intraparietal sulcus    |
| ↑ L anterior cingulate      |
| ↑ R insula                  |
| ↑ R dorsal precentral       |
| ↑ R somato-motor            |
| ↑ R supramarginal gyrus     |
| ↑ R posterior MTG           |
| ↑ R Heschl's gyrus          |
| ↓ L ventral precentral/inferior frontal junction |
| ↓ L somato-motor            |
| ↓ L posterior STG/STS/MTG    |
| ↓ L mid temporal            |
| ↓ L anterior temporal       |
| ↓ L cerebellum              |
| ↓ L thalamus                |
| ↓ L hippocampus/MTL         |

| Findings notes   |
|------------------|
| Based on Table 3 |

### Voxelwise analysis 3

| First level contrast         | Picture naming (prepare to name, correct trials) vs rest |
|------------------------------|----------------------------------------------------------|
| Analysis class               | Cross-sectional correlation with language or other measure |
| Group(s)                     | Aphasia                                                 |
| Covariate                    | Lesion volume                                           |
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes
---|---
Is accuracy matched across the second level contrast? | Yes, correct trials only
Is reaction time matched across the second level contrast? | Unknown, not reported
Behavioral data notes | Covert phase but accuracy derived from overt phase
Type of analysis | Voxelwise
Search volume | Whole brain
Correction for multiple comparisons | Clusterwise correction with with GRFT and lenient voxelwise p
Software | FSL 5.0.6
Voxelwise p | .01
Cluster extent | Based on GRFT
Statistical details | —
Findings | ↑ L ventral precentral/inferior frontal junction
| ↑ L intraparietal sulcus
| ↑ L superior parietal
| ↑ L occipital
| ↑ L basal ganglia
| ↑ R IFG
| ↑ R insula
| ↑ R ventral precentral/inferior frontal junction
| ↑ R SMA/medial prefrontal
| ↑ R somato-motor
| ↑ R intraparietal sulcus
| ↑ R occipital
| ↑ R cerebellum
| ↑ R brainstem
| ↑ R basal ganglia
Findings notes | Based on Table 4, except for R frontal activations which are missing from the table, and were added based on the figure

**Voxelwise analysis 4**

First level contrast | Picture naming (produce the name, correct trials) vs rest
Analysis class | Cross-sectional correlation with language or other measure
Group(s) | Aphasia
Covariate | Lesion volume
Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes
Is accuracy matched across the second level contrast? | Yes, correct trials only
Is reaction time matched across the second level contrast? | Unknown, not reported
Behavioral data notes | —
Type of analysis | Voxelwise
Search volume | Whole brain
Correction for multiple comparisons | Clusterwise correction with with GRFT and lenient voxelwise p
Software | FSL 5.0.6
Voxelwise p | .01
Cluster extent | Based on GRFT
Statistical details | —
Findings | ↑ L somato-motor
| ↑ L precuneus
| ↑ L occipital
| ↑ L cerebellum
| ↑ R IFG pars triangularis
| ↑ R insula
| ↑ R ventral precentral/inferior frontal junction
| Findings notes | Based on Table 4, except for bilateral occipital activations which are missing from the table, and were added based on the figure |
|---------------|--------------------------------------------------------------------------------------------------|

**Voxelwise analysis 5**

| First level contrast | Picture naming (prepare to name, correct trials) vs rest |
|----------------------|--------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia       |
| Group(s)             | Aphasia with IPS damage (n not stated) vs without IPS damage (n not stated) |
| Covariate            | —                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Covert phase but accuracy derived from overt phase |
| Type of analysis     | Voxelwise                                             |
| Search volume        | Whole brain                                           |
| Correction for multiple comparisons | Clusterwise correction with with GRFT and lenient voxelwise p |
| Software             | FSL 5.0.6                                             |
| Voxelwise p          | .01                                                   |
| Cluster extent       | Based on GRFT                                         |
| Statistical details  | Lesion volume covariate                               |
| Findings             | None                                                  |
| Findings notes       | —                                                     |

**Voxelwise analysis 6**

| First level contrast | Picture naming (prepare to name, correct trials) vs rest |
|----------------------|--------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia       |
| Group(s)             | Aphasia with insula damage (n = 18) vs without insula damage (n = 21) |
| Covariate            | —                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Covert phase but accuracy derived from overt phase |
| Type of analysis     | Voxelwise                                             |
| Search volume        | Whole brain                                           |
| Correction for multiple comparisons | Clusterwise correction with with GRFT and lenient voxelwise p |
| Software             | FSL 5.0.6                                             |
| Voxelwise p          | .01                                                   |
| Cluster extent       | Based on GRFT                                         |
| Statistical details  | Lesion volume covariate                               |
| Findings             | ↓ R IFG pars triangularis                             |
| Findings notes       | ↓ R dorsolateral prefrontal cortex                    |

**Voxelwise analysis 7**
| First level contrast       | Picture naming (prepare to name, correct trials) vs rest |
|---------------------------|---------------------------------------------------------|
| Analysis class            | Cross-sectional between two groups with aphasia        |
| Group(s)                  | Aphasia with IFG POp damage (n = 16) vs without IFG POp damage (n = 23) |
| Covariate                 | -                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes     | Covert phase but accuracy derived from overt phase      |
| Type of analysis          | Voxelwise                                              |
| Search volume             | Whole brain                                            |
| Correction for multiple comparisons | Clustervise correction with with GRFT and lenient voxelwise p |
| Software                  | FSL 5.0.6                                               |
| Voxelwise p               | .01                                                     |
| Cluster extent            | Based on GRFT                                          |
| Statistical details       | Lesion volume covariate                                |
| Findings                  | ↓ R IFG pars triangularis                               |
|                          | ↓ R dorsolateral prefrontal cortex                     |
| Findings notes            | -                                                       |

**Voxelwise analysis 8**

| First level contrast       | Picture naming (produce the name, correct trials) vs rest |
|---------------------------|---------------------------------------------------------|
| Analysis class            | Cross-sectional between two groups with aphasia        |
| Group(s)                  | Aphasia with motor cortex damage (n = 24) vs without motor cortex damage (n = 15) |
| Covariate                 | -                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes     | -                                                       |
| Type of analysis          | Voxelwise                                              |
| Search volume             | Whole brain                                            |
| Correction for multiple comparisons | Clustervise correction with with GRFT and lenient voxelwise p |
| Software                  | FSL 5.0.6                                               |
| Voxelwise p               | .01                                                     |
| Cluster extent            | Based on GRFT                                          |
| Statistical details       | Lesion volume covariate                                |
| Findings                  | None                                                    |
| Findings notes            | -                                                       |

**Voxelwise analysis 9**

| First level contrast       | Picture naming (produce the name, correct trials) vs rest |
|---------------------------|---------------------------------------------------------|
| Analysis class            | Cross-sectional between two groups with aphasia        |
| Group(s)                  | Aphasia with STS damage (n not stated) vs without STS damage (n not stated) |
| Covariate                 | -                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
### Behavioral data notes

| Type of analysis | Voxelwise |
|------------------|-----------|
| Search volume    | Whole brain |
| Correction for multiple comparisons | Clusterwise correction with GRFT and lenient voxelwise p |
| Software         | FSL 5.0.6 |
| Voxelwise p      | .01 |
| Cluster extent   | Based on GRFT |
| Statistical details | Lesion volume covariate |
| Findings         | None |
| Findings notes   | — |

### ROI analysis 1

| First level contrast | Picture naming (prepare to name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia with IFG POp damage (n = 16) |
| Covariate            | PNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Covert phase but accuracy derived from overt phase |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | R DLPFC |
| How are the ROI(s) defined? | Peak location for decreased activation for patients with left insula and left POp lesions compared to patients without said damage |
| Correction for multiple comparisons | One only |
| Statistical details  | Lesion volume covariate |
| Findings             | None |
| Findings notes       | — |

### ROI analysis 2

| First level contrast | Picture naming (prepare to name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia without IFG POp damage (n = 23) |
| Covariate            | PNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Covert phase but accuracy derived from overt phase |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | R DLPFC |
| How are the ROI(s) defined? | Peak location for decreased activation for patients with left insula and left POp lesions compared to patients without said damage |
| Correction for multiple comparisons | One only |
| Statistical details  | Lesion volume covariate |
| Findings             | None |
### Findings notes

---

### ROI analysis 3

| First level contrast | Picture naming (prepare to name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure|
| Group(s)             | Aphasia with insula damage (n = 18)                      |
| Covariate            | PNT                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

Covert phase but accuracy derived from overt phase

**Type of analysis**

Region of interest (ROI)

**ROI type**

Functional

**How many ROIs are there?**

1

**What are the ROI(s)?**

R DLPFC

**How are the ROI(s) defined?**

Peak location for decreased activation for patients with left insula and left POp lesions compared to patients without said damage

**Correction for multiple comparisons**

One only

**Statistical details**

Lesion volume covariate

**Findings**

None

**Findings notes**

---

### ROI analysis 4

| First level contrast | Picture naming (prepare to name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure|
| Group(s)             | Aphasia without insula damage (n = 21)                    |
| Covariate            | PNT                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

**Behavioral data notes**

Covert phase but accuracy derived from overt phase

**Type of analysis**

Region of interest (ROI)

**ROI type**

Functional

**How many ROIs are there?**

1

**What are the ROI(s)?**

R DLPFC

**How are the ROI(s) defined?**

Peak location for decreased activation for patients with left insula and left POp lesions compared to patients without said damage

**Correction for multiple comparisons**

One only

**Statistical details**

Lesion volume covariate

**Findings**

None

**Findings notes**

---

### ROI analysis 5

| First level contrast | Picture naming (prepare to name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia          |
| Group(s)             | Aphasia with IPS damage (n not stated) vs without IPS damage (n not stated) |
| Covariate            | --                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |

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| Question                                                   | Answer                                           |
|------------------------------------------------------------|--------------------------------------------------|
| Is accuracy matched across the second level contrast?        | Yes, correct trials only                         |
| Is reaction time matched across the second level contrast?   | Unknown, not reported                            |
| Behavioral data notes                                       | Covert phase but accuracy derived from overt phase |
| Type of analysis                                            | Regions of interest (ROI)                        |
| ROI type                                                    | Functional                                       |
| How many ROIs are there?                                    | 5                                               |
| What are the ROI(s)?                                       | (1) L IPS; (2) L insula; (3) L IFG pars opercularis; (4) R IPS; (5) R insula |
| How are the ROI(s) defined?                                 | 5 mm spheres around control peaks                |
| Correction for multiple comparisons                         | No correction                                    |
| Statistical details                                         | Lesion volume covariate                          |
| Findings                                                    | None                                             |
| Findings notes                                              | —                                                |

**ROI analysis 6**

| First level contrast                                        | Picture naming (prepare to name, correct trials) vs rest |
|-------------------------------------------------------------|----------------------------------------------------------|
| Analysis class                                              | Cross-sectional between two groups with aphasia           |
| Group(s)                                                    | Aphasia with insula damage (n = 18) vs without insula damage (n = 21) |
| Covariate                                                   | —                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                       |
| Is accuracy matched across the second level contrast?        | Yes, correct trials only                                  |
| Is reaction time matched across the second level contrast?   | Unknown, not reported                                     |
| Behavioral data notes                                       | Covert phase but accuracy derived from overt phase        |
| Type of analysis                                            | Regions of interest (ROI)                                |
| ROI type                                                    | Functional                                               |
| How many ROIs are there?                                    | 5                                                        |
| What are the ROI(s)?                                       | (1) L IPS; (2) L insula; (3) L IFG pars opercularis; (4) R IPS; (5) R insula |
| How are the ROI(s) defined?                                 | 5 mm spheres around control peaks                        |
| Correction for multiple comparisons                         | No correction                                            |
| Statistical details                                         | Lesion volume covariate                                  |
| Findings                                                    | None                                                     |
| Findings notes                                              | —                                                        |

**ROI analysis 7**

| First level contrast                                        | Picture naming (prepare to name, correct trials) vs rest |
|-------------------------------------------------------------|----------------------------------------------------------|
| Analysis class                                              | Cross-sectional between two groups with aphasia           |
| Group(s)                                                    | Aphasia with IFG POp damage (n = 16) vs without IFG POp damage (n = 23) |
| Covariate                                                   | —                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                       |
| Is accuracy matched across the second level contrast?        | Yes, correct trials only                                  |
| Is reaction time matched across the second level contrast?   | Unknown, not reported                                     |
| Behavioral data notes                                       | Covert phase but accuracy derived from overt phase        |
| Type of analysis                                            | Regions of interest (ROI)                                |
| ROI type                                                    | Functional                                               |
| How many ROIs are there?                                    | 5                                                        |
| What are the ROI(s)?                                       | (1) L IPS; (2) L insula; (3) L IFG pars opercularis; (4) R IPS; (5) R insula |
| How are the ROI(s) defined?                                 | 5 mm spheres around control peaks                        |
| Correction for multiple comparisons                         | No correction                                            |
| Statistical details | Lesion volume covariate |
|---------------------|-------------------------|
| Findings            | None                    |
| Findings notes      | —                       |

### ROI analysis 8

| First level contrast | Picture naming (produce the name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia          |
| Group(s)             | Aphasia with motor cortex damage (n = 24) vs without motor cortex damage (n = 15) |
| Covariate            | —                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                         |
| Type of analysis     | Regions of interest (ROI)                                |
| ROI type             | Functional                                               |
| How many ROIs are there? | 4                                                      |
| What are the ROI(s)? | (1) L motor; (2) L pSTS; (3) R motor; (4) R pSTS        |
| How are the ROI(s) defined? | 5 mm spheres around control peaks                        |
| Correction for multiple comparisons | No correction |
| Statistical details  | Lesion volume covariate                                  |
| Findings             | ↑ R somato-motor                                         |
| Findings notes       | —                                                         |

### ROI analysis 9

| First level contrast | Picture naming (produce the name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia          |
| Group(s)             | Aphasia with STS damage (n not stated) vs without STS damage (n not stated) |
| Covariate            | —                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, correct trials only |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                         |
| Type of analysis     | Regions of interest (ROI)                                |
| ROI type             | Functional                                               |
| How many ROIs are there? | 4                                                      |
| What are the ROI(s)? | (1) L motor; (2) L pSTS; (3) R motor; (4) R pSTS        |
| How are the ROI(s) defined? | 5 mm spheres around control peaks                        |
| Correction for multiple comparisons | No correction |
| Statistical details  | Lesion volume covariate                                  |
| Findings             | ↓ R somato-motor                                         |
| Findings notes       | —                                                         |

### ROI analysis 10

| First level contrast | Picture naming (produce the name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia without motor cortex damage (n = 15)              |
| Covariate            | PNT                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Question                                                                 | Answer                                      |
|------------------------------------------------------------------------|---------------------------------------------|
| Is accuracy matched across the second level contrast?                   | Yes, correct trials only                    |
| Is reaction time matched across the second level contrast?              | Unknown, not reported                        |
| Behavioral data notes                                                  | —                                           |
| Type of analysis                                                       | Region of interest (ROI)                    |
| ROI type                                                               | Functional                                  |
| How many ROIs are there?                                               | 1                                           |
| What are the ROI(s)?                                                   | R motor                                     |
| How are the ROI(s) defined?                                            | 5 mm sphere around control peak             |
| Correction for multiple comparisons                                    | One only                                    |
| Statistical details                                                    | Lesion volume covariate                     |
| Findings                                                               | None                                        |
| Findings notes                                                         | —                                           |

### ROI analysis 11

| First level contrast | Picture naming (produce the name, correct trials) vs rest |
|----------------------|----------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia with motor cortex damage (n = 24)               |
| Covariate            | PNT                                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast?                  | Yes, correct trials only |
| Is reaction time matched across the second level contrast?              | Unknown, not reported |

### Excluded analyses

Dietz et al. (2018)

**Reference**

**Authors**
Dietz A, Vannest J, Maloney T, Altaye M, Holland S, Szaflarski JP

**Title**
The feasibility of improving discourse in people with aphasia through AAC: clinical and functional MRI correlates

**Reference**
Aphasiology 2018; 32: 693-719

**PMID**
N/A

**DOI**
10.1080/02687038.2018.1447641

**Participants**

**Language**
US English
### Inclusion criteria

| Number of individuals with aphasia | 12 (plus 2 excluded: 1 for illness; 1 for MRI contraindication or personal conflict (inconsistent information provided)) |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | Yes (same data as Dietz et al. (2016), which is a methodological paper) |
| Is age reported for patients and controls, and matched? | Yes (AAC group: range 39-63 years; usual care group: range 47-71 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 5; females: 7) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 11; left: 1) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (AAC group: range 16-170 months; usual care group: range 38-105 months) |

### To what extent is the nature of aphasia characterized?

- **Severity and type**
  - **Language evaluation**
    - **WAB, Reading Comprehension Battery for Aphasia**
  - **Aphasia severity**
    - AAC group: AQ range 37.6-82.4; usual care group: AQ range 36.7-89.2
  - **Aphasia type**
    - AAC group: 2 Broca’s, 1 anomic, 1 conduction, 1 global, 1 Wernicke’s; usual care group: 2 anomic, 2 Broca’s, 1 conduction, 1 Wernicke’s

### Stroke and lesion descriptions

- **First stroke only?** Yes
- **Stroke type** Ischemic only
- **To what extent is the lesion distribution characterized?** Individual lesions
- **Lesion extent** AAC group: range 7849-30570 voxels; usual care group: 1583-30110 voxels (voxel size not stated)
- **Lesion location** L MCA

### Imaging

- **Modality** fMRI
- **Is the study cross-sectional or longitudinal?** Longitudinal—chronic treatment
- **If longitudinal, at what time point(s) were imaging data acquired?** T1: pre-treatment/chronic; T2: post-treatment, ~4 weeks later
- **If longitudinal, was there any intervention between the time points?** AAC group: treatment aimed at teaching participants how to utilize AAC to facilitate discourse; usual care group: traditional SLT, not focused on discourse or AAC specifically
- **Is the scanner described?** Yes (Philips Achieva 3 Tesla)
- **Is the timing of stimulus presentation and image acquisition clearly described and appropriate?** Yes
- **Total images acquired** 135
- **Are the imaging acquisition parameters, including coverage, adequately described and appropriate?** Yes (whole brain)
- **Is preprocessing and intrasubject coregistration adequately described and appropriate?** Yes
- **Is first level model fitting adequately described and appropriate?** No (no description of HRF model, which is important given sparse sampling design)
- **Is intersubject normalization adequately described and appropriate?** No (lesion impact not addressed)
- **Imaging notes** additional methodological details in Dietz et al. (2016)

### Conditions

- **Are the conditions clearly described?** Yes

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|---------------------------|
| verb generation (covert) | Multiple words (covert) | 15 | Unknown | Unknown |
| Conditions notes | Evidence for task performance from Dietz et al. (2016) |
|------------------|------------------------------------------------------|

**Contrasts**

**Contrast 1: verb generation (overt) vs noun repetition**

| Language condition | Verb generation (overt) |
|--------------------|-------------------------|
| Control condition  | Noun repetition         |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | Yes |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat |
| Are activations lateralized in the control data? | Somewhat |
| Control activation notes | Control data in Allendorfer et al. (2012); somewhat L-lateralized frontal, temporal and parietal activations, but also extensive midline activation |

**Analyses**

**ROI analysis 1**

| First level contrast | Verb generation (overt) vs noun repetition |
|----------------------|-------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia with AAC treatment (n = 6) T2 vs usual care T2 (n = 6) |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (marginal treatment effect) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Laterality indi(ces) |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | Frontal LI |
| How are the ROI(s) defined? | — |
| Correction for multiple comparisons | One only |
| Statistical details  | Temporal LI calculated but not reported |
| Findings             | None |
| Findings notes       | — |

**ROI analysis 2**
| First level contrast | Verb generation (overt) vs noun repetition |
|----------------------|------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia (both groups) T2 vs T1 |
| Covariate            | Δ WAB AQ |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (gain in AQ not tested for significance) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Laterality indices |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | Frontal LI |
| Correction for multiple comparisons | One only |
| Statistical details  | Temporal LI calculated but not reported |
| Findings             | ↑ LI (frontal) |
| Findings notes       | — |

**Notes**

Excluded analyses

(1) pre-treatment comparison between treated and untreated groups; (2) several other analyses based on LI in different ROIs, because there were no inferential statistics

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**Hallam et al. (2018)**

**Reference**

**Authors**

Hallam GP, Thompson HE, Hymers M, Millman RE, Rodd JM, Lambon Ralph MA, Smallwood J, Jefferies E

**Title**

Task-based and resting-state fMRI reveal compensatory network changes following damage to left inferior frontal gyrus

**Reference**

*Cortex* 2018; 99: 150-165

**PMID**

29223933

**DOI**

10.1016/j.cortex.2017.10.004

**Participants**

**Language**

UK English

**Inclusion criteria**

Semantic aphasia; left frontal damage (+ other regions, typically)

**Number of individuals with aphasia**

14

**Number of control participants**

16

**Were any of the participants included in any previous studies?**

No

**Is age reported for patients and controls, and matched?**

Yes (mean 61 ± 11 years, range 38-80 years)

**Is sex reported for patients and controls, and matched?**

Yes (males: 5; females: 9)

**Is handedness reported for patients and controls, and matched?**

No

**Is time post stroke onset reported and appropriate to the study design?**

Yes (range 11-264 months)

**To what extent is the nature of aphasia characterized?**

Comprehensive battery
## Language evaluation

| Language evaluation                          | Cambridge semantic battery, three additional semantic tasks, connected speech words per minute, repetition from PALPA |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Aphasia severity                            | Not stated                                                                                                             |
| Aphasia type                                | 6 anomic, 2 Broca's, 2 global, 2 transcortical sensory, 1 mixed transcortical, 1 not stated                             |
| First stroke only?                          | Not stated                                                                                                             |
| Stroke type                                 | Not stated                                                                                                             |
| To what extent is the lesion distribution characterized? | Lesion overlay                                                                                                          |
| Lesion extent                               | Not stated                                                                                                             |
| Lesion location                             | L IFG plus other MCA regions; vATL and pMTG spared                                                                       |

### Imaging

| Modality                     | fMRI                                                                 |
|------------------------------|---------------------------------------------------------------------|
| Is the study cross-sectional or longitudinal? | Cross-sectional                                                                 |
| If longitudinal, at what time point(s) were imaging data acquired? | —                                                                 |
| If longitudinal, was there any intervention between the time points? | —                                                                 |
| Is the scanner described?    | Yes (GE Signa HDx 3 Tesla)                                           |
| Design type                  | Event-related                                                       |
| Total images acquired        | 348                                                                 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)                                                                 |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes                                                                 |
| Is first level model fitting adequately described and appropriate? | Yes                                                                 |
| Is intersubject normalization adequately described and appropriate? | Yes                                                                 |
| Imaging notes                | interleaved silent steady state imaging                             |

### Conditions

| Condition                                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|------------------------------------------------|--------------|-------------|----------------------|---------------------------|
| listening to high ambiguity sentences          | None         | 24          | N/A                  | N/A                       |
| listening to low ambiguity sentences           | None         | 24          | N/A                  | N/A                       |
| listening to spectrally rotated speech         | None         | 24          | N/A                  | N/A                       |
| pressing a button to a visual cue              | Button press | 9           | Unknown              | Unknown                   |
| rest                                           | None         | 12          | N/A                  | N/A                       |

### Conditions notes

All but one patient had good single word comprehension, which was argued to support sentence comprehension

### Contrasts

| Contrast 1: listening to high or low ambiguity sentences vs listening to spectrally rotated speech |
|---------------------------------------------------------------------------------|
| Language condition                      | Listening to high or low ambiguity sentences |
| Control condition                       | Listening to spectrally rotated speech       |
| Are the conditions matched for visual demands? | Yes                                          |
| Are the conditions matched for auditory demands? | Yes                                          |
| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Are the conditions matched for motor demands?                          | Yes                                                                   |
| Are the conditions matched for cognitive/executive demands?            | Yes                                                                   |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure                                           |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task                                                  |
| Behavioral data notes                                                  | —                                                                     |
| Are control data reported in this paper or another that is referenced? | Somewhat                                                             |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                                                             |
| Are activations lateralized in the control data?                       | Unknown                                                             |
| Control activation notes                                               | Hard to evaluate contrast because a "semantic mask" is used but is not described in detail |
| Contrast notes                                                          | —                                                                     |

