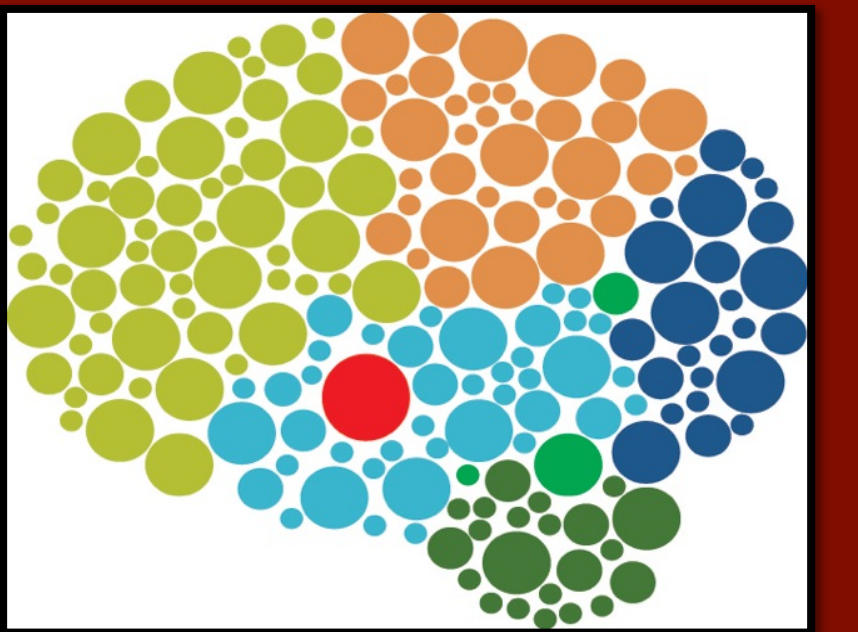




Story Grammar Analysis in Persons with Mild Aphasia

Jessica D. Richardson & Sarah Grace Hudspeth

Neuroscience of Rehabilitation Laboratory, Department of Communication Sciences and Disorders
University of South Carolina, USA



Background

- Narratives are often the basis of daily conversational interactions. When narrative skills are compromised, functional conversation is negatively impacted.
- Narrative coherence can be impacted in persons with anomic aphasia (PWaAs).¹
- Narrative abilities of individuals who have had a stroke (and perhaps previous aphasia diagnosis) but who perform within normal limits on standardized aphasia assessment measures (e.g., “not aphasic by WAB” or “NABW”) have not been characterized.
- In order to continue progressive development of interventions for PWaAs and NABWs, more information regarding narrative strengths and weaknesses is needed.
 - These individuals have little to no therapeutic options, but still have difficulty in conversation, may not be able to return to work, and may demonstrate reduced life participation.
- Story grammar analysis is a well-known and commonly used narrative analysis method.
- **Aim 1:** To determine if there are differences between PWaAs, NABWs, and non-brain-injured controls (NBIs) on production of story grammar components during telling of the Cinderella story.
- **Aim 2:** To examine the relationship between story grammar measures and an easily and quickly derived discourse measure called CoreLex.

Methods

Database

- Thirty Cinderella story transcripts (10 per group) were retrieved from the **AphasiaBank**² database, matched for gender, race/ethnicity, age, years of education, and handedness. See **Table 1**.

Table 1	PWaA	NABW	NBI
Age	53.7 (+/- 12.7)	60.9 (+/- 14.2)	59.5 (+/- 14)
Education	15.2 years (+/- 1.79)	15.7 (+/- 2.06)	15.4 (+/- 2.07)
Gender	6 male, 4 female	6 male, 4 female	6 male, 4 female
WAB-RAQ	91 (+/- 1.68)	96.4 (+/- 2.21)	--

Story Grammar Coding

- Transcripts were divided into relevant concepts (RCs) (i.e., utterances about the story that contained a subject, one main verb, and object).
 - May contain subordinate clauses, but must contain ONLY ONE MAIN verb.³
- RCs received a story grammar code.⁴ See **Table 2**.
- The following were calculated:
 - **Story Length** = total number of RCs that received a story grammar code
 - **Story Component Usage** = frequency of use of seven different story components
 - **Core Lexicon (CoreLex)**⁵ = 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, clean, wand, etc.)

