Supplementary Figure 1: Pictures used as stimuli for Picture Description task. Picture to the left\(^1\) (From the Boston Diagnostic Aphasia Examination – Third Edition by Harold Goodglass, Edith Kaplan and Barbara Barresi. Used with permission of PRO-ED, Inc. ) is described in first visit while picture to the right\(^2\) (From Marshall & Wright, Am. J. Speech-Language Pathol. (2007 ). Used with permission of ASHA) is described during the second visit.

Supplementary Figure 2: Classification performance for each task without using feature selection. Classification accuracy when using all the features, using 10-fold (by subject) cross validation. Bars show mean of 50 runs, vertical lines denote standard deviation. Results surpass chance probability.
Supplementary Figure 3: Audio Duration Impact on Classification Performance. ON/OFF Classification accuracy for audio clips of 5, 10, 15, 18 and 20 seconds. Only 18 subjects were used for this analysis since we used recordings of 20 or more seconds after removing pauses. The features used in this analysis were MFCCs given the independence of context. Bars were created based on 10-fold cross validation on 50 runs, depicting mean and standard deviation. Mean accuracy rate is stable around 0.70 for different recording lengths except for 5 seconds.
Supplementary Table 1. Medications taken by participants.

| SubjectCode | Medication | DoseFreeText | Schedule |
|-------------|------------|--------------|----------|
| 3001        | sinemet ER | 50/200       | 1 tab at bedtime |
| 3001        | vitamin d  | 1000         | daily     |
| 3001        | pramipexol | 20           | daily     |
| 3001        | ecterin    | 81           | daily     |
| 3001        | sinemet 25/100 | 3 tabs twice a day |  |
| 3001        | atenolol   | 100          | daily     |
| 3001        | comtan     | 200          | tid       |
| 3001        | norvasc    | 10           | daily     |
| 3001        | tamsulosin | 0.4          | daily     |
| 3001        | pramipexol | 0.5          | tid       |
| 3001        | lisinopril | 5            | daily     |
| 3001        | pravachol  | 20           | daily     |
| 3001        | asprin     | 325          | daily     |
| 3001        | sinemet 25/100 | 2 tabs tid    |  |
| 3001        | amantadine | 100          | 2 tabs bid |
| 3001        | gabapentin | 300          | qhs       |
| 3001        | prilosec   | 20           | daily     |
| 3001        | pravachol  | 20           | daily     |
| 3001        | sinemet 25/100 | 3 tabs TID    |  |
| 3001        | trazodone  | 50           | qhs       |
| 3001        | paroxetine | 20           | daily     |
| 3001        | asacol     | 400          | bid       |
| 3001        | omeprazole | 20           | daily     |
| 3001        | irsaprine  | 2.5          | daily     |
| 3001        | aspirin    | 81           | daily     |
| 3001        | sinemet 25/100 | 50/200       | tid       |
| 3001        | citrilozen | 20           | daily     |
| 3001        | hydrochlorothiazide | 12.5 | daily |
| 3001        | sirovaltidine | 200 | TID |
| 3001        | warfarin   | 4            | 3 caps daily |
| 3001        | sinemet 25/100 | 2 tabs tid    | TID |
| 3001        | simvastatin | 1000         | 2 tabs TID |
| 3001        | calcium-va | 600-400      | 2 tabs daily |
| 3001        | folic acid | 1500         | as needed |
| 3001        | atorvastatin | 1000         | daily     |
| 3001        | sinemet 25/100 | 25/100       | tid       |
| 3001        | azilect    | 1           | daily     |
| 3001        | lisinopril | 20           | daily     |
| 3001        | hydrochlorothiazide | 12.5 | daily |
| 3001        | pramipexol | 0.5          | at bedtime |
| 3001        | sinemet 1000 | 200          | daily     |
| 3001        | calcium-va | 600-400      | 2 tabs daily |
| 3001        | atorvastatin | 40           | daily     |
| 3001        | sinemet 25/100 | 25/100       | daily     |
| 3001        | metformin  | 1000         | BID       |
| 3001        | trudorpropril | 40          | daily     |
| 3001        | aspirin    | 81           | 3 caps daily |
| 3001        | gabapentin | 300          | qhs       |
| 3001        | aspirin    | 81           | daily     |
| 3001        | omeprazole | 40           | daily     |
| 3001        | simvastatin | 300         | daily     |
| 3001        | vitamin D3 | 1000         | daily     |
| 3001        | diclofenac | 50           | twice daily |
| 3001        | sinemet CR | 25/100       | at bedtime |
| 3001        | balsalazide | 750         | TID       |
| 3001        | metformin  | 1000         | 2 BID     |
| 3001        | atorvastatin | 40         | daily     |
| 3001        | sinemet 25/100 | 50/200     | 2 caps daily |
| 3001        | troclocromol | 0.1        | daily     |
| 3001        | aspirin    | 81           | daily     |
| 3001        | gabapentin | 800          | 2 tab daily |
| 3001        | dinzepazem | 0.5          | at bedtime |
| 3001        | amantadine | 100          | 2 caps TID |
| 3002        | ropinirole | 2.1          | tid       |
| 3002        | rytary     | 48.75/195    | 3 tabs TID |
| 3002        | ropinirole | 12           | 1 tab daily |
| 3002        | comtan     | 200          | five times a day |
| 3002        | asprin     | 325          | daily     |
| 3002        | sinemet    | 100          | daily     |
| 3002        | amantadine | 100          | four times a day |
| 3002        | sinemet 25/100 | 50/200      | 0.5 tab TID |
| 3002        | calcium-va | 600-400      | daily     |
| 3002        | ropinirole | 2            | TID       |
| 3002        | asprin     | 81           | daily     |
**Supplementary Table 2.** Classification performance. Performance achieved in each task for the 3 different feature sets. Only the classifiers with highest accuracy value are shown. Accuracy is computed as the average (+s.d.) of 50 runs with 10-fold cross-validation. The highest accuracy rate is obtained for picture description using 5 top-rank features. MFCC features are relevant for achieving good performance in the different speech tasks.