Contrast 2: listening to high ambiguity sentences vs listening to low ambiguity sentences

| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Are the conditions matched for visual demands?                         | Yes                                                                   |
| Are the conditions matched for auditory demands?                       | Yes                                                                   |
| Are the conditions matched for motor demands?                          | Yes                                                                   |
| Are the conditions matched for cognitive/executive demands?            | Yes                                                                   |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure                                           |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task                                                  |
| Behavioral data notes                                                  | —                                                                     |
| Are control data reported in this paper or another that is referenced? | No                                                                   |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                                                             |
| Are activations lateralized in the control data?                       | Unknown                                                             |
| Control activation notes                                               | —                                                                     |
| Contrast notes                                                          | —                                                                     |

Analyses

| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Are the analyses clearly described?                                    | Yes                                                                   |

ROI analysis 1

| Question                                                                 | Answer                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| First level contrast                                                   | Listening to high or low ambiguity sentences vs listening to spectrally rotated speech |
| Analysis class                                                         | Cross-sectional aphasia vs control                                       |
| Group(s)                                                               | Aphasia vs control                                                      |
| Covariate                                                              | —                                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                   |
| Is accuracy matched across the second level contrast?                  | N/A, no behavioral measure                                             |
| Is reaction time matched across the second level contrast?             | N/A, no timeable task                                                   |
| Behavioral data notes                                                  | —                                                                       |
| Type of analysis                                                       | Regions of interest (ROI)                                              |
| ROI type                                                               | Functional                                                             |
| How many ROIs are there?                                               | 2                                                                      |
| What are the ROI(s)?                                                  | (1) L vATL; (2) L pMTG                                                  |
| How are the ROI(s) defined? | Functional coordinates in literature |
| Correction for multiple comparisons | No correction |
| Statistical details | ANOVA revealed main effect of group (patient vs control), confirmed in follow-up tests for each ROI |
| Findings | ↑ L posterior MTG  
↑ L anterior temporal |
| Findings notes | — |

### ROI analysis 2

| First level contrast | Listening to high ambiguity sentences vs listening to low ambiguity sentences |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia vs control |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 2 |
| What are the ROI(s)? | (1) L vATL; (2) L pMTG |
| How are the ROI(s) defined? | Functional coordinates in literature |
| Correction for multiple comparisons | No correction |
| Statistical details | No interaction of group by condition |
| Findings | — |
| Findings notes | — |

### Complex analysis 1

| First level contrast | Listening to high ambiguity sentences vs listening to low ambiguity sentences |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia (subset with resting state data, n = 10) vs control (subset with resting state data, n = 10) |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Complex |
| Statistical details | A whole brain analysis was carried out to identify regions where the groups differed in the extent to which the strength of functional connectivity at rest from L pMTG was associated with the difference in signal between the high ambiguity and low ambiguity conditions in the same ROI. Thresholding is not described and cluster extent is not reported. |
| Findings | Other |
| Findings notes | There was a functional activation by group interaction in the L aSTG. For controls, there was a positive association between L pMTG activity and functional connectivity to aSTG, while for the patients, there was a negative association. |

### Complex analysis 2

| First level contrast | Listening to high ambiguity sentences vs listening to low ambiguity sentences |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia (subset with resting state data, n = 10) vs control (subset with resting state data, n = 10) |
|----------|-----------------------------------------------------------------------------------------------|
| Covariate | —                                                                                               |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                           |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure                                                                     |
| Is reaction time matched across the second level contrast? | N/A, no timeable task                                                                            |
| Behavioral data notes | —                                                                                               |
| Type of analysis | Complex                                                                                        |
| Statistical details | A whole brain analysis was carried out to identify regions where the groups differed in the extent to which the strength of functional connectivity at rest from L pMTG was associated with the difference in signal between the high ambiguity and low ambiguity conditions in the same ROI. Thresholding is not described. |
| Findings | None                                                                                           |
| Findings notes | No interaction is reported; both groups showed a correlation between L vATL activity and functional connectivity to a ventral IFG region |

**Notes**

Excluded analyses

Analyses involving resting state data, except for those that also involved task-based data

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**Nenert et al. (2018)**

**Reference**

**Authors**

Nenert R, Allendorfer JB, Martin AM, Banks C, Vannest J, Holland SK, Hart KW, Lindsell CJ, Szaarski JP

**Title**

Longitudinal fMRI study of language recovery after a left hemispheric ischemic stroke

**Reference**

Restor Neurol Neurosci 2018; 36: 359-385

**PMID**

29782329

**DOI**

10.3233/rnn-170767

**Participants**

| Language | US English |
|----------|------------|
| Inclusion criteria | Aphasia at acute screening (not necessarily at first study time point) |
| Number of individuals with aphasia | 17 (plus 1 excluded: significant signal artifacts) |
| Number of control participants | 85 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (mean 46 ± 16 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 9; females: 8) |
| Is handedness reported for patients and controls, and matched? | No (right: 17; left: 0; all patients stated to be right handed, but "ambidextrous patients" mentioned on p. 364) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (T1: ~2 weeks; T2: ~6 weeks; T3: ~12 weeks; T4: ~26 weeks; T5: ~52 weeks) |
| To what extent is the nature of aphasia characterized? | Not at all |
| Language evaluation | PPVT, BNT, phonemic fluency, semantic fluency, complex ideation subtest of BDAE |
| Aphasia severity | Not stated for study timepoints, but on admission, aphasia severity was assessed with the TT: 2 no aphasia per cutoff but clinical impression of aphasia, 5 mild, 6 moderate, 4 severe |
| Aphasia type | Not stated |
| First stroke only? | No |
| Stroke type | Ischemic only |
|---|---|
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Not stated |
| Lesion location | L MCA; mostly posterior per Supplementary Figure 2 |
| Participants notes | Presence and severity of aphasia assessed on hospital admission, not at first study time point, so it is not clear that all participants actually had aphasia at first study time point |

### Imaging

| Modality | fMRI |
|---|---|
| Is the study cross-sectional or longitudinal? | Longitudinal—recovery |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: ~2 weeks; T2: ~6 weeks; T3: ~12 weeks; T4: ~26 weeks; T5: ~52 weeks |
| If longitudinal, was there any intervention between the time points? | Not stated |
| Is the scanner described? | No (Philips 3 Tesla or Siemens 3 Tesla; models not stated) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | Block |
| Total images acquired | 600 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed) |
| Imaging notes | Scanner identity appropriately included as covariate |

### Conditions

| Are the conditions clearly described? | Yes |
|---|---|

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|---|---|---|---|---|
| semantic decision | Button press | 5 | No | No |
| tone decision | Button press | 5 | Yes | Unknown |
| verb generation | Multiple words (covert) | 5 | Unknown | Unknown |
| finger tapping | Other | 5 | Unknown | Unknown |

| Conditions notes | Assume semantic decision is out of 25, so chance is 12.5 and 95% CI below chance at T2; post-scan recognition test for verb generation not considered to quantify task performance |

### Contrasts

| Are the contrasts clearly described? | Yes |
|---|---|

#### Contrast 1: semantic decision vs tone decision

| Language condition | Semantic decision |
|---|---|
| Control condition | Tone decision |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | Appear mismatched |
| Is reaction time matched between the language | Unknown, not reported |
and control tasks for all relevant groups?

| Behavioral data notes | — |
|———|——|

Are control data reported in this paper or another that is referenced? Yes

Does the contrast selectively activate plausible relevant language regions in the control group? Yes

Are activations lateralized in the control data? Yes

Control activation notes L lateral and medial frontal and AG, strongly lateralized

Contrast notes —

**Contrast 2: verb generation vs finger tapping**

| Language condition | Verb generation |
|———|——|
| Control condition | Finger tapping |

Are the conditions matched for visual demands? Yes

Are the conditions matched for auditory demands? Yes

Are the conditions matched for motor demands? No

Are the conditions matched for cognitive/executive demands? No

Is accuracy matched between the language and control tasks for all relevant groups? N/A, tasks not comparable

Is reaction time matched between the language and control tasks for all relevant groups? N/A, tasks not comparable

**Behavioral data notes**

Are control data reported in this paper or another that is referenced? Yes

Does the contrast selectively activate plausible relevant language regions in the control group? Yes

Are activations lateralized in the control data? Yes

Control activation notes L lateral and medial frontal and mid temporal, strongly lateralized

Contrast notes —

**Analyses**

Are the analyses clearly described? No** (major limitation) (see specific limitation(s) below)

**Voxelwise analysis 1**

| First level contrast | Semantic decision vs tone decision |
|———|——|
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia T1 vs control |
| Covariate | — |

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes

Is accuracy matched across the second level contrast? Appear mismatched

Is reaction time matched across the second level contrast? Unknown, not reported

**Behavioral data notes**

Patients less accurate than controls on both tasks, but more so on the tone decision task

**Type of analysis** Voxelwise

**Search volume** Whole brain

**Correction for multiple comparisons** Voxelwise correction based on permutation testing

**Software** SPM12/SpNM13

**Voxelwise p** FWE p < .05

**Cluster extent** —

**Statistical details** —

**Findings** ↑ L Heschl's gyrus

**Findings notes** —
### Voxelwise analysis 2

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia T2 vs control              |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Appear mismatched** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |
| Behavioral data notes | Patients less accurate than controls on both tasks, but more so on the tone decision task |
| Type of analysis     | Voxelwise                         |
| Search volume        | Whole brain                        |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software              | SPM12/SnPM13                        |
| Voxelwise p          | FWE p < .05                         |
| Cluster extent       | —                                  |
| Statistical details  | —                                  |
| Findings             | None                               |
| Findings notes       | —                                  |

### Voxelwise analysis 3

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia T3 vs control              |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Appear mismatched** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |
| Behavioral data notes | Patients less accurate than controls on both tasks, but more so on the tone decision task |
| Type of analysis     | Voxelwise                         |
| Search volume        | Whole brain                        |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software              | SPM12/SnPM13                        |
| Voxelwise p          | FWE p < .05                         |
| Cluster extent       | —                                  |
| Statistical details  | —                                  |
| Findings             | None                               |
| Findings notes       | —                                  |

### Voxelwise analysis 4

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia T4 vs control              |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Appear mismatched** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |
### Behavioral data notes
Patients less accurate than controls on both tasks, but more so on the tone decision task

### Type of analysis
Voxelwise

### Search volume
Whole brain

### Correction for multiple comparisons
Voxelwise correction based on permutation testing

### Software
SPM12/SnPM13

### Voxelwise p
FWE p < .05

### Cluster extent
—

### Statistical details
—

### Findings
None

### Findings notes
—

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**Voxelwise analysis 5**

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia T5 vs control              |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Appear mismatched** |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

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**Voxelwise analysis 6**

| First level contrast | Verb generation vs finger tapping |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia T1 vs control              |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

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**Voxelwise analysis 5**

| Behavioral data notes | Patients less accurate than controls on both tasks, but more so on the tone decision task |
|-----------------------|-----------------------------------|
| Type of analysis      | Voxelwise                         |
| Search volume         | Whole brain                       |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software              | SPM12/SnPM13                      |
| Voxelwise p           | FWE p < .05                       |
| Cluster extent        | —                                 |
| Statistical details   | —                                 |
| Findings              | None                              |
| Findings notes        | —                                 |
### Voxelwise analysis 7

| First level contrast       | Verb generation vs finger tapping |
|---------------------------|----------------------------------|
| Analysis class            | Cross-sectional aphasia vs control |
| Group(s)                  | Aphasia T2 vs control            |
| Covariate                 | —                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes     | —                                |
| Type of analysis          | Voxelwise                        |
| Search volume             | Whole brain                      |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software                  | SPM12/SnPM13                     |
| Voxelwise p               | FWE p < .05                      |
| Cluster extent            | —                                |
| Statistical details       | —                                |
| Findings                  | None                             |
| Findings notes            | —                                |

### Voxelwise analysis 8

| First level contrast       | Verb generation vs finger tapping |
|---------------------------|----------------------------------|
| Analysis class            | Cross-sectional aphasia vs control |
| Group(s)                  | Aphasia T3 vs control            |
| Covariate                 | —                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes     | —                                |
| Type of analysis          | Voxelwise                        |
| Search volume             | Whole brain                      |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software                  | SPM12/SnPM13                     |
| Voxelwise p               | FWE p < .05                      |
| Cluster extent            | —                                |
| Statistical details       | —                                |
| Findings                  | None                             |
| Findings notes            | —                                |

### Voxelwise analysis 9

| First level contrast       | Verb generation vs finger tapping |
|---------------------------|----------------------------------|
| Analysis class            | Cross-sectional aphasia vs control |
| Group(s)                  | Aphasia T4 vs control            |
| Covariate                 | —                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
### Behavioral data notes
- **Type of analysis**: Voxelwise
- **Search volume**: Whole brain
- **Correction for multiple comparisons**: Voxelwise correction based on permutation testing
- **Software**: SPM12/SnPM13
- **Voxelwise p**: FWE p < .05
- **Cluster extent**: —
- **Statistical details**: —
- **Findings**: None
- **Findings notes**: —

### Voxelwise analysis 10

| First level contrast        | Verb generation vs finger tapping |
|-----------------------------|----------------------------------|
| Analysis class              | Cross-sectional aphasia vs control |
| Group(s)                    | Aphasia T5 vs control             |
| Covariate                   | —                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes
- **Type of analysis**: Voxelwise
- **Search volume**: Whole brain
- **Correction for multiple comparisons**: Voxelwise correction based on permutation testing
- **Software**: SPM12/SnPM13
- **Voxelwise p**: FWE p < .05
- **Cluster extent**: —
- **Statistical details**: —
- **Findings**: None
- **Findings notes**: —

### Voxelwise analysis 11

| First level contrast        | Semantic decision vs tone decision |
|-----------------------------|-----------------------------------|
| Analysis class              | Cross-sectional correlation with language or other measure |
| Group(s)                    | Aphasia T1                         |
| Covariate                   | Semantic decision accuracy         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes
- **Type of analysis**: Voxelwise
- **Search volume**: Whole brain
- **Correction for multiple comparisons**: Voxelwise correction based on permutation testing
- **Software**: SPM12/SnPM13
- **Voxelwise p**: FWE p < .05
- **Cluster extent**: —
- **Statistical details**: —
- **Findings**: ↑ L anterior temporal
- **Findings notes**: Unclear why this type of analysis was run only for semantic task, and only at T1
### Voxelwise analysis 12

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T4 vs aphasia T1 |
| Covariate            | Δ BNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Search volume        | Whole brain |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software             | SPM12/SnPM13 |
| Voxelwise p          | FWE p < .05 |
| Cluster extent       | — |
| Statistical details  | — |
| Findings             | None |
| Findings notes       | — |

### Voxelwise analysis 13

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T4 vs aphasia T1 |
| Covariate            | Δ semantic fluency |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Search volume        | Whole brain |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software             | SPM12/SnPM13 |
| Voxelwise p          | FWE p < .05 |
| Cluster extent       | — |
| Statistical details  | — |
| Findings             | None |
| Findings notes       | — |

### Voxelwise analysis 14

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T4 vs aphasia T1 |
| Covariate            | Δ PPVT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
|-----------------------|---|
| Type of analysis      | Voxelwise |
| Search volume         | Whole brain |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software              | SPM12/SnPM13 |
| Voxelwise p           | FWE p < .05 |
| Cluster extent        | — |
| Statistical details   | — |
| Findings              | None |
| Findings notes        | — |

**Voxelwise analysis 15**

| First level contrast   | Semantic decision vs tone decision |
|------------------------|-----------------------------------|
| Analysis class         | Longitudinal correlation with language or other measure |
| Group(s)               | Aphasia T4 vs aphasia T1 |
| Covariate              | Δ phonemic fluency |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes  | — |
| Type of analysis       | Voxelwise |
| Search volume          | Whole brain |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software               | SPM12/SnPM13 |
| Voxelwise p            | FWE p < .05 |
| Cluster extent         | — |
| Statistical details    | — |
| Findings               | None |
| Findings notes         | — |

**Voxelwise analysis 16**

| First level contrast   | Semantic decision vs tone decision |
|------------------------|-----------------------------------|
| Analysis class         | Longitudinal correlation with language or other measure |
| Group(s)               | Aphasia T4 vs aphasia T1 |
| Covariate              | Δ BDAE complex ideation subtest |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes  | — |
| Type of analysis       | Voxelwise |
| Search volume          | Whole brain |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software               | SPM12/SnPM13 |
| Voxelwise p            | FWE p < .05 |
| Cluster extent         | — |
| Statistical details    | — |
| Findings               | None |
| Findings notes         | — |
### Voxelwise analysis 17

| First level contrast | Verb generation vs finger tapping |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T4 vs aphasia T1 |
| Covariate            | Δ BNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Search volume        | Whole brain |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software              | SPM12/SnPM13 |
| Voxelwise p           | FWE p < .05 |
| Cluster extent        | — |
| Statistical details   | — |
| Findings              | None |
| Findings notes        | — |

### Voxelwise analysis 18

| First level contrast | Verb generation vs finger tapping |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T4 vs aphasia T1 |
| Covariate            | Δ semantic fluency |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Voxelwise |
| Search volume        | Whole brain |
| Correction for multiple comparisons | Voxelwise correction based on permutation testing |
| Software              | SPM12/SnPM13 |
| Voxelwise p           | FWE p < .05 |
| Cluster extent        | — |
| Statistical details   | — |
| Findings              | ↑ L dorsolateral prefrontal cortex |
| Findings notes        | ↑ L SMA/medial prefrontal |
|                      | ↑ R somato-motor |
|                      | ↑ R anterior temporal |

### Voxelwise analysis 19

| First level contrast | Verb generation vs finger tapping |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T4 vs aphasia T1 |
| Covariate            | Δ PPVT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| **Behavioral data notes** | Unknown, not reported |
|---------------------------|-----------------------|
| **Type of analysis**      | Voxelwise             |
| **Search volume**         | Whole brain           |
| **Correction for multiple comparisons** | Voxelwise correction based on permutation testing |
| **Software**              | SPM12/SnPM13          |
| **Voxelwise p**           | FWE p < .05           |
| **Cluster extent**        | —                     |
| **Statistical details**   | —                     |
| **Findings**              | None                  |
| **Findings notes**        | —                     |

**Voxelwise analysis 20**

| **First level contrast** | Verb generation vs finger tapping |
|--------------------------|----------------------------------|
| **Analysis class**       | Longitudinal correlation with language or other measure |
| **Group(s)**             | Aphasia T4 vs aphasia T1         |
| **Covariate**            | Δ phonemic fluency               |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | —                                 |
| **Type of analysis**     | Voxelwise                       |
| **Search volume**        | Whole brain                      |
| **Correction for multiple comparisons** | Voxelwise correction based on permutation testing |
| **Software**             | SPM12/SnPM13                    |
| **Voxelwise p**          | FWE p < .05                      |
| **Cluster extent**       | —                                 |
| **Statistical details**  | —                                 |
| **Findings**             | ↑ L cerebellum                   |
| **Findings notes**       | —                                 |

**Voxelwise analysis 21**

| **First level contrast** | Verb generation vs finger tapping |
|--------------------------|----------------------------------|
| **Analysis class**       | Longitudinal correlation with language or other measure |
| **Group(s)**             | Aphasia T4 vs aphasia T1         |
| **Covariate**            | Δ BDAE complex ideation subtest  |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | —                                 |
| **Type of analysis**     | Voxelwise                       |
| **Search volume**        | Whole brain                      |
| **Correction for multiple comparisons** | Voxelwise correction based on permutation testing |
| **Software**             | SPM12/SnPM13                    |
| **Voxelwise p**          | FWE p < .05                      |
| **Cluster extent**       | —                                 |
| **Statistical details**  | —                                 |
| **Findings**             | —                                 |
| **Findings notes**       | —                                 |
### ROI analysis 1

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal change in aphasia    |
| Group(s)             | Aphasia (comparisons between all pairs of time points) |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear similar |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                 |
| Type of analysis     | Regions of interest (ROI)         |
| ROI type             | Laterality indices                |
| How many ROIs are there? | 4                                 |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI |
| How are the ROI(s) defined? | No correction |
| Statistical details  | —                                 |
| Findings             | None                              |
| Findings notes       | —                                 |

### ROI analysis 2

| First level contrast | Verb generation vs finger tapping |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal change in aphasia    |
| Group(s)             | Aphasia (comparisons between all pairs of time points) |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                 |
| Type of analysis     | Regions of interest (ROI)         |
| ROI type             | Laterality indices                |
| How many ROIs are there? | 4                                 |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI |
| How are the ROI(s) defined? | No correction |
| Statistical details  | —                                 |
| Findings             | None                              |
| Findings notes       | —                                 |

### ROI analysis 3

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia T1 vs control             |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Behavioral data notes | —                                 |
| Type of analysis     |                                    |
| ROI type             |                                    |
| How many ROIs are there? |                                  |
| What are the ROI(s)? |                                    |
| How are the ROI(s) defined? |                                  |
| Statistical details  |                                    |
| Findings             |                                    |
| Findings notes       |                                    |
### ROI analysis 4

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control|
| Group(s)             | Aphasia T2 vs control             |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Appear mismatched** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |
| Behavioral data notes | Patients less accurate than controls on both tasks, but more so on the tone decision task |
| Type of analysis     | Regions of interest (ROI)         |
| ROI type             | Laterality ind(ices)              |
| How many ROIs are there? | 4                                 |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI |
| How are the ROI(s) defined? | —                                 |
| Correction for multiple comparisons | **No correction** |
| Statistical details  | —                                 |
| Findings             | None                              |
| Findings notes       | —                                 |

### ROI analysis 5

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control|
| Group(s)             | Aphasia T3 vs control             |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | **Appear mismatched** |
| Is reaction time matched across the second level contrast? | **Unknown, not reported** |
| Behavioral data notes | Patients less accurate than controls on both tasks, but more so on the tone decision task |
| Type of analysis     | Regions of interest (ROI)         |
| ROI type             | Laterality ind(ices)              |
| How many ROIs are there? | 4                                 |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI |
| How are the ROI(s) defined? | —                                 |
| Correction for multiple comparisons | **No correction** |
| Statistical details  | —                                 |
| Findings             | None                              |
| Findings notes       | —                                 |
### ROI analysis 6

| Findings         | None |
|------------------|------|
| Findings notes   | —    |

#### ROI analysis 6

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia T4 vs control             |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Patients less accurate than controls on both tasks, but more so on the tone decision task |
| Type of analysis     | Regions of interest (ROI)         |
| ROI type             | Laterality index(ies)             |
| How many ROIs are there? | 4 |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI |
| How are the ROI(s) defined? | |
| Correction for multiple comparisons | No correction |
| Statistical details  | —                                 |
| Findings             | None                              |
| Findings notes       | —                                 |

### ROI analysis 7

| Findings         | None |
|------------------|------|
| Findings notes   | —    |

#### ROI analysis 7

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia T5 vs control             |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | Patients less accurate than controls on both tasks, but more so on the tone decision task |
| Type of analysis     | Regions of interest (ROI)         |
| ROI type             | Laterality index(ies)             |
| How many ROIs are there? | 4 |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI |
| How are the ROI(s) defined? | |
| Correction for multiple comparisons | No correction |
| Statistical details  | —                                 |
| Findings             | None                              |
| Findings notes       | —                                 |

### ROI analysis 8

| Findings         | None |
|------------------|------|
| Findings notes   | —    |

#### ROI analysis 8

| First level contrast | Verb generation vs finger tapping |
|----------------------|-----------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia T1 vs control             |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |

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| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | Laterality indices |
| **How many ROIs are there?** | 4 |
| **What are the ROI(s)?** | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI |
| **How are the ROI(s) defined?** | — |
| **Correction for multiple comparisons** | No correction |
| **Statistical details** | — |
| **Findings** | None |
| **Findings notes** | — |

### ROI analysis 9

| **First level contrast** | Verb generation vs finger tapping |
| **Analysis class** | Cross-sectional aphasia vs control |
| **Group(s)** | Aphasia T2 vs control |
| **Covariate** | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | Laterality indices |
| **How many ROIs are there?** | 4 |
| **What are the ROI(s)?** | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI |
| **How are the ROI(s) defined?** | — |
| **Correction for multiple comparisons** | No correction |
| **Statistical details** | — |
| **Findings** | ↓ LI (language network) ↓ LI (frontal) |
| **Findings notes** | — |

### ROI analysis 10

| **First level contrast** | Verb generation vs finger tapping |
| **Analysis class** | Cross-sectional aphasia vs control |
| **Group(s)** | Aphasia T3 vs control |
| **Covariate** | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type** | Laterality indices |
| **How many ROIs are there?** | 4 |
| **What are the ROI(s)?** | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI |
| **How are the ROI(s) defined?** | — |
| **Correction for multiple comparisons** | No correction |
| ROI analysis 11 |  |  |
|----------------|----------------|----------------|
| First level contrast | Verb generation vs finger tapping |  |
| Analysis class | Cross-sectional aphasia vs control |  |
| Group(s) | Aphasia T4 vs control |  |
| Covariate |  |  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |  |
| Is accuracy matched across the second level contrast? | Unknown, not reported |  |
| Is reaction time matched across the second level contrast? | Unknown, not reported |  |
| Behavioral data notes |  |  |
| Type of analysis | Regions of interest (ROI) |  |
| ROI type | Laterality indices |  |
| How many ROIs are there? | 4 |  |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI |  |
| How are the ROI(s) defined? |  |  |
| Correction for multiple comparisons | No correction |  |
| Statistical details |  |  |
| Findings | None |  |
| Findings notes |  |  |

| ROI analysis 12 |  |  |
|----------------|----------------|----------------|
| First level contrast | Verb generation vs finger tapping |  |
| Analysis class | Cross-sectional aphasia vs control |  |
| Group(s) | Aphasia T5 vs control |  |
| Covariate |  |  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |  |
| Is accuracy matched across the second level contrast? | Unknown, not reported |  |
| Is reaction time matched across the second level contrast? | Unknown, not reported |  |
| Behavioral data notes |  |  |
| Type of analysis | Regions of interest (ROI) |  |
| ROI type | Laterality indices |  |
| How many ROIs are there? | 4 |  |
| What are the ROI(s)? | (1) frontal LI; (2) temporo-parietal LI; (3) language network LI; (4) cerebellar LI |  |
| How are the ROI(s) defined? |  |  |
| Correction for multiple comparisons | No correction |  |
| Statistical details |  |  |
| Findings | None |  |
| Findings notes |  |  |

| Complex analysis 1 |  |  |
|-------------------|----------------|----------------|
| First level contrast | Semantic decision vs tone decision |  |
| Analysis class | Longitudinal change in aphasia |  |
| Group(s) | Aphasia (comparisons between all pairs of time points) |  |
| Covariate |  |  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |  |
### Complex analysis 2

| First level contrast          | Verb generation vs finger tapping                                      |
|------------------------------|------------------------------------------------------------------------|
| Analysis class               | Longitudinal change in aphasia                                         |
| Group(s)                     | Aphasia (comparisons between all pairs of time points)                 |
| Covariate                    | —                                                                      |
| Is the second level contrast  | Yes                                                                    |
| valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                    |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                  |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                  |

**Behavioral data notes** —

**Type of analysis** Complex

**Statistical details**

PPI analyses were carried out to investigate potential changes over time in how connectivity from L and R IFG was modulated by the verb generation task. The resultant SPM was thresholded at FWE p < .05 using permutation testing implemented in SnPM 13.

