Abstract

The purpose of this study was to examine an intensive multimodal intervention for chronic aphasia. The intervention aimed to increase successful initial use of nonverbal communication modalities to prevent communication breakdowns and to improve switching among communication modalities to repair communication breakdowns. Two people with chronic aphasia completed 10 three-hour intervention sessions across a two-week period. Participant one demonstrated increased successful initial nonverbal modality use across three words lists and increased switching to repair breakdowns. Participant two showed limited success using nonverbal modalities initially or as a repair attempt. Clinical implications and future research directions will be discussed.

Intensive Multimodal Communication Intervention for People with Chronic Aphasia

Multimodal communication interventions for people with aphasia aim to improve functional communication through instruction in the use of alternative communication modalities such as gestures or drawing. One such intervention, the Multimodal Communication Training Program (Purdy & VanDyke, 2011) differs from traditional multimodal interventions in that it provides instruction in multiple communication strategies (spoken expression and alternative modalities) for a single concept in an integrated manner before moving to another concept, thus linking the nonverbal representations to the linguistic system and potentially facilitating automaticity of switching. Switching among multiple communication modalities to prevent or repair communication breakdowns is an important skill to promote functional use of these strategies. This Multimodal Communication Training Program has been examined during chronic rehabilitation (Carr & Wallace, 2013; Purdy & VanDyke, 2011) and acute rehabilitation (Wallace & Purdy, 2013). Although mostly positive, treatment effects have been mixed.

Recent examinations of interventions for aphasia have reported a significant influence of treatment intensity on outcomes (Meinzer et al., 2011; Cherney et al., 2008). Intensity in these studies is usually defined as 3 hours per day for 10 semi-consecutive days (i.e., 10/14 days). Intensity has been studied within various interventions including some aimed at improving alternative modalities (e.g., Attard, Rose, & Lanyon, 2013; Kurland, Pulvermüller, Silva, Burke, & Andrianopoulos, 2012). However, these studies did not examine switching among communication modalities to prevent or repair communication breakdowns.

The purpose of this study was to determine the effect of an intensive multimodality communication program on the prevention of communication breakdowns as measured by the number of initial nonverbal successes, and the success of communication breakdown repairs using alternative modalities.

Method

Participants

Participants were two males with global aphasia resulting from a single left-hemisphere stroke. Participant 1 was 40 years old and was 10 months post-stroke; participant 2 was 64 years old and was 22 months post-stroke. Neither participant had a history of other neurological or learning disorders.

Materials

Treatment Materials. Three lists of 10 items each, balanced for difficulty in gesturing, and drawing, frequency of occurrence, and number of syllables, were developed (two for treatment, one for control). Three sets of pictorial stimuli for each list were used for training (one set of photographs, one of line drawings, and one set of different photographs placed in a communication book).

Referential Communication Task Materials. Target and foil photographs each had two words from a single list. Photographs contained at least one person and one object in a natural setting. Each target word appeared on two different photographs during each probe. Table 1 shows an example.

Procedures

Participants completed 4 pre-treatment sessions, 10 treatment sessions across two phases (i.e., 5 sessions/phase), and 3 post-treatment sessions. Figure 1 shows the study procedures.

Pre-treatment sessions. Participants completed formal assessments across four pre-treatment sessions. Additionally, baseline performance data on a referential communication task with an unfamiliar communication partner was collected across the pre-treatment sessions and prior to the first treatment session. For the referential communication task, the clinician presented the 10 photographs (with 2 target concepts each) individually. Then, the clinician asked the participant to communicate both target items from the photographs to a communication partner who was unable to see the photograph. The partner selected a photograph from four choices (i.e., target photograph and three foils) based on the participants' response. If the response was incorrect, the participant had the opportunity to switch to another communication modality. To provide sufficient opportunities for participants to switch, the communication partner provided an incorrect item 40% of the time (four target concepts) regardless of the accuracy of the participants' production. This forced switching was modeled from Yoshihata, Watamori, Chujo, and Masuyama, (1998). If the participant incorrectly communicated the target concept during a second production, the partner suggested that the participant begin the next target concept. For each probe, the participant had between 8 and 12 opportunities to switch modalities. The researchers recorded all attempts and successful use of communication modalities and modality switching.

Treatment sessions. Intervention sessions began after the final pre-treatment session (i.e., the fifth session) and continued daily (five times per week). Word list 1 was treated during phase 1; Word list 2 was treated during phase 2. Prior to each intervention session, participants completed the referential communication task for each word list; word list 3 was probed every other session. Each treatment session was three hours.

