

A comparison of intention and pantomime gesture treatments for word retrieval in people with aphasia.

Introduction

Intention and pantomime gestural treatments have been reported to be effective for remediating noun retrieval deficits in individuals with chronic aphasia (Crosson et al., 2005; Raymer et al., 2007). These two treatments have never been compared directly to determine if one is more effective than the other. Information is needed to determine the most effective treatment strategies for improving noun retrieval in chronic aphasia.

Intention treatment uses a complex non-symbolic, left-handed movement that presumably activates the homologous right hemisphere to improve word retrieval access in aphasia. Intention gestures are flexible because they are not content specific; however, they do not provide a compensatory means of communication (Raymer, 2008; Crosson et al., 2009). Richards et al. (2002) and Crosson et al. (2009) demonstrated that complex non-symbolic gestures facilitated word retrieval improvements in participants with nonfluent aphasia.

Pantomime treatment uses gestures that visually resemble the target word or action to improve word retrieval. Raymer and colleagues (2007) reported positive gains for word retrieval and gesture production in participants with aphasia. Use of gestures may be advantageous for treating severe word retrieval impairments, providing a compensatory means for communication (Raymer, 2007).

The purpose of this investigation was to compare the effectiveness of intention gestural treatment and pantomime gestural treatment for people with chronic aphasia. Effectiveness of both treatments was measured by increased verbal productions of the target nouns and by increased use of gestures.

Participants

The study included four right-handed individuals with aphasia: three subsequent to left hemisphere stroke and one subsequent to left arterial-venous malformation (AVM). They ranged in age from 38 to 74 years, and ranged 26 to 39 months post onset of aphasia. Testing with the *Western Aphasia Battery-Revised* (Kertesz, 2007) and the *Boston Naming Test – 4th edition* (Kaplan et al., 2001) indicated two participants presented with Broca's aphasia, one with transcortical motor aphasia, and one with conduction aphasia. All participants demonstrated word retrieval deficits; however, P2 and P3 had pronounced word retrieval and repetition impairments (Table 1). The Florida Apraxia Battery (FAB; Gonzalez-Rothi, Raymer, & Heilman, 1997) indicated P2 and P3 presented with severe limb apraxia; P1 presented with moderate limb apraxia and P4 presented with mild limb apraxia. All provided written consent to participant in this treatment study.

Treatment Design and Methods

The study incorporated a single-participant multiple baseline design. The daily probe task was a picture naming/gesture production task for gesturable nouns. A total of 60 noun pictures were administered for 3-6 baseline sessions and throughout the training phases 2-3 times weekly. The noun pictures were individually selected for each participant and divided into 3 sets of twenty nouns: intention probe (IP), pantomime probe (PP), and untrained probe

(UP) sets. Baseline probe tasks required picture naming of all 60 nouns. The treatment probe tasks required picture naming for 40 nouns; twenty nouns from the training set (IP or PP) and 10 nouns from each of the other two sets. Noun sets not used for training were divided and presented across two sessions. The dependent variable in all sets was percent correct for verbal responses and recognizable gestures. A final probe, the WAB-R, and the BNT were re-administered at one month post training completion.

During two training phases, participants completed either intention or pantomime gesture treatment. Treatment order was counterbalanced across participants: P1 and P3 completed intention then pantomime treatment; treatment order was reversed for P2 and P4. Intention treatment included paired verbal production of target nouns with a left-handed, circular motion practiced repetitively. Pantomime treatment included paired verbal production of target nouns and a trained left-handed iconic gesture practiced repetitively. Hand-over-hand assistance was provided as indicated. Treatment ended when performance reached 90% across three sessions or 10 treatment sessions were completed. Results were graphed and effect sizes (d) were calculated comparing means in treatment and baseline relative to the baseline standard deviation (Busk & Marascuilo, 1992). An effect size of >2.5 was considered a small effect (Busk & Serlin, 1992) and >5.8 was considered large (Beeson & Robey, 2007).

Results

Effect sizes are reported in Table 2. P1 improved verbal picture naming following intention treatment but not pantomime treatment. Improvements did not generalize to untrained nouns, but verbal gains were stable one month post training completion. P1 did not increase use of intention or pantomime gestures during the study. P2 and P3 did not improve verbal productions of the target nouns, regardless of treatment type. Both P2 and P3 increased usage of pantomime gestures when presented with picture stimuli following pantomime gesture treatment. P2 and P3 generalized use of pantomime gestures to untrained nouns but continued to use intention gestures as a lexical retrieval strategy one month post treatment. P2 improved usage of intention gestures post training, but not to the same extent as pantomime gestures. P2 used pantomime gestures to communicate when unable to verbalize target nouns. P4 improved verbal productions as a result of intention treatment without a significant increase in utilization of intention gestures. P4 increased usage of pantomimes post pantomime treatment, though verbal productions did not significantly improve. Regardless of training method, neither verbal productions nor gestures generalized to the untrained word set.