**Findings** None

**Findings notes** —

**Notes**

Excluded analyses Longitudinal analyses in people with aphasia, because of contradictory and unclear reporting of findings

### Pillay et al. (2018)

**Reference**

| Authors                        | Pillay SB, Gross WL, Graves WW, Humphries C, Book DS, Binder JR       |
|--------------------------------|------------------------------------------------------------------------|
| Title                          | The neural basis of successful word reading in aphasia                 |
| Reference                      | J Cogn Neurosci 2018; 30: 514-525                                       |
| PMID                           | 29211656                                                               |
| DOI                            | 10.1162/jocn_a_01214                                                   |

**Participants**

| Language                       | US English                                                             |
|--------------------------------|------------------------------------------------------------------------|
| Inclusion criteria             | Residual phonologic retrieval deficit; intact semantic processing      |
| Number of individuals with aphasia | 21                                                                   |
| Number of control participants | 0                                                                     |
| Were any of the participants included in any previous studies? | No                                                                    |
| Is age reported for patients and controls, and | Yes (mean 56.4 ± 12.5 years, range 30-80 years) |
Is sex reported for patients and controls, and matched?
Yes (males: 11; females: 10)

Is handedness reported for patients and controls, and matched?
Yes (right: 21; left: 0)

Is time post stroke onset reported and appropriate to the study design?
Yes (mean 1134 ± 1491 days, range 180-6732 days)

To what extent is the nature of aphasia characterized?
Not at all

Language evaluation
Pseudoword rhyme matching, semantic picture matching (similar to PPT-P), picture naming

Aphasia severity
Not stated

Aphasia type
Not stated

First stroke only?
Not stated

Stroke type
Ischemic only

To what extent is the lesion distribution characterized?
Lesion overlay

Lesion extent
Mean 73.4 ± 58.6 cc, range 6.7-227.0 cc

Lesion location
17 L MCA, 2 combined L MCA/ACA, combined 2 L MCA/PCA

Participants notes
—

Imaging

Modality
fMRI

Is the study cross-sectional or longitudinal?
Cross-sectional

If longitudinal, at what time point(s) were imaging data acquired?
—

If longitudinal, was there any intervention between the time points?
—

Is the scanner described?
Yes (GE Excite 3 Tesla)

Is the timing of stimulus presentation and image acquisition clearly described and appropriate?
No (precise timing of stimuli not stated; total images acquired not stated)

Design type
Event-related

Total images acquired
not stated

Are the imaging acquisition parameters, including coverage, adequately described and appropriate?
Yes (whole brain)

Is preprocessing and intrasubject coregistration adequately described and appropriate?
Yes

Is first level model fitting adequately described and appropriate?
Yes

Is intersubject normalization adequately described and appropriate?
Yes

Imaging notes
—

Conditions

Are the conditions clearly described?
Yes

| Condition         | Response type | Repetitions | All groups could do | All individuals could do |
|-------------------|---------------|-------------|---------------------|--------------------------|
| reading nouns aloud | Word (overt)  | 72          | Yes                 | No                       |
| rest              | None          | implicit    | N/A                 | N/A                      |
|                   |               | baseline    |                     |                          |

Conditions notes
Some participants had < 10% accuracy, but this is appropriately addressed in the analysis

Contrasts

Are the contrasts clearly described?
Yes

Contrast 1: reading nouns aloud (correct trials) vs reading nouns aloud (incorrect trials)
## Language condition
Reading nouns aloud (correct trials)

## Control condition
Reading nouns aloud (incorrect trials)

### Are the conditions matched for visual demands?
Yes

### Are the conditions matched for auditory demands?
Yes

### Are the conditions matched for motor demands?
Yes

### Are the conditions matched for cognitive/executive demands?
Yes

### Is accuracy matched between the language and control tasks for all relevant groups?
No, by design

### Is reaction time matched between the language and control tasks for all relevant groups?
Yes, matched

## Behavioral data notes
—

### Are control data reported in this paper or another that is referenced?
N/A

### Does the contrast selectively activate plausible relevant language regions in the control group?
N/A

### Are activations lateralized in the control data?
N/A

## Control activation notes
Control data N/A because controls do not typically make errors

### Analyses

#### Are the analyses clearly described?
Yes

#### Voxelwise analysis 1

| First level contrast | Reading nouns aloud (correct trials) vs reading nouns aloud (incorrect trials) |
|----------------------|--------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional performance-defined conditions                                |
| Group(s)             | Aphasia                                                                        |
| Covariate            | —                                                                               |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast?  | No, by design                                                                  |
| Is reaction time matched across the second level contrast? | Yes, matched                                                                   |
| Behavioral data notes | —                                                                               |
| Type of analysis     | Voxelwise                                                                      |
| Search volume        | Whole brain                                                                    |
| Correction for multiple comparisons | Clusterwise correction based on 3dClustSim                                    |
| Software             | AFNI                                                                            |
| Voxelwise p          | .01                                                                             |
| Cluster extent       | 1.609 cc                                                                        |

### Statistical details
Regarding correction for multiple comparisons, addition of monoexponential function reduces but does not eliminate inflation of p values (Cox et al., 2017)

### Findings
- ↑ L angular gyrus
- ↓ L ventral precentral/inferior frontal junction
- ↓ L SMA/medial prefrontal
- ↑ R insula
- ↓ R ventral precentral/inferior frontal junction
- ↓ R SMA/medial prefrontal

### Findings notes
Positive region (L AG) was part of the semantic network, while many negative regions were positively modulated by reaction time in the aphasia group

### Notes

#### Excluded analyses
(1) ancillary analysis in which similar findings were obtained when phonological impairment was included as a covariate; (2) ancillary analysis in which similar findings were obtained when lesioned patients were excluded at each voxel; (3) analysis of modulation by reaction time (while informative, this analysis does not meet our inclusion criteria)
## Szaflarski et al. (2018)

### Reference

| Authors | Szaflarski JP, Griffis J, Vannest J, Allendorfer JB, Nenert R, Amara AW, Sung V, Walker HC, Martin AN, Mark VW, Zhou X |
|---|---|
| Title | A feasibility study of combined intermittent theta burst stimulation and modified constraint-induced aphasia therapy in chronic post-stroke aphasia |
| Reference | Restor Neurol Neurosci 2018; 36: 503-518 |
| PMID | 29889086 |
| DOI | 10.3233/rnn-180812 |

### Participants

| Language | US English |
|---|---|
| Inclusion criteria | — |
| Number of individuals with aphasia | 12 (plus 1 excluded: scanned at only 2 out of 3 time points) |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (range 26-66 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 9; females: 3) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 11; left: 1) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 1-12 years) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |
| Language evaluation | WAB, BNT, semantic fluency, phonemic fluency |
| Aphasia severity | AQ range 10.4-94.6 |
| Aphasia type | 8 anomic, 2 Broca’s, 1 conduction, 1 global |
| First stroke only? | Yes |
| Stroke type | Not stated |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent | Not stated |
| Lesion location | L MCA |

### Imaging

| Modality | fMRI |
|---|---|
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic (1-2 weeks prior to treatment); T2: post-treatment (within 1 week after end of 2-week treatment); T3: 13-20 weeks after end of treatment |
| If longitudinal, was there any intervention between the time points? | Modified CIAT + intermittent theta burst stimulation to residual left hemispheric language activation, 45 minutes/session, 5 days/week, 2 weeks |
| Is the scanner described? | Yes (Siemens Allegra 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | Block |
| Total images acquired | 330 |
| Are the imaging acquisition parameters, including... | Yes (whole brain) |
coverage, adequately described and appropriate?  Yes
Is preprocessing and intrasubject coregistration adequately described and appropriate? Yes
Is first level model fitting adequately described and appropriate? Yes
Is intersubject normalization adequately described and appropriate? Yes

Imaging notes

Conditions

Are the conditions clearly described? Yes

| Condition                  | Response type | Repetitions | All groups could do? | All individuals could do? |
|----------------------------|---------------|-------------|----------------------|---------------------------|
| semantic decision          | Button press  | 5           | Unknown              | Unknown                   |
| tone decision              | Button press  | 6           | Unknown              | Unknown                   |

Conditions notes

Contrasts

Are the contrasts clearly described? Yes

Contrast 1: semantic decision vs tone decision

| Language condition | Semantic decision |
|-------------------|-------------------|
| Control condition | Tone decision     |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |

Behavioral data notes

Are control data reported in this paper or another that is referenced? Yes
Does the contrast selectively activate plausible relevant language regions in the control group? Yes
Are activations lateralized in the control data? Yes
Control activation notes L frontal and temporal, plus other semantic regions
Contrast notes

Analyses

Are the analyses clearly described? Yes

Voxelwise analysis 1

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal change in aphasia    |
| Group(s)             | Aphasia T2 vs T1                 |
| Covariate            |                                   |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
### Behavioral data notes

| Type of analysis  | Voxelwise          |
|-------------------|--------------------|
| Search volume     | Whole brain        |
| Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta |
| Software          | SPM12              |
| Voxelwise p       | .05                |
| Cluster extent    | 0.928 cc           |

### Statistical details

#### Findings

- ↑ L supramarginal gyrus
- ↑ L intraparietal sulcus
- ↑ L precuneus
- ↑ L posterior STG
- ↑ L Heschl's gyrus
- ↑ L mid temporal
- ↑ L anterior temporal
- ↑ R supramarginal gyrus
- ↑ R superior parietal
- ↑ R precuneus
- ↑ R mid temporal
- ↑ R anterior cingulate
- ↓ L IFG pars opercularis
- ↓ L dorsolateral prefrontal cortex
- ↓ L ventral precentral/inferior frontal junction
- ↓ L dorsal precentral
- ↓ L SMA/medial prefrontal
- ↓ L somato-motor
- ↓ L superior parietal
- ↓ L occipital

#### Findings notes

- Voxelwise analysis 2

### Voxelwise analysis 2

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal change in aphasia    |
| Group(s)             | Aphasia T3 vs T2                 |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

| Type of analysis  | Voxelwise          |
|-------------------|--------------------|
| Search volume     | Whole brain        |
| Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta |
| Software          | SPM12              |
| Voxelwise p       | .05                |
| Cluster extent    | 0.928 cc           |

#### Findings

- ↑ L dorsolateral prefrontal cortex
- ↑ L angular gyrus
- ↑ L precuneus
- ↑ L posterior STS
- ↓ L SMA/medial prefrontal
- ↓ L anterior temporal
- ↓ L anterior cingulate
- ↓ R IFG
- ↓ R dorsolateral prefrontal cortex
| Findings notes | — |

**Voxelwise analysis 3**

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal change in aphasia    |
| Group(s)             | Aphasia T3 vs T1                 |
| Covariate            | —                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                 |
| Type of analysis     | Voxelwise                         |
| Search volume        | Whole brain                        |
| Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta |
| Software             | SPM12                              |
| Voxelwise p          | .05                                |
| Cluster extent       | 0.928 cc                           |
| Statistical details  | —                                 |
| Findings             | ↑ L supramarginal gyrus           |
|                      | ↑ L angular gyrus                 |
|                      | ↑ L precuneus                     |
|                      | ↑ L posterior STG                 |
|                      | ↑ L mid temporal                  |
|                      | ↑ L anterior temporal             |
|                      | ↑ L posterior cingulate           |
|                      | ↓ L somato-motor                  |
|                      | ↓ R dorsolateral prefrontal cortex |

**Findings notes**

—

**Voxelwise analysis 4**

| First level contrast | Semantic decision vs tone decision |
|----------------------|-----------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia T3 vs aphasia T2          |
| Covariate            | Δ WAB AQ                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                 |
| Type of analysis     | Voxelwise                         |
| Search volume        | Whole brain                        |
| Correction for multiple comparisons | Clusterwise correction based on cluster_threshold_beta |
| Software             | SPM12                              |
| Voxelwise p          | .05                                |
| Cluster extent       | 0.928 cc                           |
| Statistical details  | Inclusive mask of voxels that differed between T2 and T3 |

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Findings

| Findings | ↓ L inferior parietal lobule |
|----------|-----------------------------|
| Findings notes | — |

### Voxelwise analysis 5

| First level contrast | Semantic decision vs tone decision |
| Analysis class | Longitudinal correlation with language or other measure |
| Group(s) | Aphasia T3 vs aphasia T1 |
| Covariate | Δ BNT |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

#### Behavioral data notes
- Type of analysis: Voxelwise
- Search volume: Whole brain
- Correction for multiple comparisons: Clusterwise correction based on cluster_threshold_beta
- Software: SPM12
- Voxelwise p: .05
- Cluster extent: 0.928 cc
- Statistical details: Inclusive mask of voxels that differed between T1 and T3
- Findings | ↓ R IFG |
| Findings notes | — |

### Notes
- Excluded analyses | — |

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**van de Sandt-Koenderman et al. (2018)**

**Reference**

| Authors | van de Sandt-Koenderman, MWME; Orellana, CPM; van der Meulen, I; Smits, M; Ribbers, GM |
| Title | Language lateralisation after Melodic Intonation Therapy: an fMRI study in subacute and chronic aphasia |
| Reference | Aphasiology 2018; 32: 765-783 |
| PMID | N/A |
| DOI | 10.1080/02687038.2016.1240353 |

**Participants**

| Language | Dutch |
| Inclusion criteria | Severe non-fluent aphasia (< 50 words/minute); articulation deficits; repetition severely affected; moderate-good auditory comprehension |
| Number of individuals with aphasia | 9 |
| Number of control participants | 0 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | Yes (subacute: mean 51.2 years, range 25-61 years; chronic: mean 54.0 years, range 21-66 years) |
| Is sex reported for patients and controls, and matched? | Yes (males: 5; females: 4) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 8; left: 0; other: 1) |
| Is time post stroke onset reported and appropriate | Yes (subacute: range 0.5-3 months; chronic: range 17-40 months) |
To what extent is the nature of aphasia characterized?

**Comprehensive battery**

| Language evaluation | AAT, ANELT |
|---------------------|------------|
| Aphasia severity    | T1: subacute: ASRS median 1, range 0-2; ANELT range 10-29; chronic: ASRS median 1.5, range 1-2; ANELT range 20-29; T2: subacute: ASRS range 1-3; ANELT range 10-43; chronic: ASRS range 1-2; ANELT range 22-31 |
| Aphasia type        | T1: all severe non-fluent; T2: not stated |
| First stroke only?  | Not stated |
| Stroke type         | Not stated |

To what extent is the lesion distribution characterized?

**Extent and location**

| Lesion extent       | Subacute: range 32.4-141.2 cc (no lesion extent was reported for one subacute participant because there was no tissue loss yet); chronic: range 27.4-87.9 cc |
| Lesion location     | 8 L MCA, 1 L SMA and R insular-temporoparietal |

Participants notes —

**Imaging**

| Modality            | fMRI |
|---------------------|------|
| Is the study cross-sectional or longitudinal? | Longitudinal—mixed |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre treatment/subacute or chronic; T2: post-treatment, ~6 weeks later |
| If longitudinal, was there any intervention between the time points? | MIT, 5+ hours/week |
| Is the scanner described? | No (GE 3 Tesla; model not stated) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type         | Block |
| Total images acquired | 132 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed) |

Imaging notes —

**Conditions**

| Are the conditions clearly described? | Yes |

| Condition                        | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------------------------------|---------------|-------------|----------------------|--------------------------|
| listening to narrative speech     | None          | 6           | N/A                  | N/A                      |
| listening to reversed speech      | None          | 6           | N/A                  | N/A                      |

Conditions notes —

**Contrasts**

Are the contrasts clearly described? Yes

**Contrast 1: listening to narrative speech vs listening to reversed speech**

| Language condition | Listening to narrative speech |
|--------------------|-------------------------------|
| Control condition  | Listening to reversed speech  |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | Yes |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, no behavioral measure |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, no timeable task |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | No |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data? | Unknown |

**Behavioral data notes**

**Contrast notes**

**Analyses**

| Are the analyses clearly described? | No* (moderate limitation) (see specific limitation(s) below) |

**ROI analysis 1**

| First level contrast | Listening to narrative speech vs listening to reversed speech |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia T1 |
| Covariate | Lesion volume |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Region of interest (ROI) |
| ROI type | Laterality indices |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | Language network LI |
| How are the ROI(s) defined? | Activations that were "not clearly related to known language areas" were excluded, but the basis for this determination is not clear |
| Correction for multiple comparisons | One only |
| Statistical details | None |
| Findings | None |
| Findings notes | — |

**ROI analysis 2**

| First level contrast | Listening to narrative speech vs listening to reversed speech |
| Analysis class | Longitudinal correlation with language or other measure |
| Group(s) | Aphasia T2 vs T1 |
| Covariate | Lesion volume |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis | Region of interest (ROI) |
| ROI type | Laterality indices |
How many ROIs are there? 1
What are the ROI(s)? Language network LI
How are the ROI(s) defined? Activations that were "not clearly related to known language areas" were excluded, but the basis for this determination is not clear
Correction for multiple comparisons One only
Statistical details —
Findings None
Findings notes —

**ROI analysis 3**

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|-------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure     |
| Group(s)             | Aphasia T2 vs T1                                           |
| Covariate            | Δ AAT repetition score                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | —                                                           |
| Type of analysis     | Region of interest (ROI)                                    |
| ROI type             | Laterality index(es)                                        |
| How many ROIs are there? | 1                                                         |
| What are the ROI(s)? | Language network LI                                         |
| How are the ROI(s) defined? | Activations that were "not clearly related to known language areas" were excluded, but the basis for this determination is not clear |
| Correction for multiple comparisons | One only |
| Statistical details | —                                                           |
| Findings             | None                                                        |
| Findings notes       | —                                                           |

**ROI analysis 4**

| First level contrast | Listening to narrative speech vs listening to reversed speech |
|----------------------|-------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure     |
| Group(s)             | Aphasia T2 vs T1                                           |
| Covariate            | Δ ANELT                                                     |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | —                                                           |
| Type of analysis     | Region of interest (ROI)                                    |
| ROI type             | Laterality index(es)                                        |
| How many ROIs are there? | 1                                                         |
| What are the ROI(s)? | Language network LI                                         |
| How are the ROI(s) defined? | Activations that were "not clearly related to known language areas" were excluded, but the basis for this determination is not clear |
| Correction for multiple comparisons | One only |
| Statistical details | —                                                           |
| Findings             | None                                                        |
| Findings notes       | —                                                           |

Notes
### Excluded analyses

Individual participant LIIs and activation maps

### van Oers et al. (2018)

**Reference**

| Authors         | van Oers CAMM, van der Worp HB, Kappelle LJ, Raemaekers MAH, Otte WM, Dijkhuizen RM |
|-----------------|-------------------------------------------------------------------------------------|
| Title           | Etiology of language network changes during recovery of aphasia after stroke         |
| Reference       | Sci Rep 2018; 8: 856                                                                |
| PMID            | 29339771                                                                           |
| DOI             | 10.1038/s41598-018-19302-4                                                          |

**Participants**

| Language       | Dutch                                                                                |
|----------------|--------------------------------------------------------------------------------------|
| Inclusion criteria | MRS ≤ 3; ability to perform tasks                                                  |
| Number of individuals with aphasia | 12                                                                 |
| Number of control participants | 8                                                                                 |
| Were any of the participants included in any previous studies? | No                                                                                  |
| Is age reported for patients and controls, and matched? | Yes (mean 67.9 ± 11.4 years, range 46-86 years)                                    |
| Is sex reported for patients and controls, and matched? | Yes (males: 10; females: 2)                                                           |
| Is handedness reported for patients and controls, and matched? | Yes (right: 12; left: 0)                                                             |
| Is time post stroke onset reported and appropriate to the study design? | No* (moderate limitation) (T1: within 2 weeks; T2: ~3 months; T3: ~6 months; T4: ~12 months; specific timing of first time point not stated) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery                                                              |
| Language evaluation | AAT, BNT                                                                           |
| Aphasia severity | T1: 8 moderate, 2 severe, 2 not stated; T2: 4 moderate, 3 recovered, 2 not stated, 1 mild, 1 severe |
| Aphasia type      | T1: 6 Broca's, 3 anomic, 2 Wernicke's, 1 global; T2: 4 anomic, 3 recovered, 2 Broca's, 1 unclassified, 1 Wernicke's |
| First stroke only? | Yes                                                                                 |
| Stroke type       | Ischemic only                                                                        |
| To what extent is the lesion distribution characterized? | Lesion overlay                                                                     |
| Lesion extent     | Range 9-208 cc                                                                       |
| Lesion location   | L MCA                                                                                |
| Participants notes | —                                                                                  |

**Imaging**

| Modality       | fMRI                                                                                 |
|----------------|--------------------------------------------------------------------------------------|
| Is the study cross-sectional or longitudinal? | Longitudinal—recovery                                                               |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: within 2 weeks; T2: ~3 months; T3: ~6 months; T4: ~12 months; specific timing of first time point not stated |
| If longitudinal, was there any intervention between the time points? | Not stated                                                                           |
| Is the scanner described? | Yes (Philips Achieva 3 Tesla)                                                       |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (stimulus presentation was self-paced, but the ITI is not reported, nor are the number of trials presented per condition; it is likely that the language and control blocks contained different numbers of trials) |
| Design type     | Block                                                                                |
| Total images acquired | 1656 |
|-----------------------|------|
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and inrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | not all participants scanned at each time point; the number scanned at each time point is not stated |

### Conditions

Are the conditions clearly described? Yes

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|--------------------------|
| written word-picture matching | Button press | 6 | Unknown | Unknown |
| semantic decision | Button press | 6 | Unknown | Unknown |
| visual decision | Button press | 12 | Unknown | Unknown |
| rest | None | 12 | N/A | N/A |