| Speech Task (# patients) | Features | Classifiers | Top 5 features | All features |
|-------------------------|----------|-------------|----------------|--------------|
| Picture description (25 patients) | NS | RF | 0.61±0.05 | 0.58±0.04 |
| | SF | RF | 0.77±0.04 | 0.63±0.05 |
| | NS + SF | EN | 0.79±0.07 | 0.65±0.05 |
| | MFCC | EN | 0.54±0.08 | 0.73±0.07 |
| | MFCC + NS | EN | 0.50±0.06 | 0.74±0.04 |
| | MFCC + SF | LR-l1 | 0.89±0.06 | 0.64±0.07 |
| | MFCC + SF + NS | LR-l1 | 0.89±0.05 | 0.63±0.08 |
| Reverse counting (25 patients) | NS | RF | 0.41±0.07 | 0.51±0.05 |
| | MFCC | NB | 0.84±0.02 | 0.64±0.06 |
| | MFCC + NS | RF | 0.79±0.03 | 0.76±0.04 |
| Diadochokinetic rate (24 patients) | NS | LR-l1 | 0.53±0.06 | 0.70±0.05 |
| | MFCC | NB | 0.60±0.07 | 0.56±0.06 |
| | MFCC + NS | NB | 0.58±0.06 | 0.58±0.05 |

**Supplementary References:**
1. Goodglass, H., Kaplan, E. & Barresi, B. *The assessment of aphasia and related disorders.* (Lippincott Williams & Wilkins, 2001).
2. Marshall, R. C. & Wright, H. H. Developing a clinician-friendly aphasia test. *Am. J. Speech-Language Pathol.* (2007).