Novel Web Applications to Facilitate Discourse Analysis in Everyday Clinical Practice

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Summary

While individuals with aphasia have identified connected speech as a priority for SLP services (Wallace et al., 2017), the clinical feasibility of using connected speech or discourse assessments and outcome measures remains limited. Everyday clinical practice allows substantially less face-to-face time between individuals with aphasia and their clinicians than is typical in research settings (Cavanaugh et al., 2021), so it is not surprising that clinicians cite time as the primary barrier to using discourse outcome measures in practice (e.g., Bryant et al., 2017). Successful implementation of discourse outcome measurement in clinical practice requires careful attention to the time required of clinicians. Checklist-based discourse measures are one potential solution to this challenge, reducing the need for time-consuming and specialized transcription and coding (Richardson et al., 2021). However, these measures can still consume highly coveted clinical time for training, resource access and management, and scoring.

The purpose of this technical session is to present clinicians with two novel, free web applications which aim to provide an all-in-one and intuitive solution to facilitate training, efficient scoring, and continuing education on two checklist-based measures (Core Lexicon and Main Concept Analysis). It will include a brief overview of these two measures and their clinical use-cases followed by a demonstration of the use of the two companion web applications which are designed to further reduce the time required to use these measures in clinical practice. During the Q&A, attendees are encouraged to ask questions about checklist- based measures, discuss potential barriers to the use of these measures, and provide feedback on the application.

Links

Online Manual: https://drive.google.com/drive/u/0/folders/1bxazjgQWx-WD8ELTJjwBm_5IToRpgQhQ

Foqus Aphasia talk #1: https://www.youtube.com/watch?v=pxzJ4mE9xEE
Foqus Aphasia talk #2: https://www.youtube.com/watch?v=J_XVqHXNANk

CoreLexicon Web Application: https://rb-cavanaugh.shinyapps.io/coreLexicon
Main Concept Analysis Web Application: https://rb-cavanaugh.shinyapps.io/mainConcept

CoreLexicon Feedback and bug reports: https://github.com/rbcavanaugh/coreLexicon
MainConcept Feedback and bug reports: https://github.com/rbcavanaugh/mainConcept

Theoretical Background

CoreLex (Dalton & Richardson, 2015) is a micro-linguistic discourse measure based on a normed checklist of lexemes specific to a stimulus (e.g., The Broken Window picture). The CoreLex score is defined by the count of the total number of lexemes on the checklist produced by an individual. CoreLex scores are sensitive to age-related changes in healthy controls and to the presence of aphasia. They are also sensitive to aphasia subtypes and overall fluency. CoreLex scores are correlated with other discourse measures and standardized tests, suggesting that it is likely a strong measure of overall discourse-level language performance.

MCA is a hybrid micro/macro linguistic measure that incorporates aspects of discourse quantity, accuracy, and completeness (Nicholas & Brookshire, 1995; Richardson & Dalton, 2016). Main concept checklists consist of information commonly produced by healthy control participants. Each concept has multiple essential elements which are scored for accuracy and completeness. Main concept scores are sensitive to the presence of acquired and progressive aphasia and are correlated with standardized assessments. There is also preliminary evidence in support of their use to measure treatment outcomes.

Development of the novel web applications

While both CoreLex and MCA present clinicians with substantial time savings by minimizing the need for close transcription or discourse coding, hand-scoring of checklists can still be time-intensive, particularly for discourse stimuli that elicit longer samples (e.g., the Cinderella story) and include more CoreLex lexemes and main concepts. To address this challenge, we have developed two companion web applications using the open-source software R (R Core Team, 2020) and the "Shiny" R Package (Chang et al., 2021) specifically for clinical and research use. The CoreLex application leverages R's natural language processing tools to identify lexemes from orthographic transcripts and matches these lexemes with the Corelex checklists. The MCA application similarly parses orthographic transcripts and provides an easy-to-score interface for each discourse stimulus. Additionally, the MCA application includes a training module with immediate feedback for clinicians new to MCA.

Both applications automate the aggregation of final scores and provide a summary page with total scores and percentiles based on average norms relative to healthy controls and other individuals with aphasia. They also allow users to download a spreadsheet of their data and a PDF report. No data is stored by the applications. Finally, both applications are built using free, open-source software and will remain free to clinicians.

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