Data Analysis

- Aim 1: Wilcoxon Signed-Rank Tests (two-tailed)
- Aim 2: Spearman’s Rank Order Correlation (rho) (two-tailed)

Table 2. Story Grammar Components³.

Blue text indicates NBI participants’ examples of story grammar components. Red text indicates PWaAs and NABW participants’ examples.

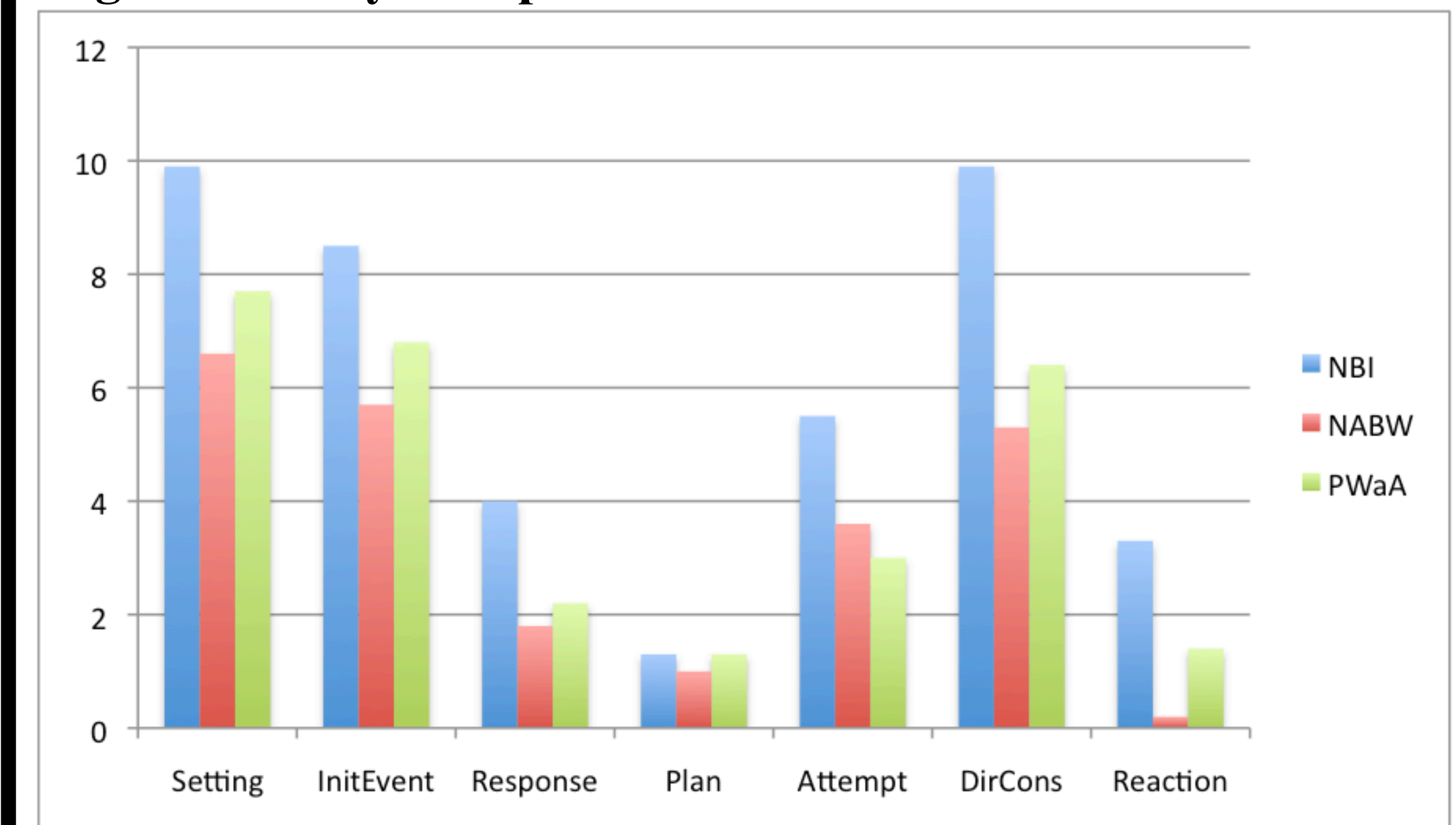
Component	Description
1. Setting	Habitual or static states of characters and locations. <ul style="list-style-type: none">• Major setting, Minor setting<ul style="list-style-type: none">• Cinderella is friends with all the animals.• The prince needs to get married.• They yell at the little girl all the time.• The new wife was /delis/... mean.
2. Initiating Events	The immediate cause for a response on the part of the protagonist. <ul style="list-style-type: none">• Natural Occurrence, Action, Internal Event, Verbalization<ul style="list-style-type: none">• They got an invitation for the ball.• The prince showed up at Cinderella’s house.• Well, the fairy godmother came along.• And all of a sudden the clock started to the clock began to strike at midnight.
3. Response	The psychological state of the character after the initiating event or a verbal response to the situation. <ul style="list-style-type: none">• Affective response, Goal, Cognition<ul style="list-style-type: none">• Cinderella was so sad.• She remembers the fairy godmother said she must be home by midnight.• Prince wanted to find her.• And eleven fifty, [she] panicked.
4. Plan	Statements that specify a character’s strategy for obtaining the goal. <ul style="list-style-type: none">• He will use the glass slipper that she lost.• Well, you will need horses and a coach to ride.• He want to see if she, she wear, will, she will wear the sleeper, the glass slipper.• We have to find the person who can fit this shoe.
5. Attempt	The character’s overt action(s) to obtain the goal. <ul style="list-style-type: none">• The fairy godmother gets Cinderella into the carriage.• The two evil stepsisters try on the slipper.• So the stepmother, stepsisters try to hear, fit the slipper.• The animal, the birds, the... sneak Cinderella the keys.
6. Direct Consequence	The character’s success or failure at attaining the goal(s); any changes in the sequence of events resulting from the character’s actions. <ul style="list-style-type: none">• Natural occurrence, Action, End State<ul style="list-style-type: none">• She lost one of her glass slippers.• Cinderella and the prince lived happily ever after.• Oh, the other sister-in-laws were too big for the foot.• The slipper is fitting the, on the /smdaeladz/.
7. Reaction	The way the character feels or reports feeling about the outcome; the character’s thoughts regarding success or failure. <ul style="list-style-type: none">• Affect, Cognition, Action<ul style="list-style-type: none">• The prince is upset that she ran away.• The prince realizes Cinderella is the one.• The girls, the, the sisters there were very very surprised.• The stepmother and the sisters gasp.