Part 1 of the intervention was modified from Purdy and VanDyke (2011). The clinician presented a chart that listed the various ways of expressing a specific concept: state the name, gesture its function, draw a picture, and reference it in a communication notebook. The clinician showed a picture of a target concept and she demonstrated how to convey it using each modality.

Part 2 was modeled from *Promoting Aphasic's Communicative Effectiveness* (Davis & Wilcox, 1985). The participant and the clinician took turns being the receiver and requester in an exchange of information regarding the target concept. Different from the referential communication task, the participant received cues and feedback to improve requesting and repair. In Parts 1 and 2, clinician assistance and cueing gradually faded as performance improved.

Post-treatment sessions. Three post-sessions assessment sessions occurred within 1 week of concluding intervention.

Research Design and Data Analysis

Two primary variables from the referential communication task were analyzed: initial nonverbal success and communicative repair. The initial nonverbal success score was the number of initial modality attempts that were nonverbal and successful. The communicative repair score was calculated as the percentage of successful modality switches after a failed first

communication attempt out of the number of opportunities to switch. Finally, the researchers also reported the pre- and post-treatment scores on the formal assessments.

Results

Initial Nonverbal Attempts

Participant 1 steadily increased his use of nonverbal modalities (gesture) during instruction of word list 1 (medium effect size); generalization to word list 2 (small effect size) and the untrained word list (small effect size) was also evident (Figure 2).

Participant 2 demonstrated some improvement in his use of nonverbal modalities on word list 1 (effect size could not be calculate due to no variation at baseline), but no generalization to lists 2 or 3 (Figure 3). Participant 2 frequently responded with unintelligible verbalizations along with undifferentiated gestures. See Table 2 for effect sizes.

Communicative Repairs

Participant 1 increased switching to repair breakdowns – however, his performance was variable even post-treatment (Figure 4). He mostly relied on gestures with some speaking and drawing. Gestures appeared to facilitate his successful spoken expression and he often combined these two modalities. Similar to Participant 1, Participant 2 demonstrated some inconsistent improvement in switching to repair breakdowns (Figure 5).

Formal Assessment Scores

Both participants' formal assessment scores increased slightly post-treatment. Formal assessment results are shown in Table 3.

Discussion

The two participants responded differently to the intensive multimodal communication intervention, despite similar language and cognition scores. Participant 1 began treatment already showing some potential to use nonverbal strategies, while Participant 2 did not. Possible explanations for these results, the clinical implications, and directions for future research will be discussed.

References

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Table 1. Example of Picture Stimuli for the Referential Communication Task

Target Words	*Target Picture*	*Foil Picture 1*	*Foil Picture 2*	*Foil Picture 3*
piano, ring	Playing the **piano** wearing a **ring.**	Talking on the **phone** while wearing a **ring**	A **cup** sitting on **piano**	**Talking on the phone while writing with a pencil**

Table 2. Participants' Initial Nonverbal Successes Effect Sizes for Each Treatment List

	Word List 1	Word List 2	Word List 3
P1	7.26 (medium)	5.42 (small)	4.63 (small)
P2	N/A	3 (no effect)	3 (no effect)

*Cohen's (1988) d statistic as calculated by Busk and Serlin (1992)

** Benchmarks of 4.0, 7.0 and 10.1 for small, medium, and large effect sizes from lexical retrieval treatment studies (Robey & Beeson, 2005)

Table 3. Participants' Pre- and Post-Treatment Formal Assessment Scores

	Western Aphasia Battery-Revised					Cognitive Linguistic Quick Test Domains						Pyramids and Palm Trees	CADL-2
	Spontaneous Speech	Auditory Verbal Comprehension	Repetition	Naming and Word Finding	Aphasia Quotient	Attention	Memory	Executive Functions	Language	Visuospatial Skills	Clock Drawing		
	(20)	(10)	(10)	(20)	(100)	(180)	(185)	(40)	(37)	(105)	(13)	(52)	Raw Score
P1 Pre-Treatment	4	3.4	1.4	1.6	20.8	169 Mild	30 Severe	18 Moderate	2 Severe	76 Mild	7 Severe	42	68
P1 Post-Treatment	4	3.7	10	2.5	24	177 Mild	40 Severe	21 Mild	4 Severe	85 WNL	9 Moderate	50	71
P2 Pre-Treatment	4	4.8	3.7	1.4	27.8	146 Mild	46 Severe	16 Moderate	1 Severe	70 Mild	6 severe	37	39
P2 Post-Treatment	4	5.95	2.9	1.6	28.9	160 Mild	61 Severe	16 Moderate	5 Severe	72 Mild	8 Moderate	38	52