Improvements were also noted on standardized testing beyond the standard error of measurement for some individuals following training. Gains on the WAB were noted for P1 (primarily in fluency) and P3 (primarily in repetition). Gains on the BNT were evident for P1 as well.

Discussion

In this small group of people with chronic aphasia, both intention and pantomime gesture treatments were effective, but for contrasting communication outcomes. Intention gesture treatment resulted in improved naming of trained nouns without generalization to untrained nouns for P1. Pantomime gesture training was effective for improving use of gestures in participants with severely limited spontaneous verbal skills and impaired repetition abilities (P2 and P3). Pantomime gesture treatment resulted in improved non-verbal communication skills for trained and untrained nouns in these two participants. P2, a female diagnosed with an ischemic stroke and Broca's aphasia, demonstrated greater use of pantomime gestures for communication than did P3, a male diagnosed with AVM and Broca's aphasia.

P4, diagnosed with a fluent aphasia responded differently to treatment than the three non-fluent participants. P4 improved verbal productions during intention treatment though he rarely utilized the intention gestures during probes. The reverse was true for pantomime treatment; he utilized the pantomime gestures frequently during the probes, but the treatment effect did not reach significance for verbal productions. These treatment effects were accompanied by improvements in standardized testing, suggesting that these gestural treatments have some broader impact on fluency of verbal skills, as seen especially in P1.

Our data suggest that remediation of communication skills in aphasia using intention gestures requires training of specific, frequently used, functional nouns, despite the flexibility of this gesture type. Pantomime gesture training generalizes to untrained nouns regardless of gesture complexity and co-occurring limb apraxia. Further investigation is warranted to determine if the type of aphasia, nature of the word retrieval deficit, gender, and the nature of the neurologic insult impacts the efficacy of gestural treatments in aphasia.

Table 1: Standardized test results

	P1		P2		P3		P4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Western Aphasia Battery</i>								
Fluency (max 10)	4	9	1	1	0	2	11	
Comprehension (max 10)	10	8.8	4.45	4.95	6.1	6.7	7.95	
Repetition (max 10)	8.2	8.4	2.8	3.2	3.4	5.4	5.4	
Naming (max 10)	7.7	8.2	1.5	1.8	2.9	3.6	7.5	
Total AQ (max 100)	77.8	84.8	23.5	21.9	24.8	37.4	75.7	
Aphasia Classification	Transcortical Motor	Anomic	Broca's	Broca's	Broca's	Broca's	Conduction	
<i>Boston Naming Test</i> (max 60)	42	49	2	1	9	12	54	
<i>Florida Apraxia Battery</i> (max 30)	8		3		2		14	

Table 2: Treatment effect sizes (d) (*estimated due to stable baseline)

	P1		P2		P3		P4	
	Naming	Gestures	Naming	Gestures	Naming	Gestures	Naming	Gestures
Training Phase 1	Intention		Pantomime		Intention		Pantomime	
Set 1 (Trained)	5.44	-0.22	1.25*	9.67	0.75	1.77	2.04	9.69
Set 2 (Untrained -Phase 2 set)	1.64	-0.44	-0.5	-0.29	0.88	-0.07	1.36	0.00
Set 3 (Untrained)	1.44	0.0	0.00*	-0.99	0.96	0.11	0.99	-0.45
Training Phase 2	Pantomime		Intention		Pantomime		Intention	
Set 1 (Maintenance-Phase 1 set)	0.57	-0.48	-0.84	0.91	-0.56	1.14	0.92	-0.6
Set 2 (Trained set)	1.22	0.89	0.33	2.84	-0.54	6.7	2.65	-0.33
Set 3 (Untrained Set)	0.65	1.06	-0.29	4.04	-0.48	8.02	1.48	-0.69
Follow up Phase 3								
Set 1 (Phase 1 training set)	5.44	-0.87	1	10.17	-0.41	2.57		
Set 2 (Phase 2 training set)	1.97	0.87	0.5	2.6	0.32	0.81		
Set 3 (Untrained set)	1.23	1.0	0.0	0.6	0.64	9.71		