Fluency is fundamental to assessment, diagnosis, and treatment in aphasia. Yet, the definition and measurement of fluency can be difficult (Gordon, 1998).

The easy, smooth flow of speech can be disrupted in different ways for different reasons:
- Basic word-finding problems can manifest in frequent pauses, revisions, and false starts
- Agrammatism can manifest in telegraphic speech
- Coexisting apraxia of speech can manifest in effortful groping and self-corrections

Fluency is scored with subjective ratings on traditional aphasia batteries.

Research Aims:
- To improve efficiency, reliability, and validity of fluency measurement in aphasia
- To determine how aphasia groups differ on outcome measures of fluency
- To determine which fluency variables predict type of aphasia

Methods

Database
- Cinderella storytelling transcripts from all AphasiaBank (MacWhinney et al, 2011) participants (from first session, if multiple) – 228 controls, 289 PWAs
- (103 Anomic, 72 Broca, 57 Conduction, 26 Wernicke, 31 NotAphasicByWAB-NABW)
- Transcripts were done in CHAT format by trained and experienced transcribers

Transcript Analysis
- FLUCALC CLAN command, provides preconfigured analyses of raw and proportioned counts of individual types of disfluencies from CHAT transcripts time-linked to audio/video files
- Non-task related utterances were excluded
- FLUCALC +t+par +a+b *.cind.cex
- +a gets pause time values from %wor tier, +b selects word mode analyses

Outcome Measures
- % filled pauses (%uh, %um), % word and phrase revisions (%/)), % word and phrase repetitions (%/), % fragments (%+sh) – manually coded into speaker line transcription, for example:
  - PPAR: <and %um she’s all> /[ /] &r-e well they’re all excited (a)bout it.
  - PPAR: and %um &r-um &r-um the [ /] the king wants the prince to get married.
- Intra-utterance pause time (total unfilled pause time, msec), Inter-utterance pause time (msec) – automatic computation from word and utterance alignment
- PPAR: and she heard a giggle. •3148977_3151347• %wor: and •3148977_3150027• she •3150357_3150477• heard •3150617_3150817• a •3150817_3150867• giggle •3150867_3151347•.
- PPAR: and she looked •3153128_3153928• %wor: and •3153128_3153318• she •3153318_3153408• looked •3153408_3153928•.
- Total utterances, total words, words/minute – automatic computation from transcript

FLUCALC greatly increases the speed, efficiency, and reliability of measuring objective fluency behaviors in language samples.

Aphasia groups differ on all fluency variables with one exception (Wernicke, filled pauses).

Together, PC1 and PC2 captured ~60% of the total variance (34.76 and 25.29%, respectively).

PC1 relates mostly to quantity and rate of speech; PC2 relates to fluency (e.g., revisions and repetitions).

Together, PC1 and PC2 captured ~60% of the total variance (34.76 and 25.29%, respectively).

Some NABW and Wernicke participants in the Control group, suggesting good fluency.

The PCA scatterplot and Gaussian Mixture Modeling suggests 3 major clusters based on these fluency variables.

The clusters correspond to Controls, Nonfluent aphasia (Broca’s), and Fluent aphasia (NABW, Anomia, Conduction, Wernicke’s), illustrating the validity of these clinically relevant fluency outcome measures.

We want to repeat these analyses with the same groups on other discourse tasks.

We want to continue to develop and explore the uses of FLUCALC for this population.

References