* CADL-2 = Communication Activities of Daily Living – Second Edition; WNL = Within Normal Limits
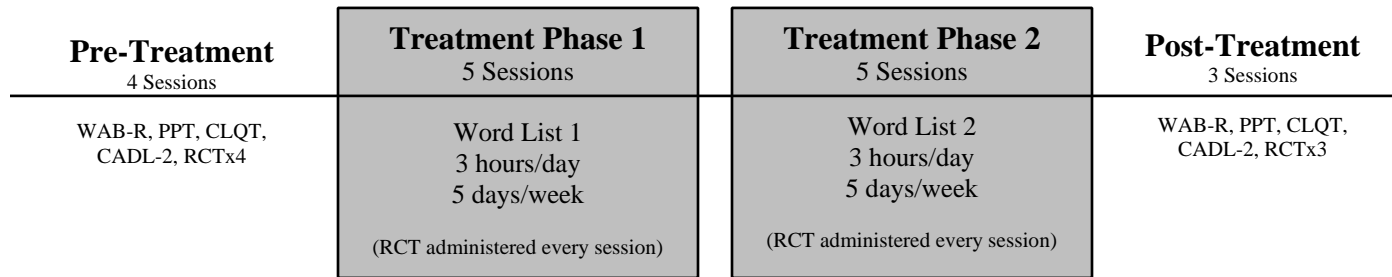
Figure 1. Study Procedures.

Pre-Treatment 4 Sessions	Treatment Phase 1 5 Sessions	Treatment Phase 2 5 Sessions	Post-Treatment 3 Sessions
WAB-R, PPT, CLQT, CADL-2, RCTx4	Word List 1 3 hours/day 5 days/week (RCT administered every session)	Word List 2 3 hours/day 5 days/week (RCT administered every session)	WAB-R, PPT, CLQT, CADL-2, RCTx3

Figure 2. Participant 1's initial nonverbal successes across pre-treatment, treatment, post-treatment sessions.
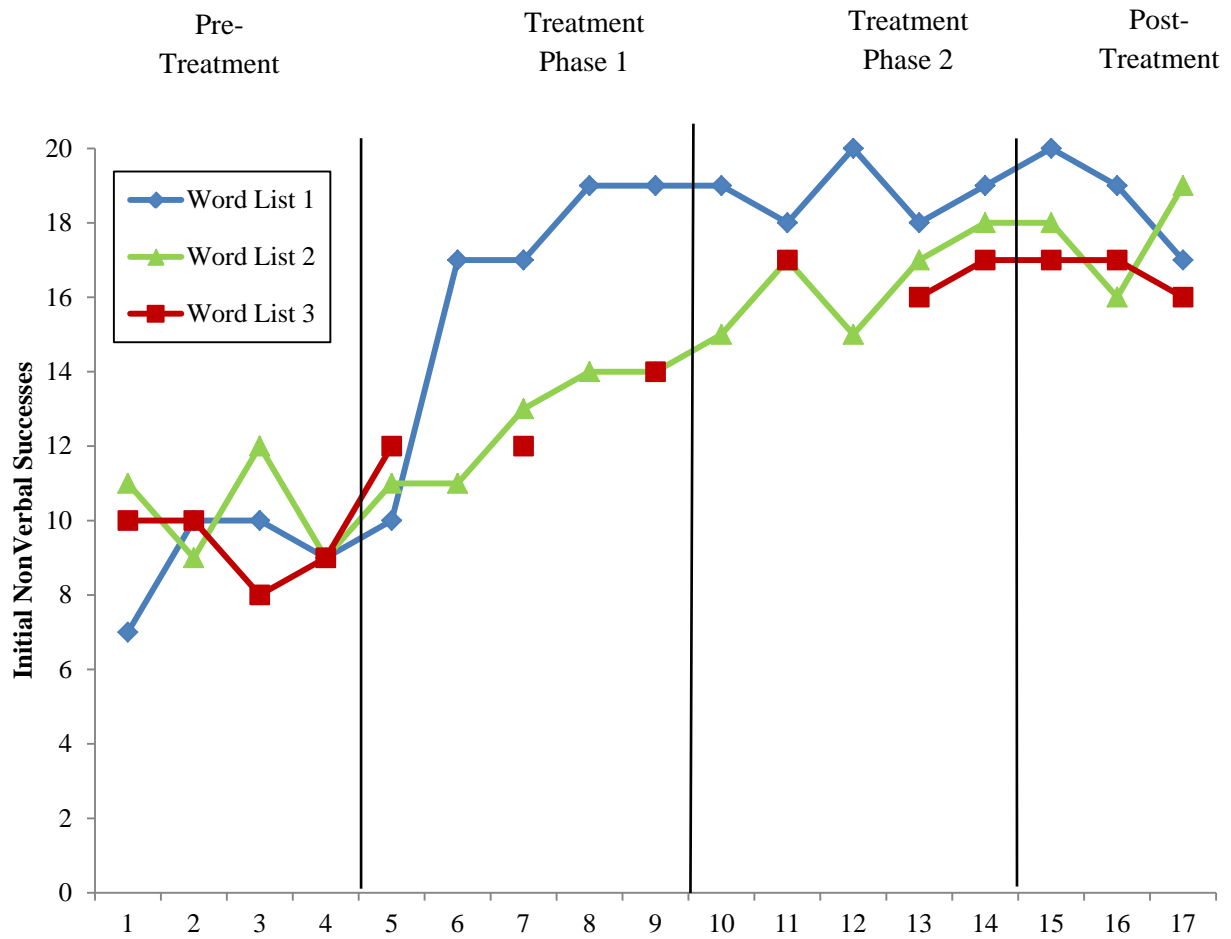
*Initial attempts that include spoken expression plus a nonverbal communication modality produce simultaneously were counted as successful nonverbal attempts whether the spoken expression was correct or incorrect.

