**Supplementary Table 1.** Demographics and acquired scans per healthy participant. Left handed participants are indicated by grey shading. 1=task/scan acquired, n/a = task/scan not acquired, *2/3 of the task was acquired, **slow version of VG task, see methods section for details.

| Nr  | Age | Gender | Handedness | Anatomy | SR | LPM | VG |
|-----|-----|--------|------------|---------|----|-----|----|
| HP1 | 6.10| f      | R          | l       | l  | n/a | n/a|
| HP2 | 6.15| f      | R          | l       | n/a| l   | n/a|
| HP3 | 6.35| f      | L          | l       | l  | l   | 1**|
| HP4 | 6.70| f      | R          | l       | l  | n/a | n/a|
| HP5 | 6.78| f      | R          | l       | l  | l   | l  |
| HP6 | 6.83| m      | R          | l       | l  | l   | l  |
| HP7 | 6.89| f      | R          | l       | l  | n/a | 1  |
| HP8 | 7.34| f      | R          | l       | l  | n/a | l  |
| HP9 | 7.63| f      | L          | l       | n/a| l   | 1  |
| HP10| 7.64| m      | L          | l       | n/a| l   | n/a|
| HP11| 7.70| m      | R          | l       | l  | l   | l  |
| HP12| 7.93| m      | R          | l       | l  | n/a | l  |
| HP13| 8.18| m      | R          | l       | n/a| l   | 1**|
| HP14| 8.24| f      | R          | l       | l  | n/a | 1  |
| HP15| 8.52| m      | R          | l       | l  | l   | l  |
| HP16| 8.61| f      | R          | l       | l  | n/a | 1  |
| HP17| 8.71| m      | R          | l       | l  | l   | 1  |
| HP18| 8.96| m      | L          | l       | l  | l   | l  |
| HP19| 9.02| f      | R          | l       | l* | l   | l  |
| HP20| 9.07| f      | R          | l       | n/a| l   | l  |
| HP21| 9.19| f      | R          | l       | l  | l   | l  |
| HP22| 9.35| m      | R          | l       | l  | l   | 1**|
| HP23| 9.39| f      | R          | l       | l  | l   | l  |
| HP24| 9.62| m      | R          | l       | l  | l   | l  |
| HP25| 9.65| m      | R          | l       | l  | l   | l  |
| HP26| 9.72| m      | L          | l       | l  | n/a | l  |
| HP27| 10.21| f  | R         | l       | n/a| l   | l  |
| HP28| 10.40| m  | R         | l       | l  | n/a | l  |
| HP29| 10.70| m  | R         | l       | l  | l   | l  |
| HP30| 10.95| m  | R         | l       | n/a| l   | l  |

16f/14m 25R/5L 20R/3L 19R/4L 20R/4L
## Supplementary Table 2

Percentage of removed scans (by motion filter, due to above-threshold motion) and proportion of statistical power (PSP) remaining after removal of the contribution of volumes with above-threshold motion. *0% scans excluded from analyses, **PSP lower than 0.4, dataset removed from further analysis.

