Abstract

The purpose of the current study was to explore the feasibility of a multimodal communication training program implemented with people with aphasia during acute stroke rehabilitation. The purpose of the program was to improve production of alternate communication modalities (gesturing, drawing) as well as verbalization, and to facilitate switching among these modalities to resolve communication breakdowns. Two people with aphasia completed the intervention and demonstrated increased accuracy in the production of various alternate communication modalities. However, improvements in the ability to switch to an alternate modality were noted for only one participant. Clinical implications and future research directions are discussed.

The Feasibility of a Multimodal Communication Treatment for Aphasia during Inpatient Rehabilitation

Many people with moderate to severe aphasia are able to learn alternative communication modes in structured settings; however, data suggest the use of multiple strategies does not generalize to natural situations (Purdy, Duffy, & Coelho, 1994; Yoshihata, et al., 1998). Purdy and VanDyke (2011) hypothesized that the limited success may relate to the design of modality interventions. Traditional interventions teach concepts in a single modality (e.g., gesture, write, point to a picture) to criterion before proceeding to the next modality. Thus, the gesture or other strategy remains separate from the linguistic system and its usage remains dependent on conscious control of switching behavior. This switching behavior is mediated by executive functions, which have been found to be impaired in individuals with aphasia (Mikola, 2011; Nicholas, Sinotte, & Helm-Estabrooks, 2011; Purdy, 2002).

The Multimodal Communication Training (MCT) (Purdy & VanDyke, 2011) differs from traditional interventions because it focuses on teaching multiple communication strategies 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.

To date, MCT has only been used with individuals with chronic aphasia. Use of MCT during acute rehabilitation should be explored for several reasons. First, AAC strategy use during acute rehabilitation may increase patient communication (Downey & Hurtig, 2006), as well as long-term rehabilitation outcomes (Denes et al., 1996). Also, executive function impairment is common in acute stroke and treatments that incorporate strategies to facilitate executive functioning at this early stage may be beneficial. Finally, people with aphasia and their families are often resistant to the use of alternative modalities and show a preference for therapy focused on verbal expression. MCT combines verbal expression with other modalities, potentially reducing concerns of mutual exclusion (Weissling & Prentice, 2010).

The current study represents two case studies to explore the feasibility of using a modified MCT program during acute stroke rehabilitation.

Method

Participants

Participants were two adults with aphasia resulting from a single left hemisphere stroke. Participant 1 (P1) was a 49 year-old female, 2 weeks post-stroke. Participant 2 (P2) was a 55 year-old male, 3 weeks post-stroke. Neither participant had a history of previous strokes, psychiatric issues, or other neurological disorders. Table 1 contains the participants' assessment information.

Materials

Two sets of colored line drawings of 10 high frequency nouns were used during modality probe and intervention sessions. A set of colored isolated photographs of the target items was used to make a communication board. High-context photographs used in a referential communication task (RCT) contained a target word and a person using that object.

Procedures

Participants completed experimental sessions in addition to the typical inpatient rehabilitation program (5-6 hours of occupational, physical and speech therapy per weekday, and 2-3 hours of therapy on Saturdays). Experimental sessions included baseline, intervention, and post-intervention sessions.

Baseline sessions.

The first baseline session included a modality probe and the WAB-R AQ. For the modality probe, the examiner showed the participants a colored line drawing of each target and asked the participant, "What is this? Show me all the ways you could communicate this". No cues were provided during probes. Paper, a marker, and the communication board were available to the participant. The participant had 2 minutes to provide all five target modalities (i.e., gesturing, writing, verbal naming, drawing, and pointing to picture). The participants completed probes during the remaining baseline sessions and prior to beginning of every other intervention session. During the second baseline session, participants completed the RCT, CADL-2, and modality probe. The CADL-2 scoring system was modified to reflect a cognitive flexibility score (Purdy & Koch, 2006). The third baseline session included the modality probe and the PPT.