Figure 3. Participant 2's initial nonverbal successes across pre-treatment, treatment, post-treatment sessions.
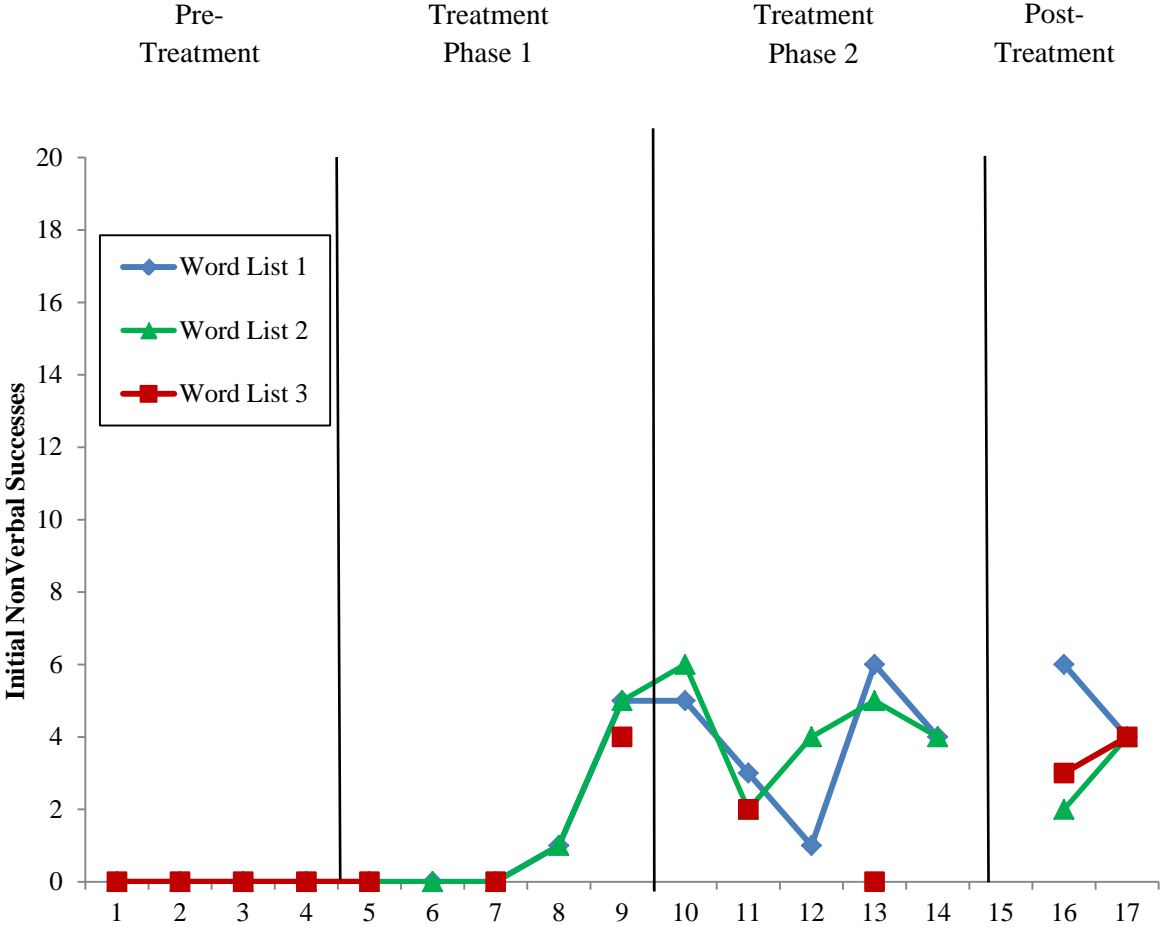
Figure 4. Participant 1's Communicative Repair Score