Conditions notes —

### Contrasts

Are the contrasts clearly described? Yes

#### Contrast 1: written word-picture matching vs visual decision

| Language condition | Written word-picture matching |
|--------------------|-------------------------------|
| Control condition | Visual decision |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported |
| Behavioral data notes | — |
| Are control data reported in this paper or another that is referenced? | Somewhat |
| Does the contrast selectively activate plausible relevant language regions in the control group? | No |
| Are activations lateralized in the control data? | Somewhat |
| Control activation notes | Primarily bilateral visual activations; frontal activation is L-lateralized |
| Contrast notes | — |

#### Contrast 2: semantic decision vs visual decision

| Language condition | Semantic decision |
|--------------------|-------------------|
| Control condition | Visual decision |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | Yes |
| Are the conditions matched for motor demands? | Yes |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported |
Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported
---|---
Behavioral data notes | —
Are control data reported in this paper or another that is referenced? | Somewhat
Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat
Are activations lateralized in the control data? | Yes
Control activation notes | L frontal, L posterior ITG, L superior parietal
Contrast notes | —

**Analyses**

Are the analyses clearly described? | No* (moderate limitation) (see specific limitation(s) below)

**ROI analysis 1**

| First level contrast | Written word-picture matching vs visual decision
---|---
| Analysis class | Cross-sectional correlation with language or other measure
| Group(s) | Aphasia (subset who returned for follow-up) T1 (n = 10)
| Covariate | Subsequent outcome (T4) overall language measure (average of AAT measures)
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes
| Is accuracy matched across the second level contrast? | Unknown, not reported
| Is reaction time matched across the second level contrast? | Unknown, not reported
| Behavioral data notes | —
| Type of analysis | Regions of interest (ROI)
| ROI type | Functional
| How many ROIs are there? | 12
| What are the ROI(s)? | (1) bilateral dorsal anterior cingulate; (2) L angular gyrus; (3) L IFG pars opercularis and triangularis; (4) L thalamus; (5) L MFG; (6) L posterior ITG; (7) R angular gyrus; (8) R IFG pars triangularis; (9) R thalamus; (10) R posterior ITG; (11) R IFG pars opercularis and triangularis; (12) R MFG
| How are the ROI(s) defined? | Control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected
| Correction for multiple comparisons | False discovery rate (FDR)
| Statistical details | —
| Findings | ↑ L posterior inferior temporal gyrus/fusiform gyrus
| Findings notes | Activation predicted later outcome even when initial language performance was included in the model

**ROI analysis 2**

| First level contrast | Written word-picture matching vs visual decision
---|---
| Analysis class | Cross-sectional correlation with language or other measure
| Group(s) | Aphasia (all time points)
| Covariate | Overall language measure (average of AAT measures) all time points
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes
| Is accuracy matched across the second level contrast? | Unknown, not reported
| Is reaction time matched across the second level contrast? | Unknown, not reported
| Behavioral data notes | —
| Type of analysis | Regions of interest (ROI)
| ROI type | Functional
| How many ROIs are there? | 12 |
|--------------------------|----|
| What are the ROI(s)? | (1) bilateral dorsal anterior cingulate; (2) L angular gyrus; (3) L IFG pars opercularis and triangularis; (4) L thalamus; (5) L MFG; (6) L posterior ITG; (7) R angular gyrus; (8) R IFG pars triangularis; (9) R thalamus; (10) R posterior ITG; (11) R IFG pars opercularis and triangularis; (12) R MFG |
| How are the ROI(s) defined? | Control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected |
| Correction for multiple comparisons | False discovery rate (FDR) |
| Statistical details | Mixed model; minimal detail provided |
| Findings | ↑ L posterior inferior temporal gyrus/fusiform gyrus |
| Findings notes | — |

**ROI analysis 3**

| First level contrast | Written word-picture matching vs visual decision |
|----------------------|-----------------------------------------------|
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia (all time points) |
| Covariate | Average of AAT comprehension score and BNT, all time points |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 12 |
| What are the ROI(s)? | (1) bilateral dorsal anterior cingulate; (2) L angular gyrus; (3) L IFG pars opercularis and triangularis; (4) L thalamus; (5) L MFG; (6) L posterior ITG; (7) R angular gyrus; (8) R IFG pars triangularis; (9) R thalamus; (10) R posterior ITG; (11) R IFG pars opercularis and triangularis; (12) R MFG |
| How are the ROI(s) defined? | Control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected |
| Correction for multiple comparisons | False discovery rate (FDR) |
| Statistical details | Mixed model; minimal detail provided |
| Findings | ↓ R IFG pars opercularis; ↓ R IFG pars triangularis |
| Findings notes | — |

**ROI analysis 4**

| First level contrast | Written word-picture matching vs visual decision |
|----------------------|-----------------------------------------------|
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia (all time points) |
| Covariate | Picture-word matching accuracy, all time points |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 12 |
| What are the ROI(s)? | (1) bilateral dorsal anterior cingulate; (2) L angular gyrus; (3) L IFG pars opercularis and triangularis; (4) L thalamus; (5) L MFG; (6) L posterior ITG; (7) R angular gyrus; (8) R IFG pars triangularis; (9) R thalamus; (10) R posterior ITG; (11) R IFG pars opercularis and triangularis; (12) R MFG |
### ROI analysis 5

| First level contrast | Written word-picture matching vs visual decision |
|----------------------|-----------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                 |
| Group(s)             | Aphasia: linear effect of time                 |
| Covariate            |                                               |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes |                                               |
| Type of analysis     | Regions of interest (ROI)                      |
| ROI type             | Functional                                     |
| How many ROIs are there? | 12                                           |
| What are the ROI(s)? | (1) bilateral dorsal anterior cingulate; (2) L angular gyrus; (3) L IFG pars opercularis and triangularis; (4) L thalamus; (5) L MFG; (6) L posterior ITG; (7) R angular gyrus; (8) R IFG pars triangularis; (9) R thalamus; (10) R posterior ITG; (11) R IFG pars opercularis and triangularis; (12) R MFG |
| How are the ROI(s) defined? | Control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected |
| Correction for multiple comparisons | False discovery rate (FDR) |
| Statistical details  | Mixed model; minimal detail provided           |
| Findings             | † R posterior inferior temporal gyrus/fusiform gyrus |
| Findings notes       |                                               |

### ROI analysis 6

| First level contrast | Semantic decision vs visual decision |
|----------------------|-------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia (subset who returned for follow-up) T1 (n = 10) |
| Covariate            | Subsequent outcome (T4) overall language measure (average of AAT measures) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (not appropriate to correlate T1 imaging with T4 behavior without T1 behavior in model) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes |                                               |
| Type of analysis     | Regions of interest (ROI)                  |

Findings notes: Similar numbers of findings are reported for controls.
**ROI analysis 7**

| First level contrast       | Semantic decision vs visual decision |
|-----------------------------|--------------------------------------|
| Analysis class              | Cross-sectional correlation with language or other measure |
| Group(s)                    | Aphasia (all time points)             |
| Covariate                   | Overall language measure (average of AAT measures) all time points |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes       | —                                    |
| Type of analysis            | Regions of interest (ROI)             |
| ROI type                    | Functional                            |
| How many ROIs are there?    | 6                                    |
| What are the ROI(s)?        | (1) L angular gyrus; (2) L IFG pars opercularis and triangularis; (3) L posterior ITG; (4) R angular gyrus; (5) R IFG pars opercularis and triangularis; (6) R posterior ITG |
| How are the ROI(s) defined? | Control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected |
| Correction for multiple comparisons | False discovery rate (FDR) |
| Statistical details         | Mixed model; minimal detail provided |
| Findings                    | None                                 |
| Findings notes              | —                                    |

**ROI analysis 8**

| First level contrast       | Semantic decision vs visual decision |
|-----------------------------|--------------------------------------|
| Analysis class              | Cross-sectional correlation with language or other measure |
| Group(s)                    | Aphasia (all time points)             |
| Covariate                   | Average of AAT comprehension score and BNT, all time points |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes       | —                                    |
| Type of analysis            | Regions of interest (ROI)             |
| ROI type                    | Functional                            |
| How many ROIs are there?    | 6                                    |
| What are the ROI(s)?        | (1) L angular gyrus; (2) L IFG pars opercularis and triangularis; (3) L posterior ITG; (4) R angular gyrus; (5) R IFG pars opercularis and triangularis; (6) R posterior ITG |
| How are the ROI(s) defined? | Control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected |
| Correction for multiple comparisons | False discovery rate (FDR) |
| Statistical details         | Mixed model; minimal detail provided |
| Findings                    | None                                 |
| Findings notes              | —                                    |
### ROI analysis 9

| Findings | None |
| --- | --- |

| Findings notes | — |

#### ROI analysis 9

| First level contrast | Semantic decision vs visual decision |
| --- | --- |

| Analysis class | Cross-sectional correlation with language or other measure |
| --- | --- |

| Group(s) | Aphasia (all time points) |
| --- | --- |

| Covariate | Semantic decision accuracy, all time points |
| --- | --- |

| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| --- | --- |

| Is accuracy matched across the second level contrast? | Accuracy is covariate |
| --- | --- |

| Is reaction time matched across the second level contrast? | Unknown, not reported |
| --- | --- |

#### Behavioral data notes

| Type of analysis | Regions of interest (ROI) |
| --- | --- |

| ROI type | Functional |
| --- | --- |

| How many ROIs are there? | 6 |
| --- | --- |

| What are the ROI(s)? | (1) L angular gyrus; (2) L IFG pars opercularis and triangularis; (3) L posterior ITG; (4) R angular gyrus; (5) R IFG pars opercularis and triangularis; (6) R posterior ITG |
| --- | --- |

| How are the ROI(s) defined? | Control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected |
| --- | --- |

| Correction for multiple comparisons | False discovery rate (FDR) |
| --- | --- |

| Statistical details | Mixed model; minimal detail provided |
| --- | --- |

| Findings | None |
| --- | --- |

| Findings notes | — |

### ROI analysis 10

| Findings | None |
| --- | --- |

| Findings notes | — |

#### ROI analysis 10

| First level contrast | Semantic decision vs visual decision |
| --- | --- |

| Analysis class | Longitudinal change in aphasia |
| --- | --- |

| Group(s) | Aphasia: linear effect of time |
| --- | --- |

| Covariate | — |
| --- | --- |

| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| --- | --- |

| Is accuracy matched across the second level contrast? | Unknown, not reported |
| --- | --- |

| Is reaction time matched across the second level contrast? | Unknown, not reported |
| --- | --- |

#### Behavioral data notes

| Type of analysis | Regions of interest (ROI) |
| --- | --- |

| ROI type | Functional |
| --- | --- |

| How many ROIs are there? | 6 |
| --- | --- |

| What are the ROI(s)? | (1) L angular gyrus; (2) L IFG pars opercularis and triangularis; (3) L posterior ITG; (4) R angular gyrus; (5) R IFG pars opercularis and triangularis; (6) R posterior ITG |
| --- | --- |

| How are the ROI(s) defined? | Control activations and their homotopic counterparts in the R hemisphere; activation measured as count of voxels activated at p < 0.001, uncorrected |
| --- | --- |

| Correction for multiple comparisons | False discovery rate (FDR) |
| --- | --- |

| Statistical details | Mixed model; minimal detail provided |
| --- | --- |

| Findings | None |
| --- | --- |

| Findings notes | — |

### Notes

| Excluded analyses | (1) activation maps in patients at each time point (Fig. 2); (2) analyses assessing whether |
| --- | --- |

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outcome can be better predicted by including fMRI data; (3) analyses examining relationships between activations related to breath holding and language tasks (there was little if any evidence that vascular reactivity was abnormal in patients); (4) correlations with ROI activity level instead of counts of activated voxels, which yielded similar but non-significant findings.

**Barbieri et al. (2019)**

**Reference**

| Authors | Barbieri E, Mack J, Chiappetta B, Europa E, Thompson CK |
| Title | Recovery of offline and online sentence processing in aphasia: Language and domain-general network neuroplasticity |
| Reference | Cortex 2019; 120: 394-418 |
| PMID | 31419597 |
| DOI | 10.1016/j.cortex.2019.06.015 |

**Participants**

| Language | US English |
| Inclusion criteria | — |
| Number of individuals with aphasia | 18 (plus 1 excluded: developed a hematoma between baseline and post-testing) |
| Number of control participants | 23 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | No (range 22-73 years; controls were younger) |
| Is sex reported for patients and controls, and matched? | Yes (males: 11; females: 7) |
| Is handedness reported for patients and controls, and matched? | No (right: 15; left: 3; not stated for controls) |
| Is time post stroke onset reported and appropriate to the study design? | Yes (range 13-107 months) |
| To what extent is the nature of aphasia characterized? | Comprehensive battery |
| Language evaluation | WAB, Northwestern Assessment of Verbs and Sentences (NAVS), Northwestern Naming Battery (NNB), analysis of spontaneous speech (Cinderella story) using Northwestern Narrative Language Analysis (NNLA) protocol |
| Aphasia severity | AQ range 52.8-91.7 |
| Aphasia type | Not stated, except that “language deficits were consistent with nonfluent aphasia and agrammatism” |
| First stroke only? | Yes |
| Stroke type | Mixed etiologies |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Not stated |
| Lesion location | Mostly L MCA but some lesions include PCA or ACA territory |
| Participants notes | One patient had two strokes within one day, but we would consider that essentially a single stroke |

**Imaging**

| Modality | fMRI |
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment |
| If longitudinal, at what time point(s) were imaging data acquired? | T1: pre-treatment/chronic; T2: post-treatment, ~12 weeks later |
| If longitudinal, was there any intervention between the time points? | 13 patients were treated and 5 were not; treatment of underlying forms; 90 minutes/session, 2 sessions/week until 80% accuracy met on weekly probe task, then 1 session/week, 12 weeks |
except for one patient who demonstrated rapid improvement and completed treatment in 6 weeks

| Question                                                                 | Answer                                                                                           |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Is the scanner described?                                                | Yes (Siemens Trio 3 Tesla or Siemens Prisma 3 Tesla)                                              |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (stimulus timing described does not match stated duration of data acquisition; timing of language and control trials not matched) |
| Design type                                                              | Block                                                                                             |
| Total images acquired                                                    | ~482                                                                                              |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)                                                                                 |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes                                                                                              |
| Is first level model fitting adequately described and appropriate?       | Yes                                                                                              |
| Is intersubject normalization adequately described and appropriate?      | Yes                                                                                              |
| Imaging notes                                                            | 2 runs before treatment and 2 runs after treatment; each pair of runs took place on two separate days (1-7 days apart) |

### Conditions

| Are the conditions clearly described?                                    | Yes                                                                                               |

| Condition                                                                 | Response type  | Repetitions | All groups could do? | All individuals could do? |
|--------------------------------------------------------------------------|---------------|-------------|-----------------------|---------------------------|
| auditory sentence-picture verification                                   | Button press  | 32          | Unknown               | Unknown                   |
| listening to reversed speech and viewing scrambled pictures              | Button press  | 8           | Unknown               | Unknown                   |

**Conditions notes**: Based on the behavioral data obtained outside the scanner, it is likely that many patients were at chance on the language task

### Contrasts

| Are the contrasts clearly described?                                     | No (see specific limitation(s) below)                                                                  |

**Contrast 1: auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures**

| Language condition                                                      | Auditory sentence-picture verification                                                               |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Control condition                                                      | Listening to reversed speech and viewing scrambled pictures                                         |
| Are the conditions matched for visual demands?                         | Yes                                                                                                  |
| Are the conditions matched for auditory demands?                       | Yes                                                                                                  |
| Are the conditions matched for motor demands?                         | Yes                                                                                                  |
| Are the conditions matched for cognitive/executive demands?            | No                                                                                                   |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported                                                                                  |
| Is reaction time matched between the language and control tasks for all relevant groups? | Unknown, not reported                                                                                  |
| Behavioral data notes                                                  | —                                                                                                     |
| Are control data reported in this paper or another that is referenced? | Yes                                                                                                  |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Somewhat                                                                                             |
| Are activations lateralized in the control data?                       | Somewhat                                                                                             |
| Control activation notes                                               | L-lateralized inferior frontal and posterior temporal, but also bilateral posterior inferior temporal and lateral occipital activations |
| Contrast notes                                                         | Contrast described as "passive > control" but seems to involve active and passive sentences           |

### Analyses

| Are the analyses clearly described?                                     | No* (moderate limitation) (see specific limitation(s) below) |

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### Voxelwise analysis 1

| First level contrast | Auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures |
|----------------------|---------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                                             |
| Group(s)             | Aphasia treated (n = 13) T2 vs T1                                                          |
| Covariate            | —                                                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                           |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                       |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                       |
| Behavioral data notes | Out-of-scanner performance on passive sentences improved                                   |
| Type of analysis     | Voxelwise                                                                                  |
| Search volume        | Clusterwise correction based on 3dClustSim                                                 |
| Correction for multiple comparisons | Clusterwise correction based on 3dClustSim                                                 |
| Software             | SPM8                                                                                       |
| Voxelwise p          | .001                                                                                       |
| Cluster extent       | 37 voxels (size not stated)                                                                |
| Statistical details  | —                                                                                           |
| Findings             | ↑ L precuneus                                                                               |
|                      | ↑ R ventral precentral/inferior frontal junction                                            |
|                      | ↑ R somato-motor                                                                            |
|                      | ↑ R supramarginal gyrus                                                                     |
|                      | ↑ R intraparietal sulcus                                                                    |
|                      | ↑ R superior parietal                                                                       |
|                      | ↑ R precuneus                                                                               |
| Findings notes       | Based on Table 7 and Figure 8                                                               |

### Voxelwise analysis 2

| First level contrast | Auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures |
|----------------------|---------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                                             |
| Group(s)             | Aphasia natural history (n = 5) T2 vs T1                                                    |
| Covariate            | —                                                                                           |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                           |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                       |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                       |
| Behavioral data notes | —                                                                                           |
| Type of analysis     | Voxelwise                                                                                  |
| Search volume        | Clusterwise correction based on 3dClustSim                                                 |
| Correction for multiple comparisons | Clusterwise correction based on 3dClustSim                                                 |
| Software             | SPM8                                                                                       |
| Voxelwise p          | .001                                                                                       |
| Cluster extent       | 37 voxels (size not stated)                                                                |
| Statistical details  | —                                                                                           |
| Findings             | None                                                                                       |
| Findings notes       | —                                                                                           |

### ROI analysis 1

| First level contrast | Auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures |
|----------------------|---------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal between two groups with aphasia                                              |
### ROI analysis 1

| Group(s) | (Aphasia treated (n=13) T2 vs T1) vs (aphasia natural history (n=5) T2 vs T1) |
|----------|---------------------------------------------------------------------------|
| Covariate | —                                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                                         |
| Type of analysis | Regions of interest (ROI)                                                   |
| ROI type | Anatomical                                                               |
| How many ROIs are there? | 4                                                                          |
| What are the ROI(s)? | (1) L hemisphere sentence processing network (IFGpt, pMTG, pSTG, AG); (2) R hemisphere homotopic regions; (3) L dorsal attention network (MFG, PrCG, SPL, sLOC); (4) R dorsal attention network (same regions) |
| How are the ROI(s) defined? | Sentence processing network based on Walenski et al. (2019); dorsal attention network based on Corbetta et al. (2008) and Vincent et al. (2008); ROIs were defined based on Harvard-Oxford atlas which would align imperfectly with these functional networks; dependent variable was number of active voxels (p < .001, uncorrected) divided by number of intact voxels |
| Correction for multiple comparisons | No correction |
| Statistical details | Derivation of dependent measures from ROIs difficulty to follow, but it seems that ROIs with less than 5 voxels upregulated were excluded and deactivations were not considered, meaning that estimates of change may be biased |
| Findings | † L dorsolateral prefrontal cortex  
† L ventral precentral/inferior frontal junction  
† L dorsal precentral  
† L angular gyrus  
† L intraparietal sulcus  
† L superior parietal  
† R dorsolateral prefrontal cortex  
† R ventral precentral/inferior frontal junction  
† R dorsal precentral  
† R angular gyrus  
† R intraparietal sulcus  
† R superior parietal |
| Findings notes | Bilateral dorsal attention network; findings were for networks as a whole; regions coded correspond to atlas ROIs |

### ROI analysis 2

| First level contrast | Auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures |
|----------------------|--------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                           |
| Group(s)             | Aphasia T2 vs T1                                                                                |
| Covariate            | ∆ offline comprehension composite                                                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | —                                                                                              |
| Type of analysis     | Regions of interest (ROI)                                                                        |
| ROI type             | Anatomical                                                                                      |
| How many ROIs are there? | 4                                                                 |
| What are the ROI(s)? | (1) L hemisphere sentence processing network (IFGpt, pMTG, pSTG, AG); (2) R hemisphere homotopic regions; (3) L dorsal attention network (MFG, PrCG, SPL, sLOC); (4) R dorsal attention network (same regions) |
| How are the ROI(s) defined? | Sentence processing network based on Walenski et al. (2019); dorsal attention network based |
on Corbetta et al. (2008) and Vincent et al. (2008); ROIs were defined based on Harvard-Oxford atlas which would align imperfectly with these functional networks; dependent variable was number of active voxels ($p < .001$, uncorrected) divided by number of intact voxels

| Correction for multiple comparisons | No correction |
|-----------------------------------|---------------|
| Statistical details              | Derivation of dependent measures from ROIs difficult to follow, but it seems that ROIs with less than 5 voxels upregulated were excluded and deactivations were not considered, meaning that estimates of change may be biased |
| Findings                          | † R IFG pars triangularis |
|                                   | † R dorsolateral prefrontal cortex |
|                                   | † R ventral precentral/inferior frontal junction |
|                                   | † R dorsal precentral |
|                                   | † R angular gyrus |
|                                   | † R intraparietal sulcus |
|                                   | † R superior parietal |
|                                   | † R posterior STG/STS/MTG |
| Findings notes                    | R homotopic sentence processing network and R dorsal attention network; findings were for networks as a whole; regions coded correspond to atlas ROIs |

**ROI analysis 3**

| First level contrast                          | Auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures |
| Analysis class                                 | Longitudinal correlation with language or other measure |
| Group(s)                                       | Aphasia participants with eye tracking data ($n = 16$) T2 vs T1 |
| Covariate                                      | Δ decrease in eye tracking online thematic prediction score |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes                         | — |
| Type of analysis                               | Regions of interest (ROI) |
| ROI type                                       | Anatomical |
| How many ROIs are there?                      | 4 |
| What are the ROI(s)?                          | (1) L hemisphere sentence processing network (IFGpt, pMTG, pSTG, AG); (2) R hemisphere homotopic regions; (3) R dorsal attention network (MFG, PrCG, SPL, sLOC); (4) R dorsal attention network (same regions) |
| How are the ROI(s) defined?                   | Sentence processing network based on Walenski et al. (2019); dorsal attention network based on Corbetta et al. (2008) and Vincent et al. (2008); ROIs were defined based on Harvard-Oxford atlas which would align imperfectly with these functional networks; dependent variable was number of active voxels ($p < .001$, uncorrected) divided by number of intact voxels |
| Correction for multiple comparisons           | No correction |
| Statistical details                           | Derivation of dependent measures from ROIs difficult to follow, but it seems that ROIs with less than 5 voxels upregulated were excluded and deactivations were not considered, meaning that estimates of change may be biased |
| Findings                                       | † R IFG pars triangularis |
|                                               | † R angular gyrus |
|                                               | † R posterior STG/STS/MTG |
| Findings notes                                | R homotopic sentence processing network; findings were for networks as a whole; regions coded correspond to atlas ROIs |