Participants completed the RCT with a communication partner. The examiner presented each high-context photograph and asked the participants to convey the target object to the communication partner who was unable to view the picture. Augmented input was provided to participants as needed to ensure comprehension of the task requirements. The communication partner chose a line drawing in response to the participant. If the response was wrong, the participants had the opportunity to switch to another communication modality. To promote participants' switching behavior, the communication partner was instructed to provide an incorrect item 50% of the time (5 target words) regardless of the accuracy of the participants' production. If the participant incorrectly communicated the target noun during a second production, the communication partner suggested that the participant move to the next target word. For each trial, the participant had at least 5 and up to 10 opportunities to switch modalities depending on his or her performance. The researchers recorded all attempts and successful use of all communication modalities and modality switching.

Intervention sessions.

The intervention protocol was modified from MCT (Purdy & VanDyke, 2011) for use within acute rehabilitation. For example, the current protocol treated only 10 nouns instead of 20 words (nouns and verbs), thus shortening the length of each session.

Intervention sessions began after the final baseline session and continued daily (5-6 times per week). Intervention sessions included the production of the 10 target nouns in each modality. During early intervention sessions, the examiner modeled each noun using the five modalities and the participants imitated each model. Direct feedback was provided through oral directions and hand-over-hand guidance. Assistance and cueing gradually faded as performance improved. The order of the modalities prompted was randomized across target words and trials. Before going on to the next target word the examiner reviewed and modeled each modality.

The participants continued intervention until criterion was reached or discharge from inpatient acute rehabilitation; whichever came first. Criterion was defined as accurate productions of three out of five modalities for at least 7 target words, for two consecutive probes.

Post-intervention sessions.

Following intervention, participants completed assessment tasks at the end of inpatient rehabilitation and at 3 months after the conclusion of MCT. Two post-intervention assessment sessions occurred within 24 of concluding intervention and included the RCT, WAB-R, CADL-2, and two modality probes. The 3-month assessment session included the RCT, CADL-2, and modality probe.

Research Design and Data Analysis

Performance on the modality probes was descriptively analyzed to provide information about the accuracy of modality production across sessions. Two scores were gleaned from the RCT and CADL-2 modified scoring at baseline, post-intervention and follow-up. The researchers recorded the number of switching attempts as a percentage of the number of opportunities to switch, and the number of successful switches as a percentage of attempts to switch.

Results and Discussion

Both participants increased their accuracy in production of multiple modalities. Additionally P1 increased her switching behavior during the RCT and CADL-2, and reach criterion during inpatient stay. P2 did not increase switching behavior and remained in treatment until discharge. Results of the modality probes, RCT, and CADL-2 are available in Figure 1, and Tables 2 and 3 respectively. Thus, administration of MCT is feasible in the acute rehabilitation setting and appears to provide some benefit to people with aphasia at this early stage. The implications of these findings will be discussed.

References

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Table 1. Participants' Initial Assessment Results

	Western Aphasia Battery – Revised					*Pyramids and Palm Trees Test*	*Communication Activities of Daily Living – 2nd ed.*
Participant	Aphasia Quotient (100)	Spontaneous Speech	Auditory Verbal Comprehension	Repetition	Naming and Word Finding	Raw Score (52)	Score (100) (percentile)
1	52.2	7	7.9	6.2	5	45	42 (9)
2	5.7	1	1.85	0	0	31	6 (<1%)

Table 2. Participants' Switching Scores on the Referential Communication Task

	Pre-Intervention		*Immediately Post-Intervention*		*Follow up*	
Participant	Attempt/ Opportunities (percentage)	Success/Attempts (percentage)	Attempt/ Opportunities (percentage)	Success/Attempts (percentage)	Attempt/ Opportunities (percentage)	Success/Attempts (percentage)
1	1/8 (12.5%)	1/1 (100%)	3/5 (60%)	3/3 (100%)	5/5 (100%)	5/5 (100%)
2	0/10	0/10	0/10	0/10	N/A*	N/A*