across pre-treatment, treatment, post-treatment sessions.
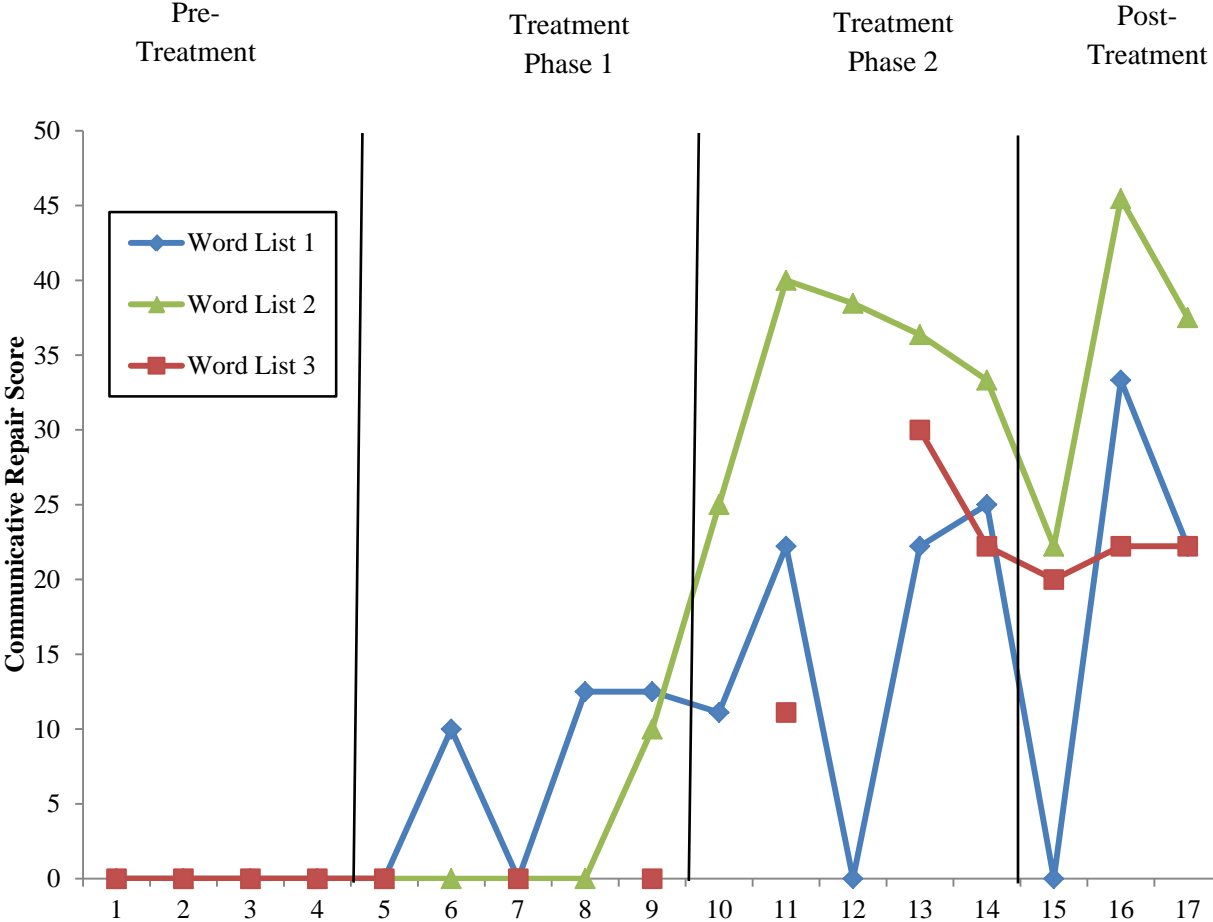
Figure 5. Participant 2's Communicative Repair Score across pre-treatment, treatment, post-treatment sessions.