**ROI analysis 4**

| First level contrast                          | Auditory sentence-picture verification vs listening to reversed speech and viewing scrambled pictures |
| Analysis class                                 | Longitudinal correlation with language or other measure |
| Group(s)                                       | Aphasia participants with eye tracking data ($n = 16$) T2 vs T1 |
| Covariate                                      | Δ eye tracking online thematic integration score |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Question | Answer |
|----------|--------|
| Group(s), time point(s), and measures involved? | Unknown, not reported |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Anatomical |
| How many ROIs are there? | 4 |
| What are the ROI(s)? | (1) L hemisphere sentence processing network (IFGpt, pMTG, pSTG, AG); (2) R hemisphere homotopic regions; (3) L dorsal attention network (MFG, PrCG, SPL, sLOC); (4) R dorsal attention network (same regions) |
| How are the ROI(s) defined? | Sentence processing network based on Walenski et al. (2019); dorsal attention network based on Corbetta et al. (2008) and Vincent et al. (2008); ROIs were defined based on Harvard-Oxford atlas which would align imperfectly with these functional networks; dependent variable was number of active voxels (p < .001, uncorrected) divided by number of intact voxels |
| Correction for multiple comparisons | No correction |
| Statistical details | Derivation of dependent measures from ROIs difficulty to follow, but it seems that ROIs with less than 5 voxels upregulated were excluded and deactivations were not considered, meaning that estimates of change may be biased |
| Findings | ↑ R dorsolateral prefrontal cortex  
↑ R ventral precentral/inferior frontal junction  
↑ R dorsal precentral  
↑ R angular gyrus  
↑ R intraparietal sulcus  
↑ R superior parietal |
| Findings notes | R dorsal attention network; findings were for networks as a whole; regions coded correspond to atlas ROIs |
| Notes | Excluded analyses Analysis of relationship between lesion volume with ROIs and functional changes in ROIs, because L and R hemisphere networks seem to be combined |

**Johnson et al. (2019)**

**Reference**

**Authors**

Johnson JP, Meier EL, Pan Y, Kiran S

**Title**

Treatment-related changes in neural activation vary according to treatment response and extent of spared tissue in patients with chronic aphasia

**Reference**

*Cortex* 2019; 121: 147-168

**PMID**

31627014

**DOI**

10.1016/j.cortex.2019.08.016

**Participants**

**Language**

US English

**Inclusion criteria**

Anomia

**Number of individuals with aphasia**

30 (plus 5 excluded: 2 withdrew from non-treatment arm; 3 fMRI acquisition errors; 1 did not complete treatment and post-treatment scanning (but of these latter 4, one must have at least completed the non-treatment arm))

**Number of control participants**

17

**Were any of the participants included in any previous studies?**

No

**Is age reported for patients and controls, and matched?**

Yes (treated group: mean 62.8 ± 10.2 years, range 42-80 years; untreated group: mean 59.0 ± 11.8 years, range 39-79 years)
| Question                                                                 | Answer                                                                                      |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Is sex reported for patients and controls, and matched?               | Yes (males: 21; females: 9)                                                                  |
| Is handedness reported for patients and controls, and matched?        | Yes (right: 27; left: 3)                                                                      |
| Is time post stroke onset reported and appropriate to the study design? | Yes (treated group: mean 58.3 ± 51.8 months, range 12-170 months; untreated group: mean 85.2 ± 141.9 months, range 10-467 months) |
| To what extent is the nature of aphasia characterized?               | Severity only                                                                               |
| Language evaluation                                                  | WAB, BNT, PPT                                                                                |
| Aphasia severity                                                      | Treated group: AQ mean 60.1 ± 24.0, range 11.7-95.2; untreated group: AQ mean 65.8 ± 24.6, range 26.9-91.5 |
| Aphasia type                                                          | Not stated                                                                                  |
| First stroke only?                                                   | Not stated                                                                                  |
| Stroke type                                                          | Not stated                                                                                  |
| To what extent is the lesion distribution characterized?             | Lesion overlay                                                                              |
| Lesion extent                                                        | Treated group: 136.6 ± 81.1 cc, range 11.7-317.1 cc; untreated group: 112.7 ± 94.6 cc, range 1.6-317.1 cc |
| Lesion location                                                       | Mostly MCA with a few extending into PCA                                                    |
| Participants notes                                                   | There were 26 patients in the treated group and 10 in the untreated group, but 6 patients overlapped between the two groups (they joined the treated group after completing the untreated phase) |

**Imaging**

| Modality                  | fMRI                                                                 |
|---------------------------|-----------------------------------------------------------------------|
| Is the study cross-sectional or longitudinal?                         | Longitudinal—chronic treatment                                        |
| If longitudinal, at what time point(s) were imaging data acquired?   | T1: pre-treatment/chronic; T2: post-treatment, ~12 weeks later         |
| If longitudinal, was there any intervention between the time points?  | Semantic naming treatment, 2 sessions/week                            |
| Is the scanner described?                                            | Yes (Siemens Trio 3 Tesla, except for 2 patients on a Siemens Prisma 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (total images not stated; short ITI and minimal jitter) |
| Design type                                                          | Event-related                                                            |
| Total images acquired                                               | not stated                                                               |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)                                                     |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes                                                                     |
| Is first level model fitting adequately described and appropriate?    | No* (moderate limitation) (unclear whether there was sufficient resting data to allow the key contrast to be computed) |
| Is intersubject normalization adequately described and appropriate?   | Yes                                                                     |
| Imaging notes                                                        | —                                                                       |

**Conditions**

| Condition                                                                 | Response type | Repetitions | All groups could do? | All individuals could do? |
|--------------------------------------------------------------------------|---------------|-------------|-----------------------|---------------------------|
| picture naming (trained items)                                          | Word (overt)  | 36          | Unknown               | Unknown                   |
| picture naming (untrained items, from control category)                 | Word (overt)  | 36          | Unknown               | Unknown                   |
| picture naming (untrained items, from experimental categories)          | Word (overt)  | 36          | Unknown               | Unknown                   |
| viewing scrambled images and saying “skip” rest                          | Word (overt)  | 36          | Unknown               | Unknown                   |
|                                                                           | None          | 36          | implicit baseline     | N/A                       |

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## Conditions notes

The untrained group were not actually trained on "trained items"; no accuracy data for untrained group (except for lack of change between T1 and T2).

## Contrasts

### Are the contrasts clearly described?

Yes

### Contrast 1: picture naming (trained items) vs rest

| Language condition | Picture naming (trained items) |
|--------------------|---------------------------------|
| Control condition  | Rest                            |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

### Behavioral data notes

Somewhat

### Does the contrast selectively activate plausible relevant language regions in the control group?

No

### Are activations lateralized in the control data?

No

### Control activation notes

Most ROIs deactivated in controls

## Analyses

### Are the analyses clearly described?

Yes

### ROI analysis 1

| First level contrast | Picture naming (trained items) vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control     |
| Group(s)             | Aphasia treated T1 (n = 26) vs control |
| Covariate            | —                                      |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

—

### Type of analysis

Regions of interest (ROI)

### ROI type

Anatomical

### How many ROIs are there?

16

### What are the ROI(s)?

(1) L IFGorb; (2) L IFGtri; (3) L IFGop; (4) L MFG; (5) L PrCG; (6) L MTG; (7) L SMG; (8) L AG; (9-16) homotopic counterparts

### How are the ROI(s) defined?

AAL but lesioned voxels were excluded from ROIs on an individual basis

### Correction for multiple comparisons

No correction

### Statistical details

—

### Findings

↑ L IFG pars triangularis
↑ R IFG pars triangularis
↓ L angular gyrus

### Findings notes

Significant interaction of ROI by group

## ROI analysis 2
### ROI analysis 3

| First level contrast | Picture naming (trained items) vs rest |
|----------------------|---------------------------------------|
| Analysis class       | Longitudinal change in aphasia         |
| Group(s)             | Aphasia untreated (n = 10) T2 vs T1    |
| Covariate            |                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes |                                       |
| Type of analysis     | Regions of interest (ROI)              |
| ROI type             | Anatomical                             |
| How many ROIs are there? | 16                                     |
| What are the ROI(s)? | (1) L IFGorb; (2) L IFGtri; (3) L IFGop; (4) L MFG; (5) L PrCG; (6) L MTG; (7) L SMG; (8) L AG; (9-16) homotopic counterparts |
| How are the ROI(s) defined? | AAL but lesioned voxels were excluded from ROIs on an individual basis |
| Correction for multiple comparisons | No correction |
| Statistical details  |                                       |
| Findings             | ↑ L IFG pars triangularis              |
| Findings notes       | None                                   |

### Complex analysis 1

| First level contrast | Picture naming (trained items) vs rest |
|----------------------|---------------------------------------|
| Analysis class       | Longitudinal change in aphasia         |
| Group(s)             | Aphasia treated (n = 26) T2 vs T1      |
| Covariate            |                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | No, different |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes |                                       |
| Type of analysis     |                                       |
| ROI type             |                                       |
| How many ROIs are there? |                                       |
| What are the ROI(s)? |                                       |
| How are the ROI(s) defined? |                                       |
| Correction for multiple comparisons |                                       |
| Statistical details  |                                       |
| Findings             |                                       |
| Findings notes       |                                       |

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| Behavioral data notes | — |
|-----------------------|---|
| Type of analysis      | Complex |
| Statistical details   | A linear model was constructed to examine the relationship between proportion of spared tissue in each L hemisphere ROI and changes in activation over time. The model is not described in sufficient detail. |
| Findings notes        | There was a significant 3-way interaction of time by ROI by spared tissue, such that in some regions (AG, MFG, IFG orb, SMG), less spared tissue was associated with greater increases in activation, while in others (PrCG, IFG op, IFG tri), less spared tissue was associated with greater decreases in activation. |

**Notes**

**Excluded analyses**

(1) the treated group showed an increase in activation over time averaged across all ROIs, and a near-significant interaction of time by hemisphere such that greater increases were observed in the right hemisphere; (2) “responders” showed an increase in activation over time averaged across all ROIs, while “nonresponders” did not (excluded because not anatomically specific, but also note that the definition of responders vs nonresponders was somewhat arbitrary)

**Kristinsson et al. (2019)**

**Reference**

**Authors**

Kristinsson S, Yourganov G, Xiao F, Bonilha L, Stark BC, Rorden C, Basilakos A, Fridriksson J

**Title**

Brain-derived neurotrophic factor genotype-specific differences in cortical activation in chronic aphasia

**Reference**

*J Speech Lang Hear Res* 2019; 62: 3923-3936

**PMID**

31756156

**DOI**

10.1044/2019_jslhr-l-rsnp-19-0021

**Participants**

**Language**

US English

**Inclusion criteria**

< 80% on PNT; able to name at least 5 out of 40 items during fMRI; WAB-R spontaneous speech ≥ 2; WAB-R auditory comprehension ≥ 2

**Number of individuals with aphasia**

87

**Number of control participants**

0

**Were any of the participants included in any previous studies?**

Yes (65 were previously included in Fridriksson et al. (2018), a tDCS study)

**Is age reported for patients and controls, and matched?**

Yes (typical BDNF genotype group mean 59.6 ± 11.2 years, range 29-77 years; atypical BDNF genotype group mean 57.7 ± 10.9 years, range 30-76 years)

**Is sex reported for patients and controls, and matched?**

Yes (males: 58; females: 29)

**Is handedness reported for patients and controls, and matched?**

Yes (right: 87; left: 0)

**Is time post stroke onset reported and appropriate to the study design?**

Yes (typical BDNF genotype group: mean 44.0 ± 38.7 months; atypical BDNF genotype group: mean 34.5 ± 36.9 months; all participants > 6 months)

**To what extent is the nature of aphasia characterized?**

Severity and type

**Language evaluation**

WAB, PNT, PPT

**Aphasia severity**

Typical BDNF genotype group: AQ mean 64.2 ± 20.3; atypical BDNF genotype group: AQ mean 54.3 ± 21.0

**Aphasia type**

Typical BDNF genotype group: 25 Broca's, 12 anomic, 11 conduction, 2 transcortical motor
aphasia, 2 Wernicke's, 1 global; atypical BDNF genotype group: 16 Broca’s, 6 anomic, 6 conduction, 3 global, 3 Wernicke’s

| First stroke only? | No |
| Stroke type | Mixed etiologies |
| To what extent is the lesion distribution characterized? | Lesion overlay |
| Lesion extent | Typical BDNF genotype group: 121.4 ± 73.2 cc; atypical BDNF genotype group: 142.2 ± 88.4 cc |
| Lesion location | L MCA |

**Imaging**

| Modality | fMRI |
| Is the study cross-sectional or longitudinal? | Cross-sectional |
| If longitudinal, at what time point(s) were imaging data acquired? | — |
| If longitudinal, was there any intervention between the time points? | — |
| Is the scanner described? | Yes (Siemens Trio 3 Tesla or Siemens Prisma 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | Event-related |
| Total images acquired | 60 |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | sparse sampling |

**Conditions**

| Are the conditions clearly described? | Yes |

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|--------------------------|
| picture naming | Word (overt) | 40 | Yes | Unknown |
| viewing abstract pictures | None | 20 | N/A | N/A |

**Conditions notes**

| — |

**Contrasts**

| Are the contrasts clearly described? | Yes |

**Contrast 1: picture naming vs viewing abstract pictures**

| Language condition | Picture naming |
|--------------------|----------------|
| Control condition | Viewing abstract pictures |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
### Behavioral data notes
- Are control data reported in this paper or another that is referenced? **No**
- Does the contrast selectively activate plausible relevant language regions in the control group? **Unknown**
- Are activations lateralized in the control data? **Unknown**

### Analyses
- Are the analyses clearly described? **No* (moderate limitation) (see specific limitation(s) below)**

#### Voxelwise analysis 1
- **First level contrast**: Picture naming vs viewing abstract pictures
- **Analysis class**: Cross-sectional between two groups with aphasia
- **Group(s)**: Aphasia with typical genotype (n = 53) vs atypical genotype (n = 34)
- **Covariate**: —
- **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** **Yes**
- **Is accuracy matched across the second level contrast?** **Yes, matched**
- **Is reaction time matched across the second level contrast?** **Unknown, not reported**
- **Behavioral data notes**: —
- **Type of analysis**: Voxelwise
- **Search volume**
- **Correction for multiple comparisons**: Voxelwise FWE correction
- **Software**: SPM12
- **Voxelwise p**: —
- **Cluster extent**: —
- **Statistical details**: —
- **Findings**: None

### Notes
- **Excluded analyses**: Comparisons between numbers of voxels activated, because not regionally specific and not described in sufficient detail

### Purcell et al. (2019)
#### Reference
- **Authors**: Purcell JJ, Wiley RW, Rapp B
- **Title**: Re-learning to be different: Increased neural differentiation supports post-stroke language recovery
- **Reference**: NeuroImage 2019; 202: 116145
- **PMID**: 31479754
- **DOI**: 10.1016/j.neuroimage.2019.116145

#### Participants
- **Language**: US English
- **Inclusion criteria**: Chronic dysgraphia (acquired impairment in spelling)
- **Number of individuals with aphasia**: 21 (plus 4 excluded: 3 health reasons; 1 data acquisition error)
- **Number of control participants**: 0
**Were any of the participants included in any previous studies?** No

**Is age reported for patients and controls, and matched?** Yes (range 40-80 years)

**Is sex reported for patients and controls, and matched?** Yes (males: 13; females: 8)

**Is handedness reported for patients and controls, and matched?** Yes (right: 16; left: 3; other: 2)

**Is time post stroke onset reported and appropriate to the study design?** Yes (range 14-209 months)

**To what extent is the nature of aphasia characterized?** Comprehensive battery

**Language evaluation**
- Spelling (PALPA 40 and 54, and other word lists), oral reading (PALPA 35), reading comprehension (PALPA 51), spoken word-picture matching and picture naming tests from Northwestern Naming Battery, PPT-P; note no generic aphasia battery, but fairly complete coverage of language domains

**Aphasia severity**
- Spelling of untrained items range 51%-94%

**Aphasia type**
- 4 orthographic working memory deficit, 8 orthographic long-term memory deficit, 9 both types of deficit

**First stroke only?** Yes

**Stroke type** Not stated

**To what extent is the lesion distribution characterized?** Lesion overlay

**Lesion extent** Range 7.7-215.0 cc

**Lesion location** L MCA with L ventral occipitotemporal cortex mostly intact

**Imaging notes** —

**Modality** fMRI

**Is the study cross-sectional or longitudinal?** Longitudinal—chronic treatment

**If longitudinal, at what time point(s) were imaging data acquired?** T1: pre-treatment/chronic; T2: post-treatment, 6-24 weeks later

**If longitudinal, was there any intervention between the time points?** Spelling treatment, 60-80 minutes/day, 2 days/week, range 6-24 weeks

**Is the scanner described?** No (not stated)

**Is the timing of stimulus presentation and image acquisition clearly described and appropriate?** Yes

**Design type** Event-related

**Total images acquired** 1232 (four runs distributed over two days)

**Are the imaging acquisition parameters, including coverage, adequately described and appropriate?** Yes (cerebellum excluded)

**Is preprocessing and intrasubject coregistration adequately described and appropriate?** Yes

**Is first level model fitting adequately described and appropriate?** No* (moderate limitation) (not feasible to separate closely spaced instruction, word, and letter/response, especially when responses will be compared to rest)

**Is intersubject normalization adequately described and appropriate?** Yes

**Imaging notes** —

**Conditions**

**Are the conditions clearly described?** Yes

| Condition                  | Response type | Repetitions | All groups could do? | All individuals could do? |
|----------------------------|---------------|-------------|-----------------------|---------------------------|
| spelling probe (training items) | Button press | 60          | Yes                   | Unknown                   |
| spelling probe (known items)    | Button press | 60          | Yes                   | Unknown                   |
| case verification             | Button press | 60          | Yes                   | Unknown                   |
| Conditions notes | Condition 3 not used in any contrasts |
|-----------------|---------------------------------------|

### Contrasts

**Are the contrasts clearly described?** Yes

#### Contrast 1: spelling probe (training items) vs rest

| Language condition | Spelling probe (training items) |
|--------------------|---------------------------------|
| Control condition  | Rest                            |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |

| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

**Behavioral data notes**

| Are control data reported in this paper or another that is referenced? | No |

| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data? | Unknown |

**Control activation notes**

Task comes from Rapp and Lipka (2011), who report lateralized activations for the contrast of spelling probes to case verification, but do not report results relative to fixation baseline

#### Contrast 2: spelling probe (known items) vs rest

| Language condition | Spelling probe (known items) |
|--------------------|--------------------------------|
| Control condition  | Rest                            |
| Are the conditions matched for visual demands? | No |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |

| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |

**Behavioral data notes**

| Are control data reported in this paper or another that is referenced? | No |

| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown |
| Are activations lateralized in the control data? | Unknown |

**Control activation notes**

Task comes from Rapp and Lipka (2011), who report lateralized activations for the contrast of spelling probes to case verification, but do not report results relative to fixation baseline

#### Analyses

**Are the analyses clearly described?** No* (moderate limitation) (see specific limitation(s) below)

##### Voxelwise analysis 1
### First level contrast

| Description                                                                 | Details                                                                 |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| **Spelling probe (training items) vs rest**                                 |                                                                        |
| **Analysis class**                                                          | Longitudinal change in aphasia                                         |
| **Group(s)**                                                                | Aphasia with both timepoints (n = 20) T2 vs T1                         |
| **Covariate**                                                               |                                                                        |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                   |
| Is accuracy matched across the second level contrast?                       | **Appear mismatched**                                                  |
| Is reaction time matched across the second level contrast?                  | **Appear mismatched**                                                  |
| **Behavioral data notes**                                                   |                                                                        |
| **Type of analysis**                                                        | Voxelwise                                                             |
| **Search volume**                                                           | Appears to be restricted to voxels spared in all patients             |
| **Correction for multiple comparisons**                                     | Clusterwise correction based on 3dClustSim                             |
| **Software**                                                                | BrainVoyager QX 2.4 or SPM12                                           |
| **Voxelwise p**                                                             | .01                                                                   |
| **Cluster extent**                                                          | 49 voxels (size not stated)                                           |
| **Statistical details**                                                     |                                                                        |
| **Findings**                                                                | ↑ L posterior cingulate                                                |
|                                                                            | ↑ R angular gyrus                                                      |
|                                                                            | ↑ R posterior cingulate                                                |
| **Findings notes**                                                          |                                                                        |

### ROI analysis 1

| Description                                                                 | Details                                                                 |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| **First level contrast**                                                    | Spelling probe (training items) vs rest                                |
| **Analysis class**                                                          | Longitudinal correlation with language or other measure               |
| **Group(s)**                                                                | Aphasia with both timepoints (n = 20) T2 vs T1                         |
| **Covariate**                                                               | Δ spelling accuracy on training items                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                   |
| Is accuracy matched across the second level contrast?                       | **Unknown, not reported**                                              |
| Is reaction time matched across the second level contrast?                  | **Unknown, not reported**                                              |
| **Behavioral data notes**                                                   |                                                                        |
| **Type of analysis**                                                        | Regions of interest (ROI)                                             |
| **ROI type**                                                                | Functional                                                             |
| **How many ROIs are there?**                                                 | 3                                                                     |
| **What are the ROI(s)?**                                                    | (1) R AG; (2) L PCC; (3) R PCC                                        |
| **How are the ROI(s) defined?**                                             | Regions activated in SPM analysis 1                                   |
| **Correction for multiple comparisons**                                     | **No correction**                                                      |
| **Statistical details**                                                     |                                                                        |
| **Findings**                                                                | None                                                                  |
| **Findings notes**                                                          |                                                                        |

### ROI analysis 2

| Description                                                                 | Details                                                                 |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| **First level contrast**                                                    | Spelling probe (training items) vs rest                                |
| **Analysis class**                                                          | Longitudinal correlation with language or other measure               |
| **Group(s)**                                                                | Aphasia with both timepoints (n = 20) T2 vs T1                         |
| **Covariate**                                                               | Δ spelling accuracy on untrained items                                 |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                   |
| Is accuracy matched across the second level contrast?                       | **Unknown, not reported**                                              |
| Is reaction time matched across the second level contrast?                  | **Unknown, not reported**                                              |
| Behavioral data notes | — |
| --- | --- |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 3 |
| What are the ROI(s)? | (1) R AG; (2) L PCC; (3) R PCC |
| How are the ROI(s) defined? | Regions activated in SPM analysis 1 |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

**ROI analysis 3**

| First level contrast | Spelling probe (training items) vs rest |
| --- | --- |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia T1 |
| Covariate | Subsequent Δ spelling accuracy on training items (T2 vs T1) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (T1 behavioral measure should be included in model) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Region of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L ventral occipitotemporal cortex |
| How are the ROI(s) defined? | The region that showed an increase in Local-Hreg from T1 to T2 |
| Correction for multiple comparisons | One only |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

**ROI analysis 4**

| First level contrast | Spelling probe (training items) vs rest |
| --- | --- |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia with both timepoints T1 (n = 20) |
| Covariate | Subsequent Δ spelling accuracy on untrained items (T2 vs T1) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (T1 behavioral measure should be included in model) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis | Region of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L ventral occipitotemporal cortex |
| How are the ROI(s) defined? | The region that showed an increase in Local-Hreg from T1 to T2 |
| Correction for multiple comparisons | One only |
| Statistical details | — |
| Findings | None |
| Findings notes | — |
### ROI analysis 5

| First level contrast | Spelling probe (training items) vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia with both timepoints (n = 20) T2 vs T1 |
| Covariate            | Δ spelling accuracy on training items |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L ventral occipitotemporal cortex |
| How are the ROI(s) defined? | The region that showed an increase in Local-Hreg from T1 to T2 |
| Correction for multiple comparisons | One only |
| Statistical details  | — |
| Findings             | None |
| Findings notes       | — |

### ROI analysis 6

| First level contrast | Spelling probe (training items) vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia with both timepoints (n = 20) T2 vs T1 |
| Covariate            | Δ spelling accuracy on untrained items |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Region of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 1 |
| What are the ROI(s)? | L ventral occipitotemporal cortex |
| How are the ROI(s) defined? | The region that showed an increase in Local-Hreg from T1 to T2 |
| Correction for multiple comparisons | One only |
| Statistical details  | — |
| Findings             | None |
| Findings notes       | — |

### Complex analysis 1

| First level contrast | Spelling probe (training items) vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Longitudinal change in aphasia |
| Group(s)             | Aphasia with both timepoints (n = 20) T2 vs T1 |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Appear mismatched |
| Is reaction time matched across the second level contrast? | Appear mismatched |
### Complex analysis 2

| First level contrast | Spelling probe (known items) vs rest |
|----------------------|--------------------------------------|
| Analysis class       | Longitudinal change in aphasia       |
| Group(s)             | Aphasia with both timepoints (n = 20) T2 vs T1 |
| Covariate            | —                                   |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | Yes, matched |

### Behavioral data notes

See section S2, main effects were not significant and effects appear smaller for known than trained

### Statistical details

Local Heterogeneity Regression Analysis (Local-Hreg) was used to identify brain regions where the heterogeneity of timecourses between neighboring voxels, specifically for the trained condition, increased from T1 to T2. A voxelwise threshold of \( p < 0.05 \) was applied, followed by cluster correction based on permutation testing. The analysis appears to have been restricted to brain regions not damaged in any patients.

