Development of a Core Function Word Set for Clinical Use

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BACKGROUND

➢ **Discourse Analysis**

- Discourse analysis requires arduous processes, such as transcribing and analyzing language samples (Dietz & Boyle, 2018; Kim et al., 2019)

- External influences such as time constraints and lack of training obstruct application and use of discourse (Maddy et al., 2015)

➢ **Function Words**

- Function word production in discourse is indicative of elaborative phrase or utterance in binding story elements (Halliday & Hasan, 1976)

- Function word production in discourse differs between adults with fluent and non-fluent aphasia (Gordon, 2006; Rochon et al., 2000; Saffran et al., 1989).

- Despite the potential clinical relevance of function word production in PWA, limited attention paid to performance of function word retrieval in PWA' discourse

➢ **Core Lexicon**

- Lexicon-based analysis is time-efficient and highly reliable because clinicians only count how many lexical items are present (MacWhinney et al., 2010)

- Based on previous research, the core lexicon measure differentiated PWA's impaired lexical access from healthy controls (Dalton & Richardson, 2015); and, captured aphasia severity (Kim et al., 2019)

➢ **Purpose of Study**

- We propose a quantitative measure of function word production for clinical practice in the core lexicon framework

RESEARCH QUESTIONS

1. Does production of core function words differ across age groups and narrative elicitation tasks?
2. Does percentage of core function words produced by PWA significantly correlate with aphasia severity ?
3. Does the core set of function words differentiate persons with fluent aphasia from persons with non-fluent aphasia?

METHOD

- Discourse elicitation task stimuli

- To create the core lexicon list, the 25 most commonly used function words were extracted from transcripts of 470 normative samples using Computerized Language Analysis (CLAN, MacWhinney, 2000)

- If PWAs produced any function words in the list, they would receive 1 point, regardless of how many times the word may have been used.

1. Mixed measures ANOVA
- **Participants**: 470 healthy adults (20-80s age group)
- **Discourse tasks**: Two wordless picture books (Picnic & Good Dog Carl)
- **Between-subject variable**: Age groups
- **Within-subject variable**: Two narrative tasks

2. Spearman's correlations
- **Participants**: 11 PWA
- **Variables**:
  - Percent agreement for the function word produced by the PWA
  - Aphasia severity determined by the WAB AQs

3. ROC curve analysis
- **Participants**: 208 PWA samples (Fluent 110; Non-fluent 98) retrieved from AphasiaBank (MacWhinney, 2000)
- **Discourse tasks**: Cinderella story
- **Dependent variable**: Fluent vs Non-fluent aphasia
- **Independent variable:** Function word production using the core lexicon list

RESULTS

- RQ1: Does core function word production differ across age groups & task?
  - ✓ Sig. main effect for the narrative task, $F(1, 452) = 9.009$, $p = .003$
    - ✓ Cognitively healthy adults produced slightly more core function words for *Picnic* compared to *GDC* using age-invariant core lexicon list
  - ✓ No main effect for age
  - ✓ Sig. two-way interaction, $F(6, 452) = 2.616$, $p = .017$
    - ✓ 50s cohort produced more core function words for *GDC* than *Picnic* using age invariant core lexicon list

- RQ2: Correlations between core function words aphasia severity?
  - ✓ Sig. correlations for *GDC*, $r = .825$, $p < .001$
  - ✓ Sig. correlations for *Picnic*, $r = .589$, $p < .001$
  - ✓ Sig. correlations for combined story, $r = .877$, $p < .001$

- RQ3: Does core function words differentiate aphasia types?
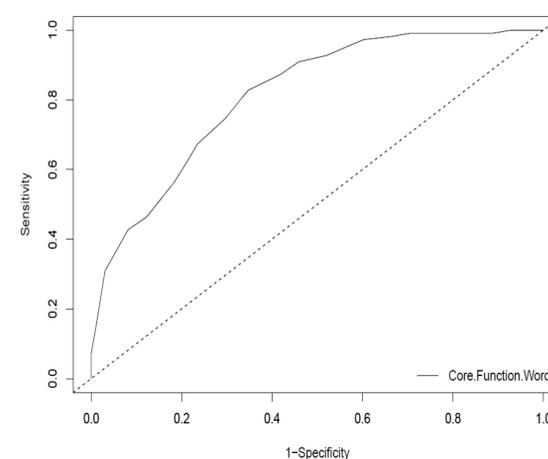
- ✓ Cut-off score of 12 out of 25
- ✓ Sensitivity: 82.7% ; Specificity: 65.3%
- ✓ AUC: .814 (95% CI [.757, .871], $p < .001$)

Selected references
- Dalton, S. G., & Richardson, J. D. (2015). Core-lexicon and main-concept production during picture-sequence description in adults without brain damage and adults with aphasia. American Journal of Speech-Language Pathology, 24(4), S923-S938.
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- Kim, H., Kintz, S., Zelnosky, K., & Wright, H. H. (2019). Measuring word retrieval in narrative discourse: core lexicon in aphasia. International journal of language & communication disorders, 54(1), 62-78.
- MacWhinney, B., Fromm, D., Holland, A., Forbes, M., & Wright, H. (2010). Automated analysis of the Cinderella story. Aphasiology, 24(6-8), 856-868.

DISCUSSION

- Age does not play a significant role in core function word production
  - The average English speaker uses a limited number of function words (approximately 40) in their daily life (Baayen et al., 1995)

- Discourse elicitation stimuli was a factor to consider for function word production
  - Different discourse structures and characters lead to unique function words required to build the story

- The strongest, significant correlations were found between the core function word list based on the combined story and aphasia severity

- The core set of function words was an accurate classifier for differentiating participants with fluent aphasia from participants with non-fluent aphasia

- The results highlight the potential of the tool as a reliable and time-efficient diagnostic tools suitable for clinical settings

- Future studies should consider a systematic approach for establishing criterion for determining core lexicon items for higher accuracy