Use of Drawing to Improve Word Retrieval in Chronic Nonfluent Aphasia

Aphasia disrupts multiple language processes with anomia often being the most common problem. Compensatory strategies have been utilized for individuals with severe anomia, including writing, gesturing, and drawing (Farias, Davis, & Harrington, 2006). However, few formal programs have focused on promoting drawing as a means of communication. These typically use drawing as a substitute for language rather than a tool to enhance verbal expression (Sacchett, 2002). Furthermore, training usually emphasizes ability to recognize drawing rather than information exchange (Morgan & Helm-Estabrooks, 1987; Trupe, 1986 as cited in Sacchett, 2002).

Semantic Feature Analysis (SFA) is a treatment approach based on the premise that although individuals with anomia have difficulty retrieving words, ability to access features related to targets is often somewhat intact (Beeson, Holland, & Murray, 1995). The semantic system is accessed by producing words related to targets, with individuals incorporating these strategies as self-cues to retrieve target words (Boyle, 2004; Chapey, 2001; Rider & Wright, 2008). To date, this approach has aimed to enhance only verbal output.

The purpose of this investigation was to examine if an individual with chronic mixed aphasia could clinically improve ability to name pictured objects through implementation of a drawing protocol. RE underwent a brief but intense treatment program incorporating drawing with SFA to improve word retrieval.

Method

RE is a 64 year old, right-handed, college-educated female with mixed aphasia from a left hemisphere CVA. She was approximately 10 years post-stroke with limited verbal output but adequate auditory comprehension skills to perform the experimental treatment tasks. Although she exhibited right-sided hemi-paresis, she had ability to hold writing implements for drawing.

RE passed a modified hearing screening for older adults at 40 dB HL at 1K, 2K, and 4K Hz (Ventry & Weinstein, 1992) and the Scanning/Visual Field/Print Size/Attention Screening Task (Garrett & Lasker, 2005) to screen visual abilities. The Boston Naming Test-II (BNT-II) (Kaplan, et al., 2001) and Western Aphasia Battery-Revised (WAB-R) (Kertesz, 2006), specifically Aphasia Quotient (AQ), were administered to determine naming ability and aphasia severity, respectively.

Pretreatment training involved RE participating in two consecutive days of training on the drawing process developed by the examiner based on Lyon (1987). Sessions lasted approximately two hours each day. Training consisted of basics of how to draw in a sequential manner. Skills taught included: correctly holding pencil/pen, moving one’s hand around the paper, tracing objects, copying pictures of objects, and drawing pictures of objects from memory.

The Classic Aphasia Therapy Stimuli (CATS) (Fogle & Reece, 2005) were used as treatment materials in the experimental intervention protocol. To determine which pictures to use as stimuli, RE named the 90 pictures at three separate sessions. Pictures she was unable to name on at least two out of three trials were used as the stimulus pool. From these, thirty nouns were randomly chosen and randomly divided into 15 treatment and 15 probe (untreated) stimuli.

In the experimental protocol, an SFA format was used in conjunction with drawing to examine the effect of drawing on word retrieval and enhanced communication. During intervention sessions, treatment on drawing to name with SFA cueing was utilized for the treatment pictures. First, RE was asked to name the picture spontaneously. Regardless of naming accuracy, she proceeded to draw the target using the SFA script. Scripts used the cues: use (“who uses this?”), properties (“what does this look like?”), and associations (“what does this remind you of?”). These cues were utilized because of amenability to drawing. RE attempted to draw each feature and then name the target component.

A time series AB design with three baseline measures was implemented for drawing and naming treatment and probe stimuli. RE participated in five treatment sessions each lasting one to two hours, over two weeks. Between days three and four of the protocol, the 15 untreated stimuli were probed for naming and drawing of semantic features. RE attended a sixth session occurring within five days of the last treatment session and another session approximately one week after this, to assess maintenance of treatment strategies. At this session, RE spontaneously drew and named all stimuli (treated and probe).