References

1. Andreetta, S., Cantagallo, A., & Marini, A. (2012). Narrative discourse in anomic aphasia. *Neuropsychologia*, 50(8), 1787-1793.
2. MacWhinney, B., Fromm, D., Forbes, M., & Holland, A. (2011). AphasiaBank: Methods for studying discourse. *Aphasiology*, 25(11), 1286-1307.
3. 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
4. Roth, F. & Spekman, N. (1986). Narrative discourse: Spontaneously generated stories of learning-disabled and normally achieving students. *Journal of Speech and Hearing Disorders*, 51, 8-23.
5. Richardson, J.D., Hudspeth, S.G., & Dillow, E.D. (in prep). Does use of a core lexicon predict narrative adequacy as measured by main concept production?

Results

Figure 1. Story Components



- 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-RAQ scores in our PWaAs and NABWs, as all were performing at or near ceiling.
- Story grammar analysis revealed significant differences between NBIs, NABWs and PWaAs in this study.
 - Reduced story components (and thus length) likely results in reduced story coherence in NABWs and PWaAs.
 - NABWs have a profile more similar to PWaAs than NBIs.
- Word-finding deficits may contribute to reduced usage of story components (microlinguistic deficits contributing to macrolinguistic deficits¹).
 - The correlation between story length and CoreLex is greater in PWaAs and NABWs than NBIs, and one interpretation is that reduced vocabulary drives the reduced story in these individuals.
- Traditional word retrieval therapy (e.g., naming) is unlikely to result in improved narrative performance in these populations. Word-finding in narrative and conversation would be most beneficial.
- Story grammar and other discourse analyses consistently reveal marked differences between PWaAs and controls, even when treatment has been suspended because of high levels of performance.
 - Narrative discourse, and not traditional assessment measures, may be a better candidate for decision-making regarding treatment termination, more consistent with the shifting focus to life participation and quality of life as treatment outcomes.

Acknowledgements: The authors would like to thank the Chapman Foundation for financial support, AphasiaBank developers and contributors, and Whitney Saunders for her work on this project.