### Findings notes

Only in L ventral occipitotemporal cortex, there was a significant increase in Local-Hreg from T1 to T2 (\( p = 0.028 \), corrected).

---

### Complex analysis 3

| First level contrast | Spelling probe (training items) vs rest |
|----------------------|--------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia T1 |
| Covariate            | T1 spelling accuracy on training items |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (training items were selected for individual patients, so training item accuracy is not an appropriate measure of spelling ability) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |

### Behavioral data notes

—

### Type of analysis

Complex

### Statistical details

A linear mixed effects model was used to investigate the relationship between Local-Hreg at T1 in the L ventral occipitotemporal region previously identified and T1 spelling accuracy of training items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail.

### Findings notes

There was a significant positive relationship between T1 Local-Hreg and T1 spelling accuracy on training items.
### Complex analysis 4

| First level contrast | Spelling probe (training items) vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia T1 |
| Covariate            | Subsequent Δ spelling accuracy on training items (T2 vs T1) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (T1 behavioral measure should be included in model) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Complex |
| Statistical details  | A linear mixed effects model was used to investigate the relationship between Local-Hreg at T1 in the L ventral occipitotemporal region previously identified and subsequent improvement in spelling accuracy of training items from T1 to T2. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. |
| Findings             | Other |
| Findings notes       | There was a significant positive relationship between T1 Local-Hreg and subsequent improvement in spelling accuracy on training items from T1 to T2. |

### Complex analysis 5

| First level contrast | Spelling probe (training items) vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia with both timepoints T1 (n = 20) |
| Covariate            | Subsequent Δ spelling accuracy on untrained items (T2 vs T1) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (T1 behavioral measure should be included in model) |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |
| Type of analysis     | Complex |
| Statistical details  | A linear mixed effects model was used to investigate the relationship between Local-Hreg at T1 in the L ventral occipitotemporal region previously identified and subsequent improvement in spelling accuracy of training items from T1 to T2. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. |
| Findings             | Other |
| Findings notes       | There was a significant positive relationship between T1 Local-Hreg and subsequent improvement in spelling accuracy on training items from T1 to T2. |

### Complex analysis 6

| First level contrast | Spelling probe (training items) vs rest |
|----------------------|----------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure |
| Group(s)             | Aphasia with both timepoints (n = 20) T2 vs T1 |
| Covariate            | Δ spelling accuracy on training items |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | — |

Findings Notes: There was a significant positive relationship between T1 Local-Hreg and subsequent improvement in spelling accuracy on untrained items from T1 to T2.
| Complex analysis 7 |
|--------------------|
| **First level contrast** | Spelling probe (training items) vs rest |
| **Analysis class** | Longitudinal correlation with language or other measure |
| **Group(s)** | Aphasia with both timepoints (n = 20) T2 vs T1 |
| **Covariate** | Δ spelling accuracy on untrained items |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Complex |
| **Statistical details** | A linear mixed effects model was used to investigate the relationship between change in Local-Hreg at T2 in the L ventral occipitotemporal region previously identified and T2 spelling accuracy of training items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. |
| **Findings** | None |
| **Findings notes** | There was a significant negative relationship between change in Local-Hreg and change in spelling accuracy on training items. |

| Complex analysis 8 |
|--------------------|
| **First level contrast** | Spelling probe (training items) vs rest |
| **Analysis class** | Cross-sectional correlation with language or other measure |
| **Group(s)** | Aphasia with both timepoints T2 (n = 20) |
| **Covariate** | T2 spelling accuracy on training items |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Complex |
| **Statistical details** | A linear mixed effects model was used to investigate the relationship between Local-Hreg at T2 in the L ventral occipitotemporal region previously identified and T2 spelling accuracy of training items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. |
| **Findings** | None |
| **Findings notes** | — |

| Complex analysis 9 |
|--------------------|
| **First level contrast** | Spelling probe (training items) vs rest |
| **Analysis class** | Longitudinal correlation with language or other measure |
| **Group(s)** | Aphasia with both timepoints (n = 20) T2 vs T1 |
| **Covariate** | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| **Behavioral data notes** | — |
| **Type of analysis** | Complex |
| **Statistical details** | A linear mixed effects model was used to investigate the relationship between change in Local-Hreg in the L ventral occipitotemporal region previously identified and change in spelling accuracy of training items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail. |
| **Findings** | Other |
| **Findings notes** | There was a significant negative relationship between change in Local-Hreg and change in spelling accuracy on training items. |
Covariate | Previous T1 Local-Hreg in L ventral occipitotemporal ROI
---|---
**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | No (the ROI was defined based on change in Local-Hreg, so spurious findings could arise in the absence of a real effect)
**Is accuracy matched across the second level contrast?** | Unknown, not reported
**Is reaction time matched across the second level contrast?** | Unknown, not reported

**Behavioral data notes** | —
**Type of analysis** | Complex
**Statistical details** | A linear mixed effects model was used to investigate the relationship between change in Local-Hreg in the L ventral occipitotemporal region previously identified and T1 Local-Hreg. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail.

**Findings** | Other
**Findings notes** | There was a significant negative relationship between change in Local-Hreg and T1 Local-Hreg.

---

**Complex analysis 10**

**First level contrast** | Spelling probe (training items) vs rest
**Analysis class** | Longitudinal correlation with language or other measure
**Group(s)** | Aphasia with both timepoints (n = 20) T2 vs T1
**Covariate** | Δ spelling accuracy on training items
**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes
**Is accuracy matched across the second level contrast?** | Unknown, not reported
**Is reaction time matched across the second level contrast?** | Unknown, not reported

**Behavioral data notes** | —
**Type of analysis** | Complex
**Statistical details** | A linear mixed effects model was used to investigate the relationship between change in Local-Hreg in the R AG, L PCC, and R PCC and change in spelling accuracy of training items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail.

**Findings** | None
**Findings notes** | —

---

**Complex analysis 11**

**First level contrast** | Spelling probe (training items) vs rest
**Analysis class** | Longitudinal correlation with language or other measure
**Group(s)** | Aphasia with both timepoints (n = 20) T2 vs T1
**Covariate** | Δ spelling accuracy on untrained items
**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes
**Is accuracy matched across the second level contrast?** | Unknown, not reported
**Is reaction time matched across the second level contrast?** | Unknown, not reported

**Behavioral data notes** | —
**Type of analysis** | Complex
**Statistical details** | A linear mixed effects model was used to investigate the relationship between change in Local-Hreg in the R AG, L PCC, and R PCC and change in spelling accuracy of untrained items. A complex model was used in which every voxel for every patient was considered an observation, with random effects of voxel and patient, but this is not described in detail.

**Findings** | None
**Findings notes** | —

---

**Notes** |
Excluded analyses

(1) confirmatory voxelwise analyses in section S4.1 and S4.2; (2) additional analyses accounting for spelling deficit type and auditory comprehension deficits described in 3.3.3; (3) relationship between overall BOLD and local heterogeneity described in 3.4.3, because not related to aphasia recovery

Sreedharan, Chandran, et al. (2019)

Reference

| Authors | Sreedharan S, Chandran A, Yanamala VR, Sylaja PN, Kesavadas C, Sitaram R |
|---------|------------------------------------------------------------------|
| Title   | Self-regulation of language areas using real-time functional MRI in stroke patients with expressive aphasia |
| Reference | Brain Imaging Behav 2019; None: |
| PMID | 31089955 |
| DOI | 10.1007/s11682-019-00106-7 |

Participants

| Language | Malayalam |
|-------------------|------------|
| Inclusion criteria | Broca's aphasia or anomic aphasia; comprehension relatively preserved; "motivated for speech therapy" |
| Number of individuals with aphasia | 8 (plus 3 excluded: 2 for claustrophobia; 1 for transportation issues) |
| Number of control participants | 4 |
| Were any of the participants included in any previous studies? | No |
| Is age reported for patients and controls, and matched? | No (range 18-68 years; controls were younger) |
| Is sex reported for patients and controls, and matched? | Yes (males: 7; females: 1) |
| Is handedness reported for patients and controls, and matched? | Yes (right: 8; left: 0) |
| Is time post stroke onset reported and appropriate to the study design? | No (6-22 weeks; patients at different subacute stages of recovery) |
| To what extent is the nature of aphasia characterized? | Severity only |
| Language evaluation | WAB translated into Malayalam |
| Aphasia severity | AQ range approximately 50-80 |
| Aphasia type | Broca's or anomic |
| First stroke only? | Not stated |
| Stroke type | Not stated |
| To what extent is the lesion distribution characterized? | Individual lesions |
| Lesion extent | Not stated |
| Lesion location | 7 L MCA, 1 bilateral MCA |
| Participants notes | — |

Imaging

| Modality | fMRI |
|-------------------|------------|
| Is the study cross-sectional or longitudinal? | Longitudinal—mixed |
| If longitudinal, at what time point(s) were imaging data acquired? | Neurofeedback group: T1: pre-treatment/subacute; T2: 1-5 weeks later; T3: 2-6 weeks after T1; T4: 3-11 weeks after T1; T5: 4-12 weeks after T1; T6: 5-12 weeks after T1; no training group: T1: subacute; T2: 2-12 weeks later; controls: T1: start of study; T2: 1-4 weeks later; T3: 3-5 weeks after T1; T4: 4-8 weeks after T1; T5: 7-37 weeks after T1; T6: 12-43 weeks after T1 |
| If longitudinal, was there any intervention between the time points? | 4 patients received 4 additional sessions involving neurofeedback training, while 4 patients received treatment as usual |
| Is the scanner described? | Yes (Siemens Avanto 1.5 Tesla) |
Is the timing of stimulus presentation and image acquisition clearly described and appropriate? No* (moderate limitation) (picture naming events consistently located between blocks)

Design type Mixed

Total images acquired probably 964

Are the imaging acquisition parameters, including coverage, adequately described and appropriate? Yes (whole brain)

Is preprocessing and intrasubject coregistration adequately described and appropriate? Yes

Is first level model fitting adequately described and appropriate? No* (moderate limitation) (event timing will make conditions difficult to disentangle)

Is intersubject normalization adequately described and appropriate? No (lesion impact not addressed)

Imaging notes —

Conditions

Are the conditions clearly described? Yes

| Condition                                      | Response type | Repetitions | All groups could do? | All individuals could do? |
|------------------------------------------------|---------------|-------------|----------------------|---------------------------|
| neurofeedback (try to activate language areas) | Other         | 24          | Unknown              | Unknown                   |
| rest                                           | None          | 24          | N/A                  | N/A                       |
| picture naming                                 | Other         | first and last timepoints: 48; other timepoints: 0 | No                    | No                        |
| word generation                                | Multiple words (covert) | 5          | Unknown              | Unknown                   |

Conditions notes Suggested strategies to activate language areas included "making a speech, having a conversation, reciting a poem or any other form of language activity performed covertly"; picture naming task involved covert word response and button press; picture naming task not used in any contrast; word generation task used only to generate ROIs

Contrasts

Are the contrasts clearly described? Yes

Contrast 1: neurofeedback (try to activate language areas) vs rest

| Language condition               | Neurofeedback (try to activate language areas) |
|----------------------------------|-----------------------------------------------|
| Control condition                | Rest                                          |
| Are the conditions matched for visual demands? | No                                            |
| Are the conditions matched for auditory demands? | Yes                                           |
| Are the conditions matched for motor demands? | Yes                                           |
| Are the conditions matched for cognitive/executive demands? | No                                            |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                      |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                      |
| Behavioral data notes            | —                                             |
| Are control data reported in this paper or another that is referenced? | Somewhat                                      |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Unknown                                       |
| Are activations lateralized in the control data? | No                                            |
| Control activation notes         | Task activated L IFG and L STG in controls (Fig. 8c), but no data on other regions, and language activations were not lateralized (Fig. 9d) |

Analyses
Are the analyses clearly described? | **No** (moderate limitation) (see specific limitation(s) below)
---|---

**ROI analysis 1**

| First level contrast | Neurofeedback (try to activate language areas) vs rest |
|----------------------|------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia mean of T1, T2, T3, T4, T5, T6 (neurofeedback patients) or T1, T2 (no training patients) vs control mean |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 4 |
| What are the ROI(s)? | (1) L Broca’s area (IFG pars opercularis and triangularis); (2) L Wernicke’s area (pSTG); (3-4) homotopic counterparts |
| How are the ROI(s) defined? | Individual activations within AAL ROIs on a separate word generation localizer |
| Correction for multiple comparisons | No direct comparison |
| Statistical details  | — |
| Findings             | ↓ L IFG pars opercularis |
|                      | ↓ L IFG pars triangularis |
|                      | ↓ L posterior STG |
|                      | ↓ R IFG pars opercularis |
|                      | ↓ R IFG pars triangularis |
|                      | ↓ R posterior STG |

**ROI analysis 2**

| First level contrast | Neurofeedback (try to activate language areas) vs rest |
|----------------------|------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia with neurofeedback training (n = 4) mean of T4, T5, T6 vs no training (n = 4) T2 |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Somewhat (no treatment effect; second half measures rather than measures of change) |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes | — |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 15 |
| What are the ROI(s)? | (1) L Broca’s area (IFG pars opercularis and triangularis); (2) L Wernicke’s area (pSTG); (3-4) homotopic counterparts; (5) L MFG; (6) L PrCG; (7) L Rolandic operculum; (8) L insula; (9) L IFG pars orbitalis; (10) L MFG orbital; (11) L SMG; (12) L MTG; (13) L PoCG; (14) L AG; (15) L HG |
| How are the ROI(s) defined? | (1-4) individual activations within AAL ROIs on a separate word generation localizer; (5-15) AAL |
| Correction for multiple comparisons | No correction |
| Statistical details  | — |
| Findings             | ↑ L ventral precentral/inferior frontal junction |
|                      | ↑ L somato-motor |
| Findings notes       | — |
### Complex analysis 1

| First level contrast      | Neurofeedback (try to activate language areas) vs rest |
|--------------------------|-------------------------------------------------------|
| Analysis class           | Cross-sectional aphasia vs control                   |
| Group(s)                 | Aphasia mean of T1, T2, T3, T4, T5, T6 (neurofeedback patients) or T1, T2 (no training patients) vs control mean |
| Covariate                | —                                                     |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | N/A, no behavioral measure |
| Is reaction time matched across the second level contrast? | N/A, no timeable task |
| Behavioral data notes    | —                                                     |
| Type of analysis         | Complex                                               |
| Statistical details      | Signal change in L IFG and L pSTG ROIs was computed, along with functional connectivity between these ROIs. Neurofeedback values were calculated based on signal change as well as correlation between the ROIs. Group differences in neurofeedback values were compared, but not quantified statistically. |
| Findings                 | Other                                                 |
| Findings notes           | Patients received lower neurofeedback values than controls, due to lower signal changes and lower functional connectivity. |

**Notes**

Excluded analyses: 
(1) individual participant analyses in Fig. 10; (2) comparisons between groups at each time point (Fig. 11), which yielded similar results to comparisons averaged across time points; (3) vague statements about temporal trends in Figs. 12, 13, and 14

### Hartwigsen et al. (2020)

**Reference**

| Authors | Hartwigsen G, Stockert A, Charpentier L, Wawrzyniak M, Klingbeil J, Wrede K, Obrig H, Saur |
|---------|------------------------------------------------------------------------------------------|
| Title   | Short-term modulation of the lesioned language network                                    |
| Reference | eLife 2020; 9: e54277                                                              |
| PMID    | 32181741                                                                                 |
| DOI     | 10.7554/elife.54277                                                                      |

**Participants**

| Language | German                                                                 |
|----------|------------------------------------------------------------------------|
| Inclusion criteria | Lesion involving left temporo-parietal cortex and sparing left frontal cortex; relatively well-recovered |
| Number of individuals with aphasia | 12 (plus 2 excluded: 1 lost to follow-up; 1 did not show any sound-related neural activation in auditory cortex after sham cTBS) |
| Number of control participants | 0                                                                                  |
| Were any of the participants included in any previous studies? | No                                                                             |
| Is age reported for patients and controls, and matched? | Yes (mean 58.8 years, range 43-72 years)                                              |
| Is sex reported for patients and controls, and matched? | Yes (males: 8; females: 4)                                                          |
| Is handedness reported for patients and controls, and matched? | Yes (right: 12; left: 0)                                                            |
| Is time post stroke onset reported and appropriate to the study design? | Yes (mean 37.9 ± 34.8 months, range 6-122 months)                                     |
| To what extent is the nature of aphasia | Not at all                                                                         |
### Language evaluation

| Characteristic                  | Description                                   |
|--------------------------------|------------------------------------------------|
| AAT                            |                                               |
| Aphasia severity               | 7 mild residual aphasia, 5 recovered          |
| Aphasia type                   | Not stated                                    |
| First stroke only?             | Yes                                           |
| Stroke type                    | Ischemic only                                 |
| To what extent is the lesion distribution characterized? | Lesion overlay                               |
| Lesion extent                  | Range 11.9-176.3 cc                           |
| Lesion location                | Left temporo-parietal cortex; maximal overlap in SMG |

### Imaging

| Modality          | fMRI                                          |
|-------------------|-----------------------------------------------|
| Is the study cross-sectional or longitudinal? | Longitudinal—chronic treatment               |
| If longitudinal, at what time point(s) were imaging data acquired? | T1/T2/T3: chronic; sessions consisted of cTBS over left anterior IFG, cTBS over left posterior IFG, or sham; sessions at least 7 days apart in randomized order |
| If longitudinal, was there any intervention between the time points? | CTBS                                           |
| Is the scanner described? | Yes (Siemens Verio 3 Tesla)                    |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | No* (moderate limitation) (stimulus timing not described in detail; stated duration of data acquisition substantially outside possible range of duration of stimuli) |
| Design type        | Block                                         |
| Total images acquired | 740                                           |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | Yes (whole brain)                             |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes                                           |
| Is first level model fitting adequately described and appropriate? | Yes                                           |
| Is intersubject normalization adequately described and appropriate? | No (lesion impact not addressed)               |

### Conditions

| Condition                  | Response type | Repetitions | All groups could do? | All individuals could do? |
|----------------------------|---------------|-------------|-----------------------|---------------------------|
| syllable count decision    | Button press  | 10          | Yes                   | Yes                       |
| semantic decision          | Button press  | 10          | Yes                   | Yes                       |
| rest                       | None          | 20          | N/A                   | N/A                       |

**Conditions notes**

Extent of recovery supports the assertion that all individuals could do the tasks

### Contrasts

**Contrast 1: syllable count decision vs rest**

| Language condition | Control condition                |
|--------------------|----------------------------------|
| Syllable count decision | Rest                             |

| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | No  |
| Are the conditions matched for motor demands? | No  |
| Are the conditions matched for cognitive/executive demands? | No  |
| Question                                                                 | Answer                                                                 |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                               |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                               |
| Behavioral data notes                                                  | —                                                                     |
| Are control data reported in this paper or another that is referenced? | Yes                                                                   |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes                                                                   |
| Are activations lateralized in the control data?                       | Somewhat                                                              |
| Control activation notes                                               | Control data in Hartwigsen et al. (2017); L-lateralized IFG but bilateral SMG |
| Contrast notes                                                          | —                                                                     |

**Contrast 2: semantic decision vs rest**

| Language condition | Semantic decision |
|--------------------|-------------------|
| Control condition  | Rest              |
| Are the conditions matched for visual demands? | Yes |
| Are the conditions matched for auditory demands? | No |
| Are the conditions matched for motor demands? | No |
| Are the conditions matched for cognitive/executive demands? | No |
| Is accuracy matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable |
| Behavioral data notes                                                  | —                                                                     |
| Are control data reported in this paper or another that is referenced? | Yes                                                                   |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes                                                                   |
| Are activations lateralized in the control data?                       | Yes                                                                   |
| Control activation notes                                               | Control data in Hartwigsen et al. (2017); L-lateralized IFG and AG most prominent |
| Contrast notes                                                          | —                                                                     |

**Analyses**

Are the analyses clearly described? Yes

**Voxelwise analysis 1**

| First level contrast | Syllable count decision vs rest |
|----------------------|---------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia after cTBS to posterior IFG vs sham; same patients, repeated measures |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | No, different |
| Behavioral data notes | Significantly slower response times when cTBS was applied over pIFG relative to when sham cTBS was applied |
| Type of analysis     | Voxelwise                      |
| Search volume        | Voxels spared in all patients  |
| Correction for multiple comparisons | Clusterwise correction with with GRFT and stringent voxelwise p |
| Software             | SPM12                          |
| Voxelwise p          | .001                           |
| Cluster extent       | Based on GRFT                  |
### Statistical details

**Findings**
- ↓ L IFG pars opercularis
- ↓ L SMA/medial prefrontal
- ↓ R SMA/medial prefrontal
- ↓ R basal ganglia

**Findings notes**
Based on Figure 4A and Table 3

### Voxelwise analysis 2

**First level contrast**
Syllable count decision vs rest

**Analysis class**
Cross-sectional between two groups with aphasia

**Group(s)**
Aphasia after cTBS to posterior IFG vs after cTBS to anterior IFG; same patients, repeated measures

**Covariate**
—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**
Yes

**Is accuracy matched across the second level contrast?**
Yes, matched

**Is reaction time matched across the second level contrast?**
No, different

**Behavioral data notes**
Significantly slower response times when cTBS was applied over pIFG relative to when cTBS was applied over aIFG

**Type of analysis**
Voxelwise

**Search volume**
Voxels spared in all patients

**Correction for multiple comparisons**
Clusterwise correction with with GRFT and stringent voxelwise p

**Software**
SPM12

**Voxelwise p**
.001

**Cluster extent**
Based on GRFT

**Statistical details**
—

**Findings**
- ↓ L IFG pars opercularis

**Findings notes**
Based on Table 3

### Voxelwise analysis 3

**First level contrast**
Semantic decision vs rest

**Analysis class**
Cross-sectional between two groups with aphasia

**Group(s)**
Aphasia after cTBS to anterior IFG vs sham; same patients, repeated measures

**Covariate**
—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**
Somewhat (no behavioral difference)

**Is accuracy matched across the second level contrast?**
Yes, matched

**Is reaction time matched across the second level contrast?**
Yes, matched

**Behavioral data notes**
Difference in reaction time did not survive correction

**Type of analysis**
Voxelwise

**Search volume**
Voxels spared in all patients

**Correction for multiple comparisons**
Clusterwise correction with with GRFT and stringent voxelwise p

**Software**
SPM12

**Voxelwise p**
.001

**Cluster extent**
Based on GRFT

**Statistical details**
—

**Findings**
- ↓ L insula
- ↓ L dorsolateral prefrontal cortex
- ↓ R insula
- ↓ R dorsolateral prefrontal cortex
- ↓ R SMA/medial prefrontal

**Findings notes**
Based on Figure 4B and Table 3
### Voxelwise analysis 4

| First level contrast | Semantic decision vs rest |
|----------------------|--------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia after cTBS to anterior IFG vs after cTBS to posterior IFG ; same patients, repeated measures |
| Covariate            | —                        |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Yes, matched |
| Is reaction time matched across the second level contrast? | No, different |
| Behavioral data notes | Significantly slower response times when cTBS was applied over aIFG relative to when cTBS was applied over pIFG |
| Type of analysis     | Voxelwise |
| Search volume        | Voxels spared in all patients |
| Correction for multiple comparisons | Clusterwise correction with with GRFT and stringent voxelwise p |
| Software             | SPM12 |
| Voxelwise p          | .001 |
| Cluster extent       | Based on GRFT |
| Statistical details  | —                        |
| Findings             | ↓ L insula |
|                      | ↓ R insula |
|                      | ↓ R dorsolateral prefrontal cortex |
| Findings notes       | Based on Table 3 |

### Complex analysis 1

| First level contrast | Syllable count decision vs rest |
|----------------------|---------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia after cTBS to posterior IFG vs sham; same patients, repeated measures |
| Covariate            | Δ RT for syllable decision (cTBS to posterior IFG timepoint vs sham timepoint) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | RT is covariate |
| Behavioral data notes | —                        |
| Type of analysis     | Complex |
| Statistical details  | Whole brain correlations were computed between the difference in functional activity after cTBS to posterior IFG versus sham stimulation, and the difference in reaction times on the syllable counting task under these two conditions. The resulting SPM was thresholded at voxelwise p < .001 (CDT) followed by correction for multiple comparisons based on cluster extent and GRFT using SPM12. |
| Findings             | Other |
| Findings notes       | Uregulation of the R supramarginal gyrus after cTBS was significantly associated with slowing of RT after cTBS. This finding remained significant after including lesion volume as covariate. |

### Complex analysis 2

| First level contrast | Semantic decision vs rest |
|----------------------|--------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| Group(s)             | Aphasia after cTBS to anterior IFG vs sham; same patients, repeated measures |
| Covariate            | Δ RT for semantic decision (cTBS to posterior IFG timepoint vs sham timepoint) |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
Is reaction time matched across the second level contrast?  
RT is covariate

Behavioral data notes  
—

Type of analysis  
Complex

Statistical details  
Whole brain correlations were computed between the difference in functional activity after cTBS to anterior IFG versus sham stimulation, and the difference in reaction times on the semantic decision task under these two conditions. The resulting SPM was thresholded at voxelwise \( p < .001 \) (CDT) followed by correction for multiple comparisons based on cluster extent and GRFT using SPM12.

