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The relationship between language impairment and narrative organisation: New methods to measure deviation from the "typical structure"

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Introduction

Effective communication involves complex structures at different levels, including organization within utterances (microstructure), and narrative discourse emerging from the combination of utterances (macrostructure). Investigations into the relationship between micro- and macrostructure help understand the impact of aphasia on communicative success.

Previous investigations primarily focused on number of errors on both levels (e.g. grammatical errors, coherence errors), measures of informativeness, and modalising behavior, such as highlighting important aspects of the narrative (Andreetta et al., 2012; Andreetta & Marini, 2015; Linnik et al., 2016; Olness et al., 2010).

Our study applies a new frequentist approach, which, instead of deciding whether a part of the narrative contains an error, determines how typical each chunk of the narrative is in relation to the control group.

Methods

We collected "Dinner Party" comic narrative samples from 20 English speaking people with aphasia (convenience sampling), and 30 controls. At the level of microstructure, we examined a range of variables including Word Count, Mean Length of Utterance, language errors (split into lexico-semantic and grammatical errors), and grammatical complexity. At the level of macrostructure, we were interested in the basic propositions narrating the story (e.g., "the man washes the dishes"), and qualitative descriptors, which add to the narrative by adding evaluation and judgment (e.g., "he is not going to get away with that").

Based on control data, we made a list of basic propositions and measured their frequency, using concepts from the artificial language learning literature (Knowlton & Squire, 1994). The new variable, "Associative Chunk Strength" (ACS), captures how typical a given part of the narrative is, in reference to the control data. We further counted the number of Qualitative Descriptors in each sample and computed a ratio by dividing the number by word count.

Results

As expected, participants with aphasia differed significantly on several microstructural variables. Participants with aphasia had a shorter MLU, produced less complex grammatical structures, and made more referential and syntactic errors (all $p < .001$). At the

macrolevel, the groups did not differ in their structure of basic propositions ($p = .20$), but produced fewer qualitative descriptors ($p = .02$). For a selection of comparisons, see Figure 1.

Backward stepwise regressions identified MLU as the microstructure variables that was the best predictor of ACS and the amount of qualitative descriptors in speakers with aphasia ($p < .001$).

Conclusions

Despite substantial language impairment, the basic narrative organization of narrative samples was similar between groups. However, speakers with aphasia showed a marked decrease in evaluating statements, which strongly support communication. Deviations from controls are predicted most strongly by MLU.

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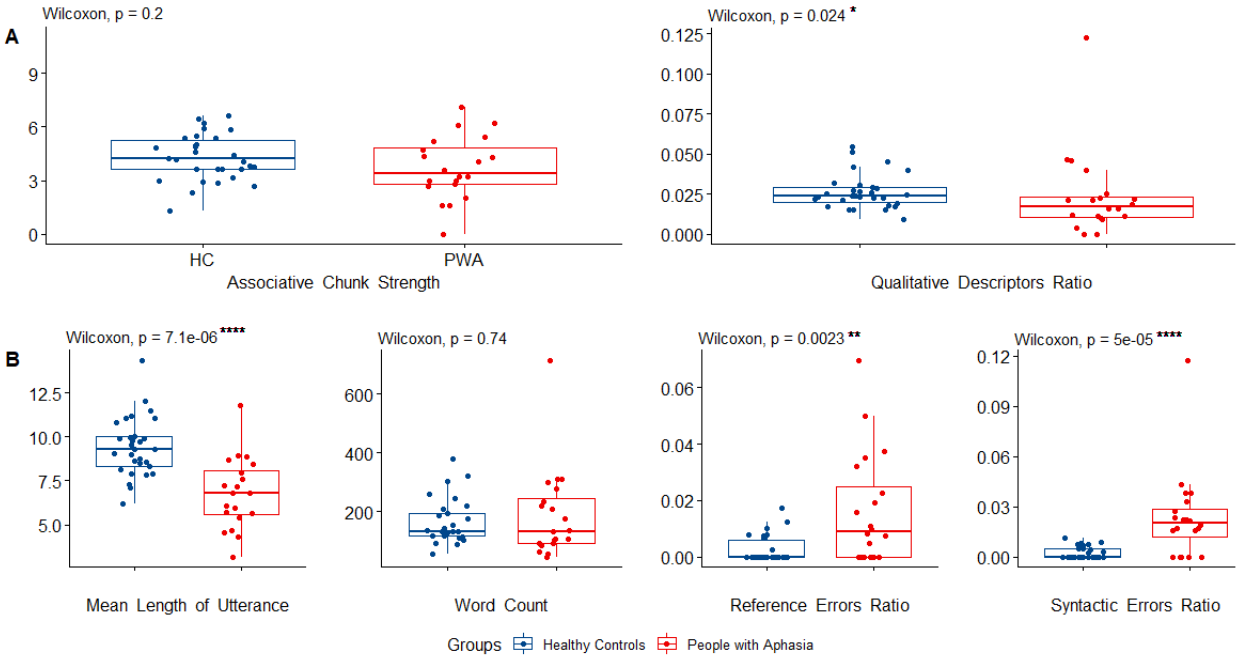

Figure 1. Comparisons between aphasic and control groups. We used unpaired two-samples Wilcoxon tests for inferential comparisons. People with aphasia produced fewer qualitative descriptors, produced shorter utterances, and made more mistakes. There was no difference in basic propositional structure (Associative Chunk Strength).