Story Grammar Analysis in Persons with Mild Aphasia

Introduction

Narratives are often the basis of daily conversational interactions. When narrative skills are compromised, functional conversation is negatively impacted. Narrative coherence can be impacted even in clinical populations with mild word-finding deficits, such as anomic aphasia (Andreetta, Cantagallo, & Marini, 2012). The narrative abilities of those individuals who have had a stroke (and perhaps a previous aphasia diagnosis) but who perform within the normal range on standardized aphasia assessment measures have not been characterized. As every clinician/clinical researcher knows, this subgroup still includes individuals who have difficulty in conversation, who cannot return to work, and whose life participation is negatively impacted. Using AphasiaBank categorization (as this study relies on AphasiaBank transcripts), we refer to this subgroup as "not aphasic by WAB" (NABW). In both persons with anomic aphasia (PWaAs) and NABWs, deficits may be so minor that they are not apparent on traditional standardized assessment measures, but it should not be assumed that they do not exist and do not affect functional communication abilities. Unfortunately, there is often very little help to be offered for this population. In order to continue progressive development of interventions for PWaAs and NABWs, more information regarding narrative strengths and weaknesses in this population is needed.

Story grammar analysis is a well-known method of analyzing narrative discourse in several clinical populations and is likely to be sensitive to differences between closely matched groups. The specific aims of this study are to 1) determine if there are differences between PWaAs, NABW, and non-brain injured controls (NBIs) on production of story grammar components during retelling of the Cinderella story, and 2) to examine the relationship between story grammar measures and an easily and quickly derived discourse measure called CoreLex to further characterize the relationship between micro- and macro-level processes in persons with mild aphasia.

Methods

Transcripts

Thirty transcripts were retrieved from the AphasiaBank database, matched for gender, race, years of education, and age.

- 10 (NBIs): 6 male/4 female, 10 Caucasian, age 36.0-82.3 years (M=59.5, SD=14), education 11-18 years (M=15.4, SD=2.07)
- 10 NABWs: 6 male/4 female, 10 Caucasian, age 35.5-80.6 years (M=60.9, SD=14.2), education 12-19 years (M=15.7, SD=2.06), WAB AQ 93.8-99.6 (M=96.4, SD=2.21)
- 10 PWaAs: 6 male/4 female, 10 Caucasian, age 34.4-83.2 years (M=53.7, SD=12.7), education 12-20 years (M=15.2, SD=1.79), WAB AQ 88.3-93.4 (M=91, SD=1.68)

Story Grammar Coding

The Cinderella story was chosen for analysis because of its length and complexity, making it a good candidate for predicting conversational speech. Cinderella transcripts were extracted from AphasiaBank database and divided into relevant concepts (RCs), defined as utterances about the story that contained a subject, one main verb, and object; the utterance could contain subordinate clauses, but must contain only one main verb (adapted from Nicholas & Brookshire, 1995). Each RC received one of the following story grammar component codes (for definitions, see Roth & Spekman, 1986): 1) Setting, 2) Initiating Event, 3) Response, 4) Plan, 5)

Attempt, 6) Direct Consequence, or 7) Reaction. Following coding, the following variables were calculated:

- Story Length: the total number of RCs that received a story grammar component code.
- Story Component Usage: the frequency of use of the different story components.
- Core Lexicon (CoreLex): the total number of words spoken in the transcript that have been identified in previous research as the core lemmas spoken by 50% of AphasiaBank control participants (e.g., Cinderella, prince, run, slipper, etc.) (Author2, Dillow, Author1, 2013).

Data Analysis

Previous preliminary research demonstrated differences between NBIs and PWaAs for story grammar components (Author1, Author2, Saunders, & Payne, 2013), therefore omnibus testing was not performed in this small N exploratory study. Wilcoxon signed-rank tests (two-tailed) were used to compare performance between NBI v. NABW, NBI v. PWaA, and NABW v. PWaA for each story component code and for Story Length. Spearman's rank order correlations (rho) (two-tailed) were conducted to determine if a positive relationship existed between CoreLex and Story Length for each group.

