Gist and Coherence during Picture Descriptions in Persons with Mild Aphasia

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Introduction

- Narratives are the basis of daily conversational interactions, but deficits are present in even the mildest aphasia subtypes.[1-4]
- Most discourse research to date has focused at or below the level of the sentence[5]; more information about supra-sentential narrative abilities is needed, especially to characterize deficits in persons with mild aphasia.
- Of particular interest is how persons with aphasia are able to convey the main ideas of a narrative in a coherent fashion, so that consecutive utterances are related to each other (local coherence) and to the overarching topic (global coherence).[6,7]
- Main Concept Analysis (MCA) measures how accurately and completely an individual produces the gist or essential elements of a story,[8] and has been used as a measure of coherence.[9]
- However, it is quite common for persons with aphasia to be able to produce full or partial main concepts in an incoherent manner that is not conducive to the creation of an accurate mental representation of the story on behalf of the listener.

In a sequential picture description task, we will:

- **Specific Aim 1: determine differences between controls and individuals with mild aphasia on measures of local and global coherence.**
- **Specific Aim 2: determine differences between controls and individuals with mild aphasia on gist production.**
- **Specific Aim 3: determine the relationship between measures of gist production and coherence.**

Methods

Participants

- Transcripts from 119 healthy control participants, 27 persons who identify as speech-language impaired post-stroke but scored above the cutoff on the WAB (not aphasic by WAB; NABW), and 92 persons with anomic aphasia were obtained from AphasiaBank.
  - **Anomic:** 38 females and 54 males; Mean 63.8 years (13.8 SD); range 32.8-93.4 years; 87 Caucasians, 3 African Americans, 2 Hispanic/Latino.
  - **NABW:** 17 females and 10 males; Mean 62.9 years (15 SD), range 26 – 95 years; 24 Caucasians, 2 Hispanic/Latino, 1 African American.
  - **Healthy Controls:** 55 females and 64 males; Mean 63.6 years (15.4 SD); range 29.9-89.5; 116 Caucasians, 2 Hispanic/Latino, 1 African American.

Discourse Production

- All participants completed a sequential picture description (Broken Window).

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Methods (Continued)

1 – Main Concept Analysis

- Transcripts were scored for the presence, accuracy, and completeness of MCs previously identified by Richardson and Dalton[10] according to established criteria[8] and given one of the five following codes: Accurate/Complete (AC); Accurate/Incomplete (AI); Inaccurate/Complete (IC); Inaccurate/Incomplete (II); and Absent (AB). For a composite score, a numeric value (0-3) was assigned to each code:
  - AC=3, AI=2, IC=2, II=1 and AB=0 (adapted from Kong[11])

2 – Coherence Analysis

- Each utterance received a score of 1-5 for global coherence (where 1 did not relate at all to the topic, was unintelligible, or was a comment on the discourse, and 5 included concrete information related to the topic) and a score of 1-5 for local coherence (where 1 indicated a radical topic shift, unintelligible utterance, or a comment on the discourse, and 5 indicated a relation through continuation, elaboration, repetition, subordination or coordination of ideas from the preceding utterance). [6,12]
- Due to the low frequency of 2 and 4 ratings, "low" (scores of 1 and 2), "medium" (scores of 3), and "high" (scores of 4 and 5) bins were used.[12]
- Inter-rater reliability for all measures was above 90% (90.7%-100%).

Data Analysis

- Data were screened for assumptions of the planned analysis, including an evaluation of normality (skewness, kurtosis), linearity, and monotonicity (visual inspection). Since the data was not normal, median-tests and Spearman's rho were used. Holm-Bonferroni correction for multiple comparisons was used.
- For **Specific Aims 1 and 2**, median-tests were calculated between controls and individuals with mild aphasia on measures of local and global coherence as well as MC Composite scores.
- For **Specific Aim 3,** two-tailed correlations using Spearman's *rho* were calculated between the MC Composite scores and global and local coherence scores for all participants, controls, and individuals with mild aphasia.

Results

- We found significant differences between controls and individuals with mild aphasia for both MC Composite scores and all global and local coherence measures, except scores of medium local coherence (see Table 2).
- Moderate correlations were found between MC Composite scores and global and local coherence measures for all participants, weak correlations between these measures for individuals with mild aphasia, and no statistically significant correlations between these measures for controls (see Table 1 and Figure 1).