| Number | Age  | SR   | LPM  | VG   | Proportion variance remaining |
|--------|------|------|------|------|-------------------------------|
| 1      | 6.10 | 12.6 | -    | -    | 0.88                          |
| 2      | 6.15 | -    | 68.4 | -    | -                             |
| 3      | 6.35 | 45.5 | 9.9  | 61.2 | 0.54                          |
|        |      |      |      |      | 0.90                          |
| 4      | 6.70 | 5.8  | -    | -    | 0.94                          |
| 5      | 6.78 | 21.6 | 8.2  | 5.6  | 0.76                          |
| 6      | 6.83 | 4.0  | 6.5  | 1.9  | 0.97                          |
| 7      | 6.89 | 10.1 | -    | 14.0 | 0.89                          |
| 8      | 7.34 | 0.0* | -    | 0.2  | 1*                            |
| 9      | 7.63 | -    | 14.3 | 2.1  | 0.85                          |
| 10     | 7.64 | -    | 27.5 | -    | 0.73                          |
| 11     | 7.70 | 11.0 | 4.0  | -    | 0.90                          |
| 12     | 7.93 | 7.6  | -    | 11.1 | 0.94                          |
| 13     | 8.18 | -    | 62.0 | 44.6 | -                             |
| 14     | 8.24 | 9.5  | -    | 7.0  | 0.89                          |
| 15     | 8.52 | 18.2 | 6.6  | 11.4 | 0.80                          |
| 16     | 8.61 | 45.0 | 18.4 | -    | 0.50                          |
| 17     | 8.71 | 1.3  | 50.1 | 1.3  | 0.99                          |
| 18     | 8.96 | 2.7  | 0.6  | 1.7  | 0.97                          |
| 19     | 9.02 | 7.4  | 6.8  | 5.0  | 0.91                          |
| 20     | 9.07 | -    | 2.2  | 2.1  | -                             |
| 21     | 9.19 | 1.1  | 0.4  | 0.2  | 0.99                          |
| 22     | 9.35 | 3.3  | 8.2  | 12.1 | 0.97                          |
| 23     | 9.39 | 0.8  | 0.0* | 0.0* | 0.99                          |
| 24     | 9.62 | 53.9 | 2.5  | 7.7  | 0.46                          |
| 25     | 9.65 | 19.7 | 17.6 | 27.6 | 0.79                          |
| 26     | 9.72 | 13.7 | -    | 10.3 | 0.87                          |
| 27     | 10.21| -    | 3.8  | 0.2  | -                             |
| 28     | 10.40| 0.9  | -    | 2.5  | 0.99                          |
| 29     | 10.70| 23.3 | 16.7 | 3.3  | 0.75                          |
| 30     | 10.95| -    | 22.6 | 23.7 | 0.76                          |
| Number | Age   | SR    | LPM   | VG    |
|--------|-------|-------|-------|-------|
| 1      | 6.10  | 0.51  | -     | -     |
| 2      | 6.15  | -     | Excl  | -     |
| 3      | 6.35  | 0.12  | 0.23  | Excl  |
| 4      | 6.70  | 0.90  | -     | -     |
| 5      | 6.78  | 0.69  | 0.19  | 0.64  |
| 6      | 6.83  | 0.65  | 0.76  | 0.82  |
| 7      | 6.89  | 0.13  | 0.64  | -     |
| 8      | 7.34  | 0.82  | -     | 0.73  |
| 9      | 7.63  | -     | -0.51 | -0.82 |
| 10     | 7.64  | -     | 0.47  | -     |
| 11     | 7.70  | 0.33  | 0.14  | 0.76  |
| 12     | 7.93  | 0.79  | -     | 0.65  |
| 13     | 8.18  | -     | Excl  | 0.16  |
| 14     | 8.24  | 0.37  | -     | 0.41  |
| 15     | 8.52  | 0.44  | 0.66  | 0.73  |
| 16     | 8.61  | 0.31  | 0.02  | -     |
| 17     | 8.71  | 0.75  | 0.37  | 0.92  |
| 18     | 8.96  | 0.36  | 0.63  | 0.73  |
| 19     | 9.02  | 0.31  | 0.29  | 0.86  |
| 20     | 9.07  |       | 0.14  | 0.44  |
| 21     | 9.19  | 0.39  | 0.75  | 0.83  |
| 22     | 9.35  | 0.52  | 0.34  | 0.46  |
| 23     | 9.39  | 0.77  | 0.56  | 0.77  |
| 24     | 9.62  | 0.85  | 0.43  | 0.42  |
| 25     | 9.65  | 0.50  | 0.67  | 0.60  |
| 26     | 9.72  | 0.54  | -     | 0.65  |
| 27     | 10.21 | -     | 0.39  | 0.94  |
| 28     | 10.40 | 0.09  | -     | 0.79  |
| 29     | 10.70 | 0.14  | -0.14 | 0.55  |
| 30     | 10.95 | -     | 0.16  | 0.55  |

Supplementary Table 3. Lateralization indices of all healthy participants and all language tasks. Excl = dataset excluded from analysis because of excessive movement (PSP value <0.4). At the bottom, the total number of datasets per task is given, and the number thereof that was excluded due to excessive motion.
### Supplementary Material

#### Supplementary Table 4. Demographics and acquired scans per epilepsy participant. Left handed participants are indicated by grey shading. 1 = task/scan acquired, n/a = task/scan not acquired, fTCD = functional transcranial doppler, ECS = electrocortical stimulation, *the participant was unable to perform the normal or fast version of the VG task, **slow version of VG task, see methods section for details, ***task suspended prematurely on participant request (task at least 85% complete).

| Nr  | Age  | Gender | Handed-ness | Seizure focus | MRI results | Clinical Language Laterali- zation | Anatomy | SR | LPM | VG |
|-----|------|--------|-------------|---------------|-------------|----------------------------------|---------|----|-----|----|
| EP1 | 7.51 | f      | R           | R temporo-occipital | Suspected multilobar type 1 dysplasia R | L (fTCD) | 1 | 1  | n/a | 1*** |
| EP2 | 7.99 | m      | R           | R temporal     | Negative (pathology: hippocampal sclerosis) | L (fTCD) | 1 | 1  | n/a | 1**  |
| EP3 | 8.12 | m      | R           | L parietal    | L parietal focal | n/a | 1 | 1  | 1   | n/a* |
| EP4 | 8.63 | m      | L           | L central     | L central ischemic injury | L (ECS) | 1 | 1  | 1   | n/a* |
| EP5 | 8.88 | m      | R           | R precentral | R precentral focal cortical dysplasia | n/a | 1 | 1  | 1   | 1**  |
| EP6 | 10.65| m      | L           | Bilateral temporal | Normal | L (wada) | 1 | 1  | 1   | 1   |
| EP7 | 11.10| f      | R           | R frontotemporal | Large R middle cerebral artery infarct | n/a | 1 | 1  | 1** | 1*** |

| Lateralization Index |
|-----------------------|
| Number | Age | SR | LPM | VG |
| EP1    | 7.51| 0,81| -   | 0,25|
| EP2    | 7.99| 0,14| -   | 0,31|
| EP3    | 8.12| 0,62| 0,31| -   |
| EP4    | 8.63| 0,40| -0,13| -  |
| EP5    | 8.88| -0,15| 0,35| 0,19|
| EP6    | 10.65| 0,21| 0,46| 0,23|
| EP7    | 11.10| 0,39| 0,41| 0,73|

Supplementary Table 5. Lateralization indices of all epilepsy participants and all language tasks. At the bottom, the total number of datasets per task is given, and the number thereof that was excluded (excl) due to excessive motion.