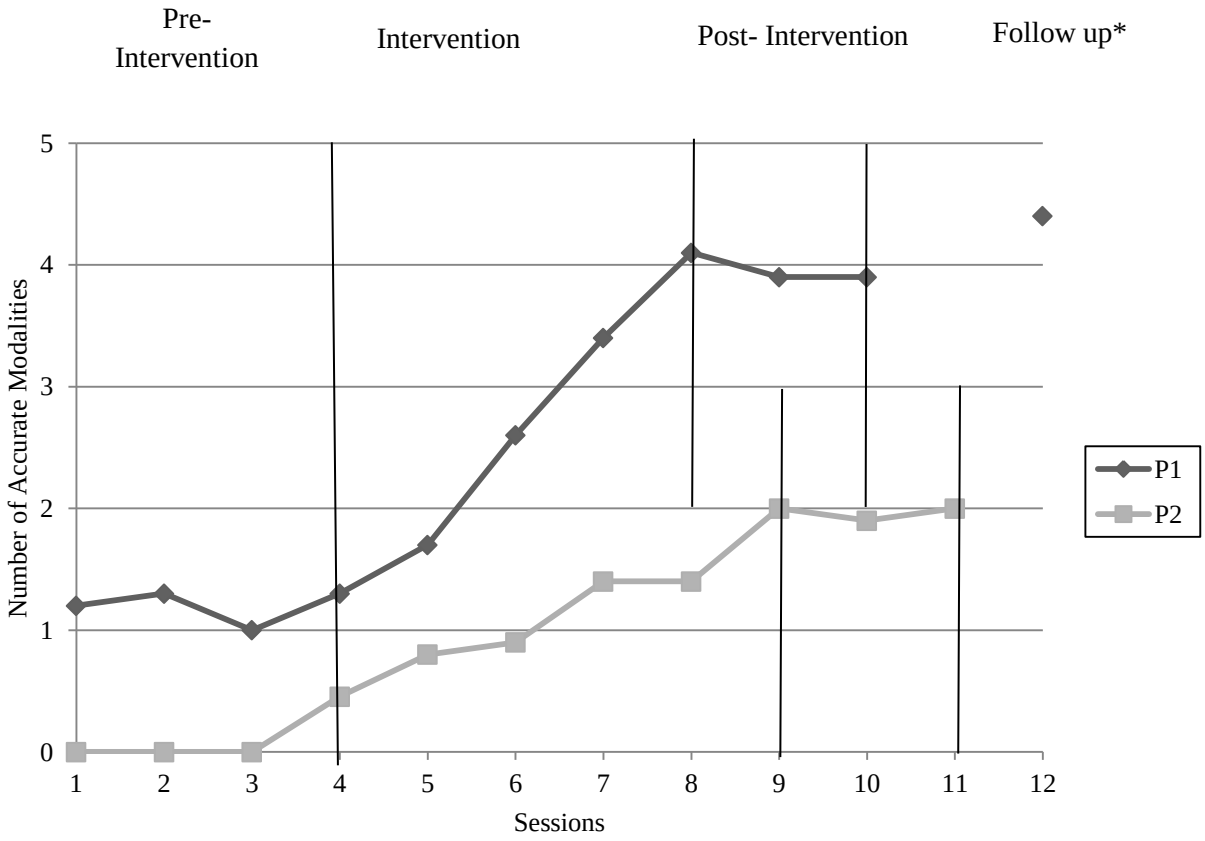
*N/A = P2 was not available for follow up.

Table 3. Participants' Scores on CADL-2 with Modified Scoring

	Pre-Intervention			*Immediately Post-Intervention*			*Follow-up*		
Participant	Score (100) (percentile)	Modified Score Attempt (percentile)	Modified Score Success (percentile)	Score (100) (percentile)	Modified Score Attempt (percentile)	Modified Score Success (percentile)	Score (100) (percentile)	Modified Score Attempt (percentile)	Modified Score Success (percentile)
1	42 (9)	2/15 (13.33%)	2/15 (13.33%)	73 (45)	3/9 (33.33%)	3/9 (33.33%)	85 (67)	3/4 (75%)	3/4 (75%)
2	6 (<1)	0/21 (0%)	0/21 (0%)	10 (<1)	0/18 (0%)	0/18 (0%)	N/A*	N/A*	N/A*

*N/A = P2 was not available for follow up.

Figure 1. Participants' modality probe accuracy across baseline, intervention, post intervention and follow-up sessions



*P2 was not available for follow up.