Findings  
None

Notes  
Excluded analyses  
—

### Stockert et al. (2020)

#### Reference

**Authors**  
Stockert A, Wawrzyniak M, Klingbeil J, Wrede K, Kümmerer D, Hartwigsen G, Kaller CP, Weiller C, Saur D

**Title**  
Dynamics of language reorganization after left temporo-parietal and frontal stroke

**Reference**  
Brain 2020; 143: 844-861

**PMID**  
32068789

**DOI**  
10.1093/brain/awaa023

#### Participants

**Language**  
German

**Inclusion criteria**  
Lesion localized to frontal or temporal cortex

**Number of individuals with aphasia**  
34 (plus 50 excluded: 19 lesions spanned frontal and temporal, or were subcortical, or had persisting large vessel occlusions; 31 not all three timepoints were acquired)

**Number of control participants**  
17

**Were any of the participants included in any previous studies?**  
Yes (8 patients were included in Saur et al. (2006); there may also be overlap with Saur et al. (2010), a study that did not meet our inclusion criteria)

**Is age reported for patients and controls, and matched?**  
Yes (frontal group: mean 52.3 ± 18.9 years, range 15-78 years; temporo-parietal group: mean 54.4 ± 12.7 years, range 31-76 years)

**Is sex reported for patients and controls, and matched?**  
Yes (males: 25; females: 9)

**Is handedness reported for patients and controls, and matched?**  
No (right: 31; left: 2; other: 1; not stated for controls)

**Is time post stroke onset reported and appropriate to the study design?**  
Yes (frontal group: T1 acute: mean 3.2 ± 2.0 days, range 1-7 days; T2 subacute: mean 11.9 ± 2.2 days, range 8-17 days; T3 chronic: mean 272.6 ± 88.5 days, range 181-435 days; temporo-parietal group: T1 acute: mean 1.6 ± 0.8 days, range 1-4 days; T2 subacute: mean 10.1 ± 1.7 days, range 8-13 days; T3 chronic: mean 262.5 ± 75.0 days, range 184-394 days)

**To what extent is the nature of aphasia characterized?**  
Severity only

**Language evaluation**  
AAT including TT, comprehension composite (LRScomp) and production composite (LRSprod) were derived

**Aphasia severity**  
Frontal group: T1 acute: LRScomp mean 0.48 ± 0.26; T2 subacute: LRScomp mean 0.64 ± 0.21; T3 chronic: LRScomp mean 0.91 ± 0.07; temporo-parietal group: T1 acute: LRScomp mean 0.63 ± 0.32; T2 subacute: LRScomp mean 0.79 ± 0.20; T3 chronic: LRScomp mean 0.91 ± 0.13

**Aphasia type**  
Not stated

**First stroke only?**  
Yes

**Stroke type**  
Ischemic only
To what extent is the lesion distribution characterized?  
Lesion extent  
Frontal group: mean 69.3 ± 34.0 cc, range 12.3-76.6 cc; temporo-parietal group: mean 54.8 ± 41.1 cc, range 6.2-108.5 cc  
Lesion location  
L MCA, frontal (n = 17) or temporo-parietal (n = 17)  
Participants notes  
1630 patients screened for inclusion; frontal patients scanned later than temporal patients at T1 and T2

### Imaging

| Modality | fMRI |
|----------|------|
| Is the study cross-sectional or longitudinal? | Longitudinal—recovery |
| If longitudinal, at what time point(s) were imaging data acquired? | T1 acute: 1-7 days; T2 subacute: 8-21 days; T3 chronic: > 6 months |
| If longitudinal, was there any intervention between the time points? | Not stated |
| Is the scanner described? | Yes (Siemens Trio 3 Tesla or Siemens Verio 3 Tesla) |
| Is the timing of stimulus presentation and image acquisition clearly described and appropriate? | Yes |
| Design type | Event-related |
| Total images acquired | 660 (20 patients; paradigm 1) or 260 (14 patients; paradigm 2) |
| Are the imaging acquisition parameters, including coverage, adequately described and appropriate? | No (whole brain; TE = 96 ms questionable) |
| Is preprocessing and intrasubject coregistration adequately described and appropriate? | Yes |
| Is first level model fitting adequately described and appropriate? | Yes |
| Is intersubject normalization adequately described and appropriate? | Yes |
| Imaging notes | — |

### Conditions

| Condition | Response type | Repetitions | All groups could do? | All individuals could do? |
|-----------|---------------|-------------|----------------------|--------------------------|
| listening to normal sentences and making a plausibility judgment (paradigm 1) | None | 46 | Unknown | Unknown |
| listening to semantically anomalous sentences and making a plausibility judgment (paradigm 1) | Button press | 46 | Unknown | Unknown |
| listening to reversed speech | Button press | paradigm 1: 92; paradigm 2: 30 | Yes | Unknown |
| listening to normal sentences (paradigm 2) | Button press | 15 | Yes | Unknown |
| listening to semantically anomalous sentences (paradigm 2) | Button press | 15 | Yes | Unknown |
| listening to pseudoword speech (paradigm 2) | Button press | 30 | Yes | Unknown |
| rest | None | implicit baseline | N/A | N/A |

**Conditions notes**  
Conditions 2, 5, and 6 were not used, and condition 7 was effectively contrasted out; reported behavioral data collapses across conditions and paradigms and so does not establish performance on any specific condition, but the data suggest that at least the conditions where no language-related decisions were required could have been performed by all groups.

### Contrasts

Are the contrasts clearly described?  
No (see specific limitation(s) below)
### Contrast 1: listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

| Language condition | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) |
|--------------------|---------------------------------------------------------------------------------------------------------------------|
| Control condition  | Listening to reversed speech                                                                                         |
| Are the conditions matched for visual demands? | Yes                                                                                                                   |
| Are the conditions matched for auditory demands? | Yes                                                                                                                   |
| Are the conditions matched for motor demands? | No                                                                                                                    |
| Are the conditions matched for cognitive/executive demands? | No                                                                                                                    |
| Is accuracy matched between the language and control tasks for all relevant groups? | Unknown, not reported                                                                                                 |
| Is reaction time matched between the language and control tasks for all relevant groups? | N/A, tasks not comparable                                                                                              |
| Behavioral data notes | In paradigm 1, responses were required in the language condition but not the control condition, making the tasks not comparable for RT |
| Are control data reported in this paper or another that is referenced? | Somewhat                                                                                                             |
| Does the contrast selectively activate plausible relevant language regions in the control group? | Yes                                                                                                                    |
| Are activations lateralized in the control data? | Yes                                                                                                                    |
| Control activation notes | Not stated which of the two paradigms controls were run on, but clearly L-lateralized frontal and temporal activation; bilateral MD network activation also noted |
| Contrast notes | 20 patients performed paradigm 1 and 14 patients performed paradigm 2; data were combined despite some differences; unclear whether all reversed speech was included, or only reversed speech derived from plausible sentences |

### Analyses

| Are the analyses clearly described? | Yes |

### ROI analysis 1

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|---------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                                                                         |
| Group(s)             | Aphasia T2 vs T1                                                                                                      |
| Covariate            | —                                                                                                                    |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                   |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                 |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                 |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis      | Regions of interest (ROI)                                                                                              |
| ROI type              | Functional                                                                                                            |
| How many ROIs are there? | 13                                                                                                                  |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL |
| How are the ROI(s) defined? | Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints |
| Correction for multiple comparisons | No correction                                                                                                          |
| Statistical details  | Post-hoc tests comparing 2 out of the 3 time points were corrected using the Bonferroni-Holm procedure, but there is no indication that that multiple comparisons across ROIs were accounted for |
| Findings             | ↑ L IFG pars orbitalis                                                                                                 |
### ROI analysis 2

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                                                                                    |
| Group(s)             | Aphasia T3 vs T1                                                                                                                  |
| Covariate            | —                                                                                                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                 |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                             |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                             |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions          |
| Type of analysis     | Regions of interest (ROI)                                                                                                           |
| ROI type             | Functional                                                                                                                         |
| How many ROIs are there? | 13                                                                                           |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL |
| How are the ROI(s) defined? | Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints |
| Correction for multiple comparisons | No correction                                                                                                                      |
| Statistical details  | Post-hoc tests comparing 2 out of the 3 time points were corrected using the Bonferroni-Holm procedure, but there is no indication that that multiple comparisons across ROIs were accounted for |
| Findings             | ↑ L IFG pars orbitalis                                                                                                             |
|                      | ↑ L dorsolateral prefrontal cortex                                                                                                |
|                      | ↑ L posterior STG/STS/MTG                                                                                                         |
|                      | ↑ L anterior temporal                                                                                                             |
| Findings notes       | Based on Figure 3; several additional regions are mentioned in text and/or Table 1                                               |

### ROI analysis 3

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia                                                                                                    |
| Group(s)             | Aphasia T3 vs T2                                                                                                                  |
| Covariate            | —                                                                                                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                 |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                             |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                             |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions          |
| Type of analysis     | Regions of interest (ROI)                                                                                                           |
| ROI type             | Functional                                                                                                                         |
| How many ROIs are there? | 13                                                                                           |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL |
| How are the ROI(s) defined? | Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints |
| Findings notes       | Based on Figure 3; several additional regions are mentioned in text and/or Table 1                                               |
**Correction for multiple comparisons**

No correction

**Statistical details**

Post-hoc tests comparing 2 out of the 3 time points were corrected using the Bonferroni-Holm procedure, but there is no indication that multiple comparisons across ROIs were accounted for.

**Findings**

None

**Findings notes**

Based on Figure 3; several additional regions are mentioned in text and/or Table 1

---

### ROI analysis 4

**First level contrast**

Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

**Analysis class**

Cross-sectional between two groups with aphasia

**Group(s)**

Aphasia frontal mean of T1, T2, T3 (n = 17) vs temporo-parietal mean of T1, T2, T3 (n = 17)

**Covariate**

—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**

Yes

**Is accuracy matched across the second level contrast?**

Unknown, not reported

**Is reaction time matched across the second level contrast?**

Unknown, not reported

**Behavioral data notes**

No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

**Type of analysis**

Regions of interest (ROI)

**ROI type**

Functional

**How many ROIs are there?**

13

**What are the ROI(s)?**

(1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL

**How are the ROI(s) defined?**

Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints

**Correction for multiple comparisons**

No correction

**Statistical details**

—

**Findings**

↑ L posterior STG/STS/MTG  
↑ R IFG pars orbitalis  
↑ R anterior temporal  
↓ L IFG pars opercularis  
↓ L IFG pars triangularis  
↓ L dorsolateral prefrontal cortex

**Findings notes**

Based on Table 1

---

### ROI analysis 5

**First level contrast**

Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

**Analysis class**

Longitudinal between two groups with aphasia

**Group(s)**

(Aphasia frontal (n = 17) T2 vs T1) vs (temporo-parietal (n = 17) T2 vs T1)

**Covariate**

—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**

Yes

**Is accuracy matched across the second level contrast?**

Unknown, not reported

**Is reaction time matched across the second level contrast?**

Unknown, not reported

**Behavioral data notes**

No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

**Type of analysis**

Regions of interest (ROI)

**ROI type**

Functional

**How many ROIs are there?**

13

**What are the ROI(s)?**

(1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L
**How are the ROI(s) defined?**

Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints

**Correction for multiple comparisons**

No correction

**Statistical details**

Interactions were significant in model with all 3 time points; post-hoc sub-interactions not reported but the patterns appear clear

**Findings**

↓ L IFG pars opercularis  
↓ L IFG pars triangularis  
↓ R IFG pars triangularis  
↓ R dorsolateral prefrontal cortex

**Findings notes**

—

### ROI analysis 6

**First level contrast**

Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

**Analysis class**

Longitudinal between two groups with aphasia

**Group(s)**

(Aphasia frontal \( n = 17 \) T3 vs T1) vs (temporo-parietal \( n = 17 \) T3 vs T1)

**Covariate**

—

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?

Yes

Is accuracy matched across the second level contrast?

Unknown, not reported

Is reaction time matched across the second level contrast?

Unknown, not reported

**Behavioral data notes**

No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

**Type of analysis**

Regions of interest (ROI)

**ROI type**

Functional

**How many ROIs are there?**

13

**What are the ROI(s)?**

(1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL

**How are the ROI(s) defined?**

Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints

**Correction for multiple comparisons**

No correction

**Statistical details**

Interactions were significant in model with all 3 time points; post-hoc sub-interactions not reported and patterns are not clear

**Findings**

↓ L IFG pars opercularis  
↓ L IFG pars triangularis  
↓ R IFG pars triangularis  
↓ R dorsolateral prefrontal cortex

**Findings notes**

—

### ROI analysis 7

**First level contrast**

Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

**Analysis class**

Longitudinal between two groups with aphasia

**Group(s)**

(Aphasia frontal \( n = 17 \) T3 vs T2) vs (temporo-parietal \( n = 17 \) T3 vs T2)

**Covariate**

—

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?

Yes

Is accuracy matched across the second level contrast?

Unknown, not reported

Is reaction time matched across the second level contrast?

Unknown, not reported

**Behavioral data notes**

No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

**Type of analysis**

Regions of interest (ROI)
| ROI type | Functional |
|----------|------------|
| How many ROIs are there? | 13 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL |
| How are the ROI(s) defined? | Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints |
| Correction for multiple comparisons | No correction |
| Statistical details | Post-hoc sub-interactions not reported but there do not appear to be any T2/T3 effects |
| Findings | None |
| Findings notes | — |

**ROI analysis 8**

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia |
| Group(s)             | Aphasia T2 vs T1 |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis     | Regions of interest (ROI) |
| ROI type              | Other |
| How many ROIs are there? | 2 |
| What are the ROI(s)? | (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals |
| How are the ROI(s) defined? | (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction |
| Statistical details | Test of group by time interaction not reported |
| Findings | Other |
| Findings notes | There was a significant increase in activation in perilesional ROIs |

**ROI analysis 9**

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia |
| Group(s)             | Aphasia T3 vs T1 |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis     | Regions of interest (ROI) |
| ROI type              | Other |
| How many ROIs are there? | 2 |
| What are the ROI(s)? | (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals |
| How are the ROI(s) defined? | (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions |
temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions

**Correction for multiple comparisons**
No correction

**Statistical details**
Test of group by time interaction not reported

**Findings notes**
There was a significant increase in activation in perilesional ROIs

### ROI analysis 10

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal change in aphasia |
| Group(s)             | Aphasia T3 vs T2 |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Other |
| How many ROIs are there? | 2 |
| What are the ROI(s)? | (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals |
| How are the ROI(s) defined? | (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction |
| Statistical details  | Test of group by time interaction not reported |
| Findings notes       | — |
| Findings             | None |

### ROI analysis 11

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia frontal mean of T1, T2, T3 (n = 17) vs temporo-parietal mean of T1, T2, T3 (n = 17) |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Other |
| How many ROIs are there? | 2 |
| What are the ROI(s)? | (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals |
| How are the ROI(s) defined? | (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction |
| Statistical details  | Test of group by time interaction not reported; this comparison is somewhat questionable |
| Findings notes       | — |
| Findings             | None |
Findings
Other
Findings notes
Frontal patients showed relatively greater activation in regions homotopic to their lesions

### ROI analysis 12

**First level contrast**
Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

**Analysis class**
Cross-sectional aphasia vs control

**Group(s)**
Aphasia frontal T1 (n = 17) vs control

**Covariate**
—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**
Yes

**Is accuracy matched across the second level contrast?**
Unknown, not reported

**Is reaction time matched across the second level contrast?**
Unknown, not reported

**Behavioral data notes**
No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

**Type of analysis**
Regions of interest (ROI)

**ROI type**
Functional

**How many ROIs are there?**
13

**What are the ROI(s)?**
(1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL

**How are the ROI(s) defined?**
Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs

**Correction for multiple comparisons**
No correction

**Statistical details**
—

**Findings**
↓ L IFG pars triangularis
↓ L insula
↓ L dorsolateral prefrontal cortex

**Findings notes**
—

### ROI analysis 13

**First level contrast**
Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

**Analysis class**
Cross-sectional aphasia vs control

**Group(s)**
Aphasia temporo-parietal T1 (n = 17) vs control

**Covariate**
—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**
Yes

**Is accuracy matched across the second level contrast?**
Unknown, not reported

**Is reaction time matched across the second level contrast?**
Unknown, not reported

**Behavioral data notes**
No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

**Type of analysis**
Regions of interest (ROI)

**ROI type**
Functional

**How many ROIs are there?**
13

**What are the ROI(s)?**
(1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL

**How are the ROI(s) defined?**
Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs

**Correction for multiple comparisons**
No correction

**Statistical details**
—

**Findings**
↓ L IFG pars triangularis
| ROI analysis 14 |  |
|---|---|
| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| Analysis class | Cross-sectional between two groups with aphasia |
| Group(s) | Aphasia frontal T1 (n = 17) vs temporo-parietal T1 (n = 17) |
| Covariate |  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 13 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL |
| How are the ROI(s) defined? | Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints |
| Correction for multiple comparisons | No correction |
| Statistical details |  |
| Findings | ↑ L anterior temporal |
|           | ↑ R IFG pars triangularis |
|           | ↑ R anterior temporal |
| Findings notes |  |

| ROI analysis 15 |  |
|---|---|
| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| Analysis class | Cross-sectional aphasia vs control |
| Group(s) | Aphasia frontal T2 (n = 17) vs control |
| Covariate |  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Functional |
| How many ROIs are there? | 13 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL |
| How are the ROI(s) defined? | Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs |
| Correction for multiple comparisons | No correction |
| Findings notes |  |

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### ROI analysis 16

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control |
| Group(s)             | Aphasia temporo-parietal T2 (n = 17) vs control |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 13 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL |
| How are the ROI(s) defined? | Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs |
| Correction for multiple comparisons | No correction |

### ROI analysis 17

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia |
| Group(s)             | Aphasia frontal T2 (n = 17) vs temporo-parietal T2 (n = 17) |
| Covariate            | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis     | Regions of interest (ROI) |
| ROI type             | Functional |
| How many ROIs are there? | 13 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL |
| How are the ROI(s) defined? | Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints |
| Correction for multiple comparisons | No correction |

| Findings |
|-----------------------------|
| ↓ L IFG pars opercularis    |
| ↓ L IFG pars triangularis   |
| ↓ L dorsolateral prefrontal cortex |
### ROI analysis 18

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                                                                                                                                                  |
| Group(s)             | Aphasia frontal T3 (n = 17) vs control                                                                                                                                                    |
| Covariate            | —                                                                                                                                                                                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                                                                                              |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                                                                                             |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                                                                                             |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions                                                                           |
| Type of analysis     | Regions of interest (ROI)                                                                                                                                                                         |
| ROI type             | Functional                                                                                                                                                                                        |
| How many ROIs are there? | 13                                                                                                                                                |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL |
| How are the ROI(s) defined? | Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs |
| Correction for multiple comparisons | No correction                                                                                                                                      |
| Statistical details  | —                                                                                                                                                                                                |
| Findings             | ↓ L IFG pars triangularis                                                                                                                                                                       |
| Findings notes       | —                                                                                                                                                                                                |

### ROI analysis 19

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional aphasia vs control                                                                                                                                                                  |
| Group(s)             | Aphasia temporo-parietal T3 (n = 17) vs control                                                                                                                                                    |
| Covariate            | —                                                                                                                                                                                                |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                                                                                              |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                                                                                             |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                                                                                             |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions                                                                           |
| Type of analysis     | Regions of interest (ROI)                                                                                                                                                                         |
| ROI type             | Functional                                                                                                                                                                                        |
| How many ROIs are there? | 13                                                                                                                                                |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL |
| How are the ROI(s) defined? | Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; circular because patients but not controls used to define ROIs |
| Correction for multiple comparisons | No correction                                                                                                                                      |
| Statistical details  | —                                                                                                                                                                                                |
| Findings             | None                                                                                                                                                                                             |
| Findings notes       | —                                                                                                                                                                                                |

### ROI analysis 20

| Findings notes | — |
### First level contrast

- **Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech**

### Analysis class

- **Cross-sectional between two groups with aphasia**

### Group(s)

- **Aphasia frontal T3 (n = 17) vs temporo-parietal T3 (n = 17)**

### Covariate

- —

### Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?

- **Yes**

### Is accuracy matched across the second level contrast?

- **Unknown, not reported**

### Is reaction time matched across the second level contrast?

- **Unknown, not reported**

### Behavioral data notes

- No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

### Type of analysis

- **Regions of interest (ROI)**

### ROI type

- **Functional**

### How many ROIs are there?

- 13

### What are the ROI(s)?

- (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL

### How are the ROI(s) defined?

- Spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints

### Correction for multiple comparisons

- **No correction**

### Statistical details

- —

### Findings

- ↓ L IFG pars opercularis
- ↓ L IFG pars triangularis
- ↓ L IFG pars orbitalis
- ↓ L dorsolateral prefrontal cortex

### Findings notes

- —

### ROI analysis 21

#### First level contrast

- Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

#### Analysis class

- Cross-sectional aphasia vs control

#### Group(s)

- Aphasia frontal T1 (n = 17) vs control

#### Covariate

- —

#### Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?