Discussion

- There is a need for more clinician-friendly supra-sentential narrative measures that are likely to outperform sentential level measures when predicting real-world conversational abilities.
- These measures are especially relevant for patients with mild aphasia types, whose deficits may not be apparent on standardized assessment measures but still affect functional conversational abilities and social participation.
- We found that MC scores for the mild aphasia group were significantly lower than those of the healthy control group, confirming that MC measures can detect deficits in the ability to communicate the gist of a story in even the mildest aphasia types.

Table 1. MC Composite and Coherence Scores Comparisons (Controls & All Mild Aphasia)

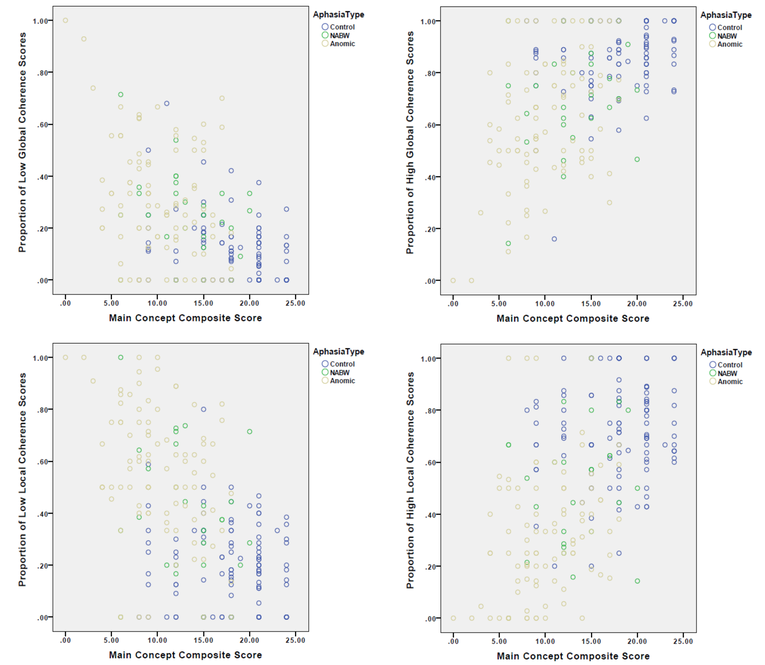
	Median Test Results		
Low Global*	$\chi^2 = 63.180, p < .001$	Low Local*	$\chi^2 = 90.200, p < .001$
Medium Global*	$\chi^2 = 15.411, p < .001$	Medium Local	$\chi^2 = 2.840, p = .092$
High Global*	$\chi^2 = 64.610, p < .001$	High Local*	$\chi^2 = 87.132, p < .001$
MC Composite*	$\chi^2 = 71.053, p < .001$		

* = significant difference

Table 2. MC Composite and Coherence Scores Correlations

	All Participants	Mild Aphasia	Healthy Controls
Low Global	*rho* = -.465, $p < .001$	*rho* = -.244, $p = .007$	*rho* = -.133, $p = .149$
Medium Global	*rho* = -.274, $p < .001$	*rho* = -.244, $p = .007$	*rho* = -.033, $p = .723$
High Global	*rho* = .493, $p < .001$	*rho* = .312, $p = .001$	*rho* = .132, $p = .151$
Low Local	*rho* = -.521, $p < .001$	*rho* = -.337, $p < .001$	*rho* = -.034, $p = .712$
Medium Local	*rho* = -.094, $p = .148$	*rho* = .016, $p = .867$	*rho* = -.021, $p = .820$
High Local	*rho* = .547, $p < .001$	*rho* = .361, $p < .001$	*rho* = .077, $p = .406$

Figure 1. Correlation between MC Composite Scores and Coherence Scores



Discussion (Continued)

- For the first time, this study revealed that local and global coherence measures can detect another aspect of narrative ability in mild aphasia.
- Although there is a weak correlation between the MC composite and coherence scores for people with mild aphasia, it cannot be claimed that performance on one measure will predict performance on the other.
- In fact, we found no significant correlation between the two measures in healthy controls, revealing that the two scoring protocols measure different aspects of narrative production.
- We present MC and coherence scoring protocols as functional and meaningful narrative assessment tools for clinicians.