Results

NBIs had the numerically highest values for all story grammar variables. NBIs were significantly different from NABWs for Story Length ($z=-2.395$, $p=.017$), "Setting" ($z=-2.144$, $p=.032$), "Response" ($z=-2.109$, $p=.035$), "Direct Consequence" ($z=-2.145$, $p=.032$), and "Reaction" ($z=-2.810$, $p=.005$). NBIs were significantly different from PWaAs for Story Length ($z=-2.091$, $p=.037$), "Attempt" ($z=-2.322$, $p=.020$), and "Reaction" ($z=-2.539$, $p=.011$). The only significant difference observed between PWaAs and NABWs was for the story component "Reaction", $z=-2.280$, $p=.023$.

Spearman rho results for CoreLex – Story Length relationships are as follows: NBI, $r_s(8) = .567$, $p =.043$; and identical results for NABW and PWaA, $r_s(8) = .784$, $p =.004$.

Discussion

Communication deficits were not captured by WAB or WAB-R AQ scores in the clinical population studied (NABW, PWaA), as all were performing at or near ceiling. Story grammar analysis reveals significant differences between NBIs and both NABWs and PWaAs for Story Length and other story component codes. Reduced story length and missing story components negatively impact story coherence, so it is likely that the narratives of the clinical population under study were less coherent than their typical peers.

Strong correlations between CoreLex and Story Length were observed for both brain-injured groups under study. Word-finding deficits, characterized here as decreased production of core lexical items produced by typical peers (CoreLex), are a likely contributor to the reduced usage of story components (i.e., microlinguistic deficits contributing to macrolinguistic deficits). This is consistent with previous research (Andreetta, Cantagallo, & Marini, 2012) where microlinguistic variables (e.g., speech rate, MLU, % semantic paraphasias, % complete sentences) seemed to contribute to errors of local and global coherence. The correlation between CoreLex and Story Length is stronger in the clinical populations versus NBIs, and one interpretation is that the reduced vocabulary is driving the reduced story in NABWs and PWaAs.

Though this study has a small sample size and is meant to be exploratory in nature, it is consistent with previous studies demonstrating narrative differences between NBIs and PWaAs, and is the first study to reveal that the population of NABWs has a profile more similar to PWaAs than NBIs. These narrative differences probably predict performance in everyday

conversational tasks, but these clinical populations in particular usually receive very little, if any, treatment geared towards these deficits. Traditional naming therapy is unlikely to result in improved narrative performance, as they are already performing at ceiling. Treatment tasks involving word-finding in narrative and conversation would be most beneficial. Perhaps this and future studies can be used to inform treatment decisions and prevent premature suspension of treatment that is based on traditionally administered assessment measures.

References

Andreetta, S., Cantagallo, A., & Marini, A. (2012). Narrative discourse in anomic aphasia. *Neuropsychologia, 50*(8), 1787-1793.

Author2, Dillow, E. P., & Author1. (2013). Core lexicon analysis: Efficient assessment of narrative discourse in persons with aphasia. Technical research session presented at Annual Convention of the American Speech-Language-Hearing Association. Chicago, Illinois.

Nicholas, L. E., & Brookshire, R. H. (1995). Presence, completeness, and accuracy of main concepts in the connected speech of non-brain-damaged adults and adults with aphasia. *Journal of Speech, Language, and Hearing Research, 38,* 145-156.

Author1, Author2, Saunders, W., Payne, V. (2013). Story Narrative in Anomic Aphasia: Analysis of Story Grammar Components. Poster presented at the Annual Convention of the Speech-Language Hearing Association. Chicago, Illinois.

Roth, F. P., & Spekman, N. J. (1986). Narrative discourse: Spontaneously generated stories of learning-disabled and normally achieving students. *Journal of Speech and Hearing Disorders*, *51*(1), 8.