- **Yes**

#### Is accuracy matched across the second level contrast?

- **Unknown, not reported**

#### Is reaction time matched across the second level contrast?

- **Unknown, not reported**

#### Behavioral data notes

- No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

#### Type of analysis

- **Regions of interest (ROI)**

#### ROI type

- **Other**

#### How many ROIs are there?

- 2

#### What are the ROI(s)?

- (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals

#### How are the ROI(s) defined?

- (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions

#### Correction for multiple comparisons

- **No correction**

#### Statistical details

- —

#### Findings notes

- Frontal patients showed reduced activation in perilesional tissue

### ROI analysis 22

#### First level contrast

- Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech
normal sentences (paradigm 2) vs listening to reversed speech

Analysis class
Cross-sectional aphasia vs control

Group(s)
Aphasia frontal T2 (n = 17) vs control

Covariate
—

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes

Is accuracy matched across the second level contrast? Unknown, not reported

Is reaction time matched across the second level contrast? Unknown, not reported

Behavioral data notes No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

Type of analysis Regions of interest (ROI)

ROI type Other

How many ROIs are there? 2

What are the ROI(s)? (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals

How are the ROI(s) defined? (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions

Correction for multiple comparisons No correction

Statistical details —

Findings Other

Findings notes Frontal patients showed reduced activation in perilesional tissue

ROI analysis 23

First level contrast Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

Analysis class Cross-sectional aphasia vs control

Group(s)
Aphasia frontal T3 (n = 17) vs control

Covariate —

Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? Yes

Is accuracy matched across the second level contrast? Unknown, not reported

Is reaction time matched across the second level contrast? Unknown, not reported

Behavioral data notes No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

Type of analysis Regions of interest (ROI)

ROI type Other

How many ROIs are there? 2

What are the ROI(s)? (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals

How are the ROI(s) defined? (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions

Correction for multiple comparisons No correction

Statistical details —

Findings Other

Findings notes Frontal patients showed reduced activation in perilesional tissue

ROI analysis 24

First level contrast Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

Analysis class Cross-sectional aphasia vs control

Group(s)
Aphasia temporo-parietal T1 (n = 17) vs control

Covariate —
| Question                                                                 | Answer                      |
|-------------------------------------------------------------------------|----------------------------|
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                        |
| Is accuracy matched across the second level contrast?                   | Unknown, not reported        |
| Is reaction time matched across the second level contrast?              | Unknown, not reported        |
| Behavioral data notes                                                   | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis                                                        | Regions of interest (ROI)    |
| ROI type                                                                | Other                       |
| How many ROIs are there?                                                | 2                          |
| What are the ROI(s)?                                                   | (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals |
| How are the ROI(s) defined?                                            | (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons                                     | No correction               |
| Statistical details                                                    | —                           |
| Findings                                                               | None                        |
| Findings notes                                                         | Temporal patients showed reduced activation in perilesional tissue and in regions homotopic to their lesions |

ROI analysis 25

| First level contrast                                                   | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class                                                         | Cross-sectional aphasia vs control                                                                                                           |
| Group(s)                                                               | Aphasia temporo-parietal T2 (n = 17) vs control                                                                                              |
| Covariate                                                              | —                                                                                                                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                                         |
| Is accuracy matched across the second level contrast?                  | Unknown, not reported                                                                                                                        |
| Is reaction time matched across the second level contrast?             | Unknown, not reported                                                                                                                        |
| Behavioral data notes                                                  | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions                        |
| Type of analysis                                                       | Regions of interest (ROI)                                                                                                                   |
| ROI type                                                               | Other                                                                                                                                     |
| How many ROIs are there?                                               | 2                                                                                                                                         |
| What are the ROI(s)?                                                  | (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals                                                      |
| How are the ROI(s) defined?                                           | (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons                                    | No correction                                                                                                                              |
| Statistical details                                                   | —                                                                                                                                         |
| Findings                                                              | None                                                                                                                                     |
| Findings notes                                                        | —                                                                                                                                         |

ROI analysis 26

| First level contrast                                                   | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class                                                         | Cross-sectional aphasia vs control                                                                                                           |
| Group(s)                                                               | Aphasia temporo-parietal T3 (n = 17) vs control                                                                                              |
| Covariate                                                              | —                                                                                                                                         |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                                         |
| Is accuracy matched across the second level contrast?                  | Unknown, not reported                                                                                                                        |

602
| Is reaction time matched across the second level contrast? | Unknown, not reported |
|----------------------------------------------------------|-----------------------|
| **Behavioral data notes**                                | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| **Type of analysis**                                     | Regions of interest (ROI) |
| **ROI type**                                             | Other |
| **How many ROIs are there?**                             | 2 |
| **What are the ROI(s)?**                                 | (1) perilesional tissue; (2) regions homotopic to lesions; each unique to individuals |
| **How are the ROI(s) defined?**                          | (1) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (2) homotopic ROIs were flipped lesions |
| **Correction for multiple comparisons**                  | No correction |
| **Statistical details**                                  | — |
| **Findings**                                             | None |
| **Findings notes**                                       | — |

### ROI analysis 27

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| **Group(s)**         | Aphasia T1 |
| **Covariate**        | Comprehension composite |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
| **Behavioral data notes** | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| **Type of analysis** | Regions of interest (ROI) |
| **ROI type**         | Mixed |
| **How many ROIs are there?**                             | 15 |
| **What are the ROI(s)?**                                 | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| **How are the ROI(s) defined?**                          | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| **Correction for multiple comparisons**                  | No correction |
| **Statistical details**                                  | — |
| **Findings**                                             | ↑ L IFG pars opercularis |
| **Findings notes**                                       | ↑ L IFG pars triangularis |
|                                                        | ↑ L IFG pars orbitalis |
|                                                        | other |
|                                                        | L IFG pars opercularis and orbitalis did not remain significant when lesion volume was included as a covariate; there was a significant correlation between perilesional activation and LRScomp; this did not remain significant when lesion volume was included as a covariate |

### ROI analysis 28

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure |
| **Group(s)**         | Aphasia T2 |
| **Covariate**        | Comprehension composite |

603
| Description                                      | Value                                                                 |
|-------------------------------------------------|----------------------------------------------------------------------|
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                 |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                |
| Behavioral data notes                           | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis                                 | Regions of interest (ROI)                                           |
| ROI type                                         | Mixed                                                               |
| How many ROIs are there?                        | 15                                                                 |
| What are the ROI(s)?                            | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined?                     | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons              | No correction                                                      |
| Statistical details                             | —                                                                  |
| Findings                                         | ↑ L IFG pars triangularis                                          |
| Other                                            |                                                                     |
| Findings notes                                   | There was a significant correlation between perilesional activation and LRScomp |

### ROI analysis 29

| Description                                      | Value                                                                 |
|-------------------------------------------------|----------------------------------------------------------------------|
| First level contrast                            | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| Analysis class                                  | Cross-sectional correlation with language or other measure          |
| Group(s)                                        | Aphasia T3                                                         |
| Covariate                                       | Comprehension composite                                            |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                 |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                |
| Behavioral data notes                           | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis                                 | Regions of interest (ROI)                                           |
| ROI type                                         | Mixed                                                               |
| How many ROIs are there?                        | 15                                                                 |
| What are the ROI(s)?                            | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined?                     | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons              | No correction                                                      |
| Statistical details                             | —                                                                  |
| Findings                                         | ↑ L IFG pars triangularis                                          |
| Other                                            |                                                                     |
| Findings notes                                   | Did not remain significant when lesion volume was included as a covariate |

### ROI analysis 30

| Description                                      | Value                                                                 |
|-------------------------------------------------|----------------------------------------------------------------------|
| First level contrast                            | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| Analysis class                                  | Longitudinal correlation with language or other measure              |
### ROI analysis 31

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                                                       |
| Group(s)             | Aphasia T3 vs T1                                                                                                                |
| Covariate            | Δ comprehension composite                                                                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                               |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                            |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                            |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions          |
| Type of analysis     | Regions of interest (ROI)                                                                                                        |
| ROI type             | Mixed                                                                                                                           |
| How many ROIs are there? | 15                                                                                                                               |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction                                                                                                                  |
| Statistical details | —                                                                                                                                |
| Findings             | ↑ L insula                                                                                                                      |
|                      | ↑ R dorsolateral prefrontal cortex                                                                                            |
| Findings notes       | R dorsolateral prefrontal cortex did not remain significant when lesion volume was included as a covariate                     |

### ROI analysis 32

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                                                       |
| Group(s)             | Aphasia T2 vs T1                                                                                                                |
| Covariate            | Δ comprehension composite                                                                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                               |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                            |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                            |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions          |
| Type of analysis     | Regions of interest (ROI)                                                                                                        |
| ROI type             | Mixed                                                                                                                           |
| How many ROIs are there? | 15                                                                                                                               |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction                                                                                                                  |
| Statistical details | —                                                                                                                                |
| Findings             | None                                                                                                                            |
| Findings notes       | —                                                                                                                                |
| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                                                         |
| Group(s)             | Aphasia T3 vs T2                                                                                                               |
| Covariate            | Δ comprehension composite                                                                                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                      |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                             |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                             |
| Behavioral data notes| No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions           |
| Type of analysis     | Regions of interest (ROI)                                                                                                         |
| ROI type             | Mixed                                                                                                                          |
| How many ROIs are there? | 15                                                                 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction |
| Statistical details  | —                                                                            |
| Findings             | None                                                                                                                          |
| Findings notes       | —                                                                            |

**ROI analysis 33**

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                                         |
| Group(s)             | Aphasia frontal T1 (n = 17)                                                                                                         |
| Covariate            | Comprehension composite                                                                                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                      |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                             |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                             |
| Behavioral data notes| No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions           |
| Type of analysis     | Regions of interest (ROI)                                                                                                         |
| ROI type             | Mixed                                                                                                                          |
| How many ROIs are there? | 15                                                                 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction |
| Statistical details  | —                                                                            |
| Findings             | None                                                                                                                          |
| Findings notes       | —                                                                            |
### ROI analysis 34

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                                       |
| Group(s)             | Aphasia frontal T2 (n = 17)                                                                                                      |
| Covariate            | Comprehension composite                                                                                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                               |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis     | Regions of interest (ROI)                                                                                                         |
| ROI type             | Mixed                                                                                                                            |
| How many ROIs are there? | 15                                                                                |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction                                                                      |
| Findings             | None                                                                               |
| Findings notes       | —                                                                                  |

### ROI analysis 35

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                                       |
| Group(s)             | Aphasia frontal T3 (n = 17)                                                                                                      |
| Covariate            | Comprehension composite                                                                                                          |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                               |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis     | Regions of interest (ROI)                                                                                                         |
| ROI type             | Mixed                                                                                                                            |
| How many ROIs are there? | 15                                                                                |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction                                                                      |
| Findings             | None                                                                               |
| Findings notes       | —                                                                                  |
### ROI analysis 36

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                                                              |
| Group(s)             | Aphasia frontal (n = 17) T2 vs T1                                                                                                       |
| Covariate            | Δ comprehension composite                                                                                                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                           |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                                     |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                                     |

#### Behavioral data notes

- No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions.

| Type of analysis | Regions of interest (ROI) |
|------------------|---------------------------|
| ROI type         | Mixed                     |
| How many ROIs are there? | 15                          |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |

| Correction for multiple comparisons | No correction |

| Statistical details | Findings |
|---------------------|----------|
| Findings notes      | —        |

### ROI analysis 37

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                                                              |
| Group(s)             | Aphasia frontal (n = 17) T3 vs T1                                                                                                       |
| Covariate            | Δ comprehension composite                                                                                                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                           |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                                     |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                                     |

#### Behavioral data notes

- No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions.

| Type of analysis | Regions of interest (ROI) |
|------------------|---------------------------|
| ROI type         | Mixed                     |
| How many ROIs are there? | 15                          |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |

| Correction for multiple comparisons | No correction |

| Statistical details | Findings |
|---------------------|----------|
| Findings notes      | —        |
| Findings               | None |
|-----------------------|------|
| Findings notes        | —    |

### ROI analysis 38

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                                                         |
| Group(s)             | Aphasia frontal (n = 17) T3 vs T2                                                                                             |
| Covariate            | Δ comprehension composite                                                                                                     |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                             |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                        |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                        |

| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
|-----------------------|-------------------------------------------------------------------------------------------------------------------|
| Type of analysis      | Regions of interest (ROI)                                                                                         |
| ROI type              | Mixed                                                                                                             |
| How many ROIs are there? | 15                                                                                                             |
| What are the ROI(s)?  | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction                                                        |
| Statistical details   | —                                                                  |
| Findings              | None                                                               |
| Findings notes        | —                                                                  |

### ROI analysis 39

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                                       |
| Group(s)             | Aphasia temporo-parietal T1 (n = 17)                                                                                            |
| Covariate            | Comprehension composite                                                                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                             |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                        |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                        |

| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
|-----------------------|-------------------------------------------------------------------------------------------------------------------|
| Type of analysis      | Regions of interest (ROI)                                                                                         |
| ROI type              | Mixed                                                                                                             |
| How many ROIs are there? | 15                                                                                                             |
| What are the ROI(s)?  | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction                                                        |
### ROI analysis 40

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                                    |
| Group(s)             | Aphasia temporo-parietal T2 (n = 17)                                                                                         |
| Covariate            | Comprehension composite                                                                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions         |
| Type of analysis     | Regions of interest (ROI)                                                                                                      |
| ROI type             | Mixed                                                                                                                          |
| How many ROIs are there? | 15                                                                                                                               |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction |
| Statistical details  | —                                                                                                                                |
| Findings             | ↑ R anterior temporal                                                                                                           |
| Findings notes       | —                                                                                                                                |

### ROI analysis 41

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional correlation with language or other measure                                                                    |
| Group(s)             | Aphasia temporo-parietal T3 (n = 17)                                                                                         |
| Covariate            | Comprehension composite                                                                                                       |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions         |
| Type of analysis     | Regions of interest (ROI)                                                                                                      |
| ROI type             | Mixed                                                                                                                          |
| How many ROIs are there? | 15                                                                                                                               |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
Correction for multiple comparisons | No correction
---|---
Statistical details | —
Findings | None
Findings notes | —

ROI analysis 42

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| --- | --- |
| Analysis class | Longitudinal correlation with language or other measure |
| Group(s) | Aphasia temporo-parietal (n = 17) T2 vs T1 |
| Covariate | Δ comprehension composite |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Mixed |
| How many ROIs are there? | 15 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings | ↑ L insula |
| Findings notes | — |

ROI analysis 43

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| --- | --- |
| Analysis class | Longitudinal correlation with language or other measure |
| Group(s) | Aphasia temporo-parietal (n = 17) T3 vs T1 |
| Covariate | Δ comprehension composite |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Mixed |
| How many ROIs are there? | 15 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

### ROI analysis 44

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| Analysis class | Longitudinal correlation with language or other measure |
| Group(s) | Aphasia temporo-parietal (n = 17) T3 vs T2 |
| Covariate | Δ comprehension composite |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Mixed |
| How many ROIs are there? | 15 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

### ROI analysis 45

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia T1 |
| Covariate | Lesion volume |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Mixed |
| How many ROIs are there? | 15 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional... |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings | ↓ L IFG pars triangularis |
| Findings notes | Lesion volume negatively correlated with activation |

### ROI analysis 46

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia T2 |
| Covariate | Lesion volume |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Mixed |
| How many ROIs are there? | 15 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

### ROI analysis 47

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia T3 |
| Covariate | Lesion volume |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Mixed |
| How many ROIs are there? | 15 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
### ROI analysis 48

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                                                       |
| Group(s)             | Aphasia T2 vs T1                                                                                                                |
| Covariate            | Lesion volume                                                                                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                              |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                           |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                           |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions       |
| Type of analysis     | Regions of interest (ROI)                                                                                                         |
| ROI type             | Mixed                                                                                                                           |
| How many ROIs are there? | 15                                                                                                                              |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction                                                                                                                   |
| Statistical details | —                                                                                |
| Findings             | None                                                                             |
| Findings notes       | —                                                                                |

### ROI analysis 49

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal correlation with language or other measure                                                                       |
| Group(s)             | Aphasia T3 vs T1                                                                                                                |
| Covariate            | Lesion volume                                                                                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                              |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                           |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                           |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions       |
| Type of analysis     | Regions of interest (ROI)                                                                                                         |
| ROI type             | Mixed                                                                                                                           |
| How many ROIs are there? | 15                                                                                                                              |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction                                                                                                                   |
| Statistical details | —                                                                                |
| Findings             | None                                                                             |
| Findings notes       | —                                                                                |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

**ROI analysis 50**

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class | Longitudinal correlation with language or other measure |
| Group(s) | Aphasia T3 vs T2 |
| Covariate | Lesion volume |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Regions of interest (ROI) |
| ROI type | Mixed |
| How many ROIs are there? | 15 |
| What are the ROI(s)? | (1) L IFG orb; (2) L IFG tri; (3) L IFG op; (4) L DLPFC; (5) L insula; (6) L ATL; (7) L PTL; (8) L SMA/dACC; (9) R L IFG orb; (10) R IFG tri; (11) R insula; (12) R DLPFC; (13) R ATL; (14) perilesional tissue; (15) regions homotopic to lesions |
| How are the ROI(s) defined? | (1-13) spheres around peaks of whole brain analysis of all patients collapsing across groups and timepoints; (14) perilesional ROIs were voxels 3-15 mm from the lesion that were located in frontal or temporal regions activated by the language contrast in controls; (15) homotopic ROIs were flipped lesions |
| Correction for multiple comparisons | No correction |
| Statistical details | — |
| Findings | None |
| Findings notes | — |

**Complex analysis 1**

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class | Cross-sectional between two groups with aphasia |
| Group(s) | Aphasia frontal T1 (n = 17) vs temporo-parietal T1 (n = 17) |
| Covariate | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Complex |
| Statistical details | Correlations between activity in 15 ROIs and LRScomp were compared between patients with... |
Correlations were higher in the temporal group in the R ATL.

### Complex analysis 2

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia                                                                                   |
| Group(s)             | Aphasia frontal T2 (n = 17) vs temporo-parietal T2 (n = 17)                                                                         |
| Covariate            | —                                                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                   |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                               |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                               |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis     | Complex                                                                             |
| Statistical details  | Correlations between activity in 15 ROIs and LRScomp were compared between patients with frontal and temporal lesions, using interaction terms as well as the Fisher r-to-z transformation. There was no correction for multiple comparisons across the 15 ROIs. |
| Findings             | Other                                                                               |
| Findings notes       | Correlations were higher in the temporal group in L posterior temporal cortex and L IFG op.                                         |

### Complex analysis 3

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia                                                                                   |
| Group(s)             | Aphasia frontal T3 (n = 17) vs temporo-parietal T3 (n = 17)                                                                         |
| Covariate            | —                                                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                   |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                               |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                               |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis     | Complex                                                                             |
| Statistical details  | Correlations between activity in 15 ROIs and LRScomp were compared between patients with frontal and temporal lesions, using interaction terms as well as the Fisher r-to-z transformation. There was no correction for multiple comparisons across the 15 ROIs. |
| Findings             | Other                                                                               |
| Findings notes       | Correlations were different between groups in the R ATL, but the correlation is not reported as significant in the temporo-parietal group alone. |

### Complex analysis 4

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Longitudinal between two groups with aphasia                                                                                   |
| Group(s)             | (Aphasia frontal (n = 17) T2 vs T1) vs (aphasia temporo-parietal (n = 17) T2 vs T1)                                              |
| Covariate            | —                                                                                  |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                   |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                               |
| Complex analysis 5 | Complex analysis 6 |
|-------------------|-------------------|
| **Finding notes** | In the L insula, the temporo-parietal group showed a stronger correlation than the frontal group between changes in activation and changes in LRScomp. |
| **Behavioral data notes** | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| **Type of analysis** | Complex |
| **Statistical details** | Correlations between changes in activity in 15 ROIs and changes in LRScomp were compared between patients with frontal and temporal lesions, using interaction terms as well as the Fisher r-to-z transformation. There was no correction for multiple comparisons across the 15 ROIs. |
| **Findings** | None |
| **Findings notes** | Other |
| **First level contrast** | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| **Analysis class** | Longitudinal between two groups with aphasia |
| **Group(s)** | (Aphasia frontal (n = 17) T3 vs T1) vs (temporo-parietal (n = 17) T3 vs T1) |
| **Covariate** | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |

| Complex analysis 5 | Complex analysis 6 |
|-------------------|-------------------|
| **Finding notes** | In the L insula, the temporo-parietal group showed a stronger correlation than the frontal group between changes in activation and changes in LRScomp. |
| **Behavioral data notes** | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| **Type of analysis** | Complex |
| **Statistical details** | Correlations between changes in activity in 15 ROIs and changes in LRScomp were compared between patients with frontal and temporal lesions, using interaction terms as well as the Fisher r-to-z transformation. There was no correction for multiple comparisons across the 15 ROIs. |
| **Findings** | None |
| **Findings notes** | Other |
| **First level contrast** | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| **Analysis class** | Longitudinal between two groups with aphasia |
| **Group(s)** | (Aphasia frontal (n = 17) T3 vs T2) vs (temporo-parietal (n = 17) T3 vs T2) |
| **Covariate** | — |
| **Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?** | Yes |
| **Is accuracy matched across the second level contrast?** | Unknown, not reported |
| **Is reaction time matched across the second level contrast?** | Unknown, not reported |
### Complex analysis 7

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia                                                                                                                                                  |
| Group(s)             | Aphasia frontal T1 (n = 17) vs temporo-parietal T1 (n = 17)                                                                                                                                       |
| Covariate            | —                                                                                                                                                                                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                                                                                            |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                                                                                           |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                                                                                           |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions                                                                          |
| Type of analysis     | Complex                                                                                                                                                                                         |
| Statistical details  | Correlations between activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. There was no correction for multiple comparisons across the 15 ROIs. |
| Findings             | None                                                                                                                                                                                           |
| Findings notes       | —                                                                                                                                                                                              |

### Complex analysis 8

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia                                                                                                                                                  |
| Group(s)             | Aphasia frontal T2 (n = 17) vs temporo-parietal T2 (n = 17)                                                                                                                                       |
| Covariate            | —                                                                                                                                                                                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                                                                                            |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                                                                                           |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                                                                                           |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions                                                                          |
| Type of analysis     | Complex                                                                                                                                                                                         |
| Statistical details  | Correlations between activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. There was no correction for multiple comparisons across the 15 ROIs. |
| Findings             | None                                                                                                                                                                                           |
| Findings notes       | —                                                                                                                                                                                              |

### Complex analysis 9

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis class       | Cross-sectional between two groups with aphasia                                                                                                                                                  |
| Group(s)             | Aphasia frontal T3 (n = 17) vs temporo-parietal T3 (n = 17)                                                                                                                                       |
| Covariate            | —                                                                                                                                                                                              |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes                                                                                                                                                                                            |
| Is accuracy matched across the second level contrast? | Unknown, not reported                                                                                                                                                                           |
| Is reaction time matched across the second level contrast? | Unknown, not reported                                                                                                                                                                           |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions                                                                          |
| Complex analysis 10 |
|--------------------|
| **Type of analysis** | Complex |
| **Statistical details** | Correlations between activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. There was no correction for multiple comparisons across the 15 ROIs. |
| **Findings** | None |
| **Findings notes** | — |

**First level contrast**
Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

**Analysis class**
Longitudinal between two groups with aphasia

**Group(s)**
(Aphasia frontal (n = 17) T2 vs T1) vs (temporo-parietal (n = 17) T2 vs T1)

**Covariate**
—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**
Yes

**Is accuracy matched across the second level contrast?**
Unknown, not reported

**Is reaction time matched across the second level contrast?**
Unknown, not reported

**Behavioral data notes**
No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

| Complex analysis 11 |
|--------------------|
| **Type of analysis** | Complex |
| **Statistical details** | Correlations between changes in activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. There was no correction for multiple comparisons across the 15 ROIs. |
| **Findings** | None |
| **Findings notes** | — |

**First level contrast**
Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech

**Analysis class**
Longitudinal between two groups with aphasia

**Group(s)**
(Aphasia frontal (n = 17) T3 vs T1) vs (temporo-parietal (n = 17) T3 vs T1)

**Covariate**
—

**Is the second level contrast valid in terms of the group(s), time point(s), and measures involved?**
Yes

**Is accuracy matched across the second level contrast?**
Unknown, not reported

**Is reaction time matched across the second level contrast?**
Unknown, not reported

**Behavioral data notes**
No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions

| Complex analysis 12 |
|--------------------|
| **Type of analysis** | Complex |
| **Statistical details** | Correlations between changes in activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. There was no correction for multiple comparisons across the 15 ROIs. |
| **Findings** | None |
| **Findings notes** | — |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Complex |
| Statistical details | Correlations between changes in activity in 15 ROIs and lesion extent were compared between patients with frontal and temporal lesions. There was no correction for multiple comparisons across the 15 ROIs. |
| Findings | None |
| Findings notes | — |

**Complex analysis 13**

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| Analysis class | Cross-sectional correlation with language or other measure |
| Group(s) | Aphasia T1 |
| Covariate | Interaction of comprehension composite by lesion size |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Complex |
| Statistical details | To investigate why some activation-behavior relationships did not remain significant when lesion extent was included as a covariate, models were constructed looking at the relationship between activation and behavior in patients with larger and smaller lesions. |
| Findings | Other |
| Findings notes | The three regions where this applied at T1, namely perilesional cortex, L IFG op, and L IFG orb, all showed positive correlations between activation and LRScomp in patients with larger lesions, but no correlations in patients with smaller lesions. |

**Complex analysis 14**

| First level contrast | Listening to normal sentences and making a plausibility judgment (paradigm 1) or listening to normal sentences (paradigm 2) vs listening to reversed speech |
| Analysis class | Longitudinal correlation with language or other measure |
| Group(s) | Aphasia T2 vs T1 |
| Covariate | Interaction of Δ comprehension composite by lesion size |
| Is the second level contrast valid in terms of the group(s), time point(s), and measures involved? | Yes |
| Is accuracy matched across the second level contrast? | Unknown, not reported |
| Is reaction time matched across the second level contrast? | Unknown, not reported |
| Behavioral data notes | No differences in proportion of expected button presses by group or time, but behavioral data pooled across conditions |
| Type of analysis | Complex |
| Statistical details | To investigate why some activation-behavior relationships did not remain significant when lesion extent was included as a covariate, models were constructed looking at the relationship between activation and behavior in patients with larger and smaller lesions. |
| Findings | Other |

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| Findings notes | This applied to the R DLPFC in the T2 vs T1 analysis. This region showed a positive correlation between activation and LR5comp in patients with larger lesions, but no correlation in patients with smaller lesions. |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Notes         | **Excluded analyses** | ROI analyses 27-32 and 45-50 were carried out with and without lesion extent as a covariate, but are coded only once, with notes as to which regions did not remain significant when the covariate was included. |