Word Retrieval Treatments for Aphasia: Connected Speech Outcomes

Abstract:

We examined changes in connected speech in individuals with aphasia following errorless naming treatment and gestural facilitation of naming administered in a single-participant crossover design. In addition to picture naming, participants completed two connected speech tasks during baseline and after each training phase. Positive training effect sizes in picture naming were associated with increased use of Correct Information Units and substantive nouns in connected speech. Greater use of CIUs and substantive nouns were evident for a questions task over a picture description task. Open-ended questions tended to be more effective than picture description for documenting speech changes associated with treatment.

Summary:

The primary outcome measure used in most word retrieval treatment studies in aphasia has been percent improvement in oral picture naming, a measure of language functions (WHO, 2001). Only a small portion of studies have also reported treatment outcomes for measures of communication activities/participation, which some argue represents the true impact of our aphasia treatments for real-life communication needs (Hickin et al., 2001). Such measures would include analyses of patterns of aphasic discourse over time.

Several methods exist for analysis of aphasic discourse, many of which focus on lexical properties of the discourse (Arkin & Mahendra, 2001; Berndt et al., 2001; Luzzatti et al., 2006; Mayer & Murray, 2003; Nicholas & Brookshire, 1993). Fewer of these measures have been implemented to measure discourse changes associated with word retrieval treatment. Boyle and Coelho (Boyle, 2004; Coelho, McHugh, & Boyle, 2000) analyzed Correct Information Units (Nicholas & Brookshire, 1993), which measure the informativeness of the words spoken in discourse. Several studies have coded the use of nouns and verbs in discourse following word retrieval treatment. Hickin et al (2005) reported increased conversational use of nouns following word retrieval treatment. Del Toro et al. (2008) found that word retrieval treatment led to increases in noun use along with increases in a Units of New Information, which is sensitive to novel meaningful contributions provided in discourse.

A number of treatment methods have been proposed to address word retrieval impairments so common in various forms of aphasia, including errorless naming treatments (ENT)(Fillingham et al., 2005, 2006) and gestural facilitation of naming (GES)(Rose, 2006; Attard et al., 2012; Marshall et al., 2012; Raymer et al., 2006). While both approaches show positive changes on picture naming tasks, a recent investigation showed some advantage of the errorless treatment over gesture treatment for individuals with moderate-severe aphasia (Raymer et al., 2012). What has not been systematically investigated is the impact of ENT and GES for discourse outcomes. The purpose of the current study was to examine changes in connected speech patterns following two phases of word retrieval treatment in aphasia, errorless naming treatment (ENT) and gestural facilitation of naming (GES).

Methods: Six right handed participants (2 men, 4 women; age 40-78 yrs; 11-16 years education) with aphasia following left hemisphere stroke (6-30 months post onset) took part in

this treatment study. Standardized aphasia testing with the Western Aphasia Battery (Kertesz, 2007) indicated that 5/6 had nonfluent forms of aphasia (Aphasia Quotients ranged 49.3-70.0) and the Boston Naming Test (Kaplan et al., 2001) indicated that all had pronounced word retrieval impairments (scores ranged 2-23/60 correct). Lexical testing indicated that two had additional word comprehension deficits indicative of a semantic anomia, whereas the other four had adequate comprehension, suggesting a pattern of phonologic anomia.

The treatment study incorporated a single-participant crossover design in which participants received ENT and GES in counterbalanced order. Participants were seen for up to 20 treatment sessions per phase. In addition to a daily probe picture naming task, reported in an earlier publication, participants completed standardized aphasia testing and two connected speech tasks during baseline and after each training phase. One speech task required responses to four open-ended questions, and the other required telling a story for four Norman Rockwell pictures. Language samples were transcribed and methods from the Quantitative Production Analysis (Berndt et al., 2001) were used to prepare the transcripts for coding. Two trained examiners who were blind to baseline and treatment conditions coded the total number of words, and the numbers and percentages of Correct Information Units (CIUs), substantive nouns, and vague nouns relative to total words. Results were analyzed statistically to examine differences in connected speech performance across time (ANOVA: baseline vs post-ENT vs post-GES; t-tests: baseline vs post-treatment 2), and between the two discourse tasks (picture description vs. response to questions). Correlations were calculated for picture naming effect sizes, baseline standardized test results, and connected speech outcomes.

Results: Although changes from baseline to post-training displayed in Table 1 show increased use of CIUs and substantive nouns, and decreased use of vague nouns, these changes were not significant, and no differences were evident between treatments. Significantly greater use of CIUs (t=2.83, p=.04) was noted following GES training for the questions task over the picture description task. Likewise, significantly greater use of substantive nouns (t=2.55, p=.05) was noted following ENT training for the questions task over the picture description task.

Correlations demonstrated significant relationships between poor comprehension abilities in baseline standardized testing and increased use of vague nouns in connected speech for pretreatment and post-treatment administrations. The higher the baseline WAB AQ, the greater the use of substantive nouns following both types of training. Positive training effect sizes (d= mean post-treatment – mean baseline/baseline standard deviation; Busk & Serlin, 1992) in picture naming for trained words in GES and trained and untrained words in ENT were associated with increased use of CIUs in response to picture description and increased use of substantive nouns in response to questions.

Discussion: Although changes in connected speech were limited following picture naming training in this small group of participants, some promising outcomes were noted. Our findings suggest that connected speech samples gained from responses to open-ended questions tended to be more effective than picture description for documenting speech changes associated with treatment, although both sampling procedures had strong relationships with performance in standardized aphasia testing and treatment effect sizes in picture naming. Increases in training effects for picture naming were associated with increases in some connected speech outcomes.

CIUs and substantive noun use tended to increase in those individuals who responded best on picture naming probes. The implication is that, although picture naming tends to be used for ease of administration and scoring in clinical practice, clinicians may have some confidence that patients with aphasia may indeed improve aspects of their lexical use in connected speech as well. Individuals with poorer lexical comprehension abilities suggestive of semantic anomia are less likely to respond to treatment and have limited patterns of substantive noun and CIU use. Those are the individuals who may benefit from alternative methods of treatment, in particular, focus on the use of gesture to facilitate communication.

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Table 1: Group means (standard deviations) for each outcome over phases of treatment (n=6).

	Pretx	PostENT	PostGES	PostTx2
Total Number Words:	221.0	347.33	362.0	360.17
	(95.26)	331.15	233.56	240.63
Percent CIUs Total	26.02	29.32	28.33	33.21
	(19.66)	(15.83)	(13.9)	(18.31)
Percent Vague Nouns	4.78	2.11	3.72	2.40
	(3.81)	(1.13)	(3.81)	(1.48)
Percent Substantive Nouns	8.81	17.30	8.67	9.27
	(4.57)	(19.49)	(4.17)	(4.52)

Table 2: Connected speech outcomes for pictures versus questions (n=6).

	Pictures		Questions	
	Mean	SD	Mean	SD
Percent CIUS				
Pretreatment	9.19	3.54	16.84	17.34
Post ENT	13.10	6.84	16.97	14.26
Post GES	10.06	9.29	18.27	5.97
Percent Vague Nouns				
Pretreatment	2.03	1.95	2.75	2.21
Post ENT	1.04	.74	1.06	.69
Post GES	.97	1.04	2.74	3.76
Percent Substantive Nouns				
Pretreatment	3.47	1.59	5.34	4.02
Post ENT	2.89	2.04	5.34	2.59
Post GES	3.55	2.50	5.12	2.22