Results

Multidimensional scoring was used to rate drawing and naming performance (appendix) with intra-observer and inter-observer reliability were both 95%. These data were converted to percentages to determine changes in naming and drawing treatment and probe stimuli. RE demonstrated notable increases in naming ability throughout the treatment regimen (Figure 1). Relative to probes, she showed improved performance in word retrieval that was maintained at 2 weeks after end of treatment.

Results for drawing were more apparent with RE showing remarkable changes from baseline to end of treatment and at maintenance sessions. For probes, performance suggests initial generalization; however, performance decreased post-treatment (Figure 2).

An example of RE’s drawing pre/post-treatment is in Figures 3 and 4. In viewing Figure 3 without Figure 4, one may not be able to identify that the drawing is of a computer. RE uses simple shapes with unsteady lines and little detail other than letters and numbers on what appears to be the screen. In Figure 4, however, RE used shapes within shapes to represent the computer screen and keys on the keyboard. Lines are steadier and more controlled. In using SFA, RE reviewed the different components of a computer such as it having keys, a mouse, and a computer screen. Specific shapes were discussed as a computer consists of squares and rectangles. These shapes were more apparent and in greater detail in the post-treatment drawing.

Effect sizes (ES) were calculated for treatment and probe data, using the standard effect size formula (Table 1).The ES for naming treatment stimuli was 1.97, representing performance greater than one standard deviation above the mean. This observation indicates findings that are clinically and practically important relative to changes in word retrieval ability for treated stimuli. The ES for naming probe stimuli was

0.82, suggesting some generalization from treated to untreated items. For drawing, treatment ES was 0.66, representing moderate performance change. RE was very variable, yielding a relatively smaller than expected ES for drawing. The ES for drawing probes was 1.01, suggesting more generalization in the drawing process.

For standardized test scores, increased performance was observed on the BNT pre/post-treatment, but there was decline in WAB-R AQ (Table 2).

Discussion

In the current study, drawing was used to stimulate linguistic verbal output, identifying a manner in which an individual with chronic aphasia and limited verbal output could experience more consistency in self-cuing for word retrieval. Overall, RE made remarkable increases in her naming and drawing ability from baseline to end of treatment. Although WAB-R AQ did not reflect an upward change, overall naming ability appeared to improve as seen in increased performance on BNT-II.

Drawing may facilitate communication because it provides a permanent record of individuals' communication intent, does not rely on language symbols, and represents the most direct and effective course to communicate by bypassing the linguistic component of expression (Lyon, 1995). Drawing also may access a different neural pathway to the lexical-semantic system, assisting individuals with aphasia in retrieving words more effectively (Farias et al., 2006). Overall, findings suggest that drawing of semantic features may improve word retrieval and drawing ability in chronic aphasia.

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Appendix: Multidimensional Scoring System

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Scoring for Naming

6- Correct response
5- Repeat the question
4- Rhyming word
3- Fill in the blank (cloze format)
2- Phonemic cues
1- Choice of 4
0- Choice of 2

Scoring for Drawing

Omissions:
4- Correct drawing
3-Ask about missing element and draws without assistance
2- Have patient point to where missing element belongs and draws without assistance
1- Direct patient to draw missing element
0- Clinician verbally guides the participant through process or hand over hand assistance

Distortions:
4- Correct drawing
3- Have patient identify unrecognizable part
2- Have patient add additional details or enlarged drawing
1- Clinician starts drawing and has patient finish
0- Clinician verbally guides the participant through process or hand over hand assistance

Substitutions:
4- Correct drawing
3- Ask patient what needs to be changed and draws without assistance
2- Clinician draws a comparison object
1- Clinician cues what to draw
0- Clinician verbally guides the participant through process or hand over hand assistance

Table 1: Effect Sizes for Naming and Drawing

Effect Sizes	
Naming Treatment	ES = 1.97
Naming Probe	ES = 0.82
Drawing Treatment	ES = 0.66
Drawing Probe	ES = 1.01

Table 2: Standardized Test Scores Pre/Post-Treatment

	Pre-Treatment	**Post-Treatment**	**Difference of Scores**
WAB-R Aphasia Quotient	33.9	27.1	-6.8
WAB-R Naming and Word Finding Subtest	2	2.4	+0.4
BNT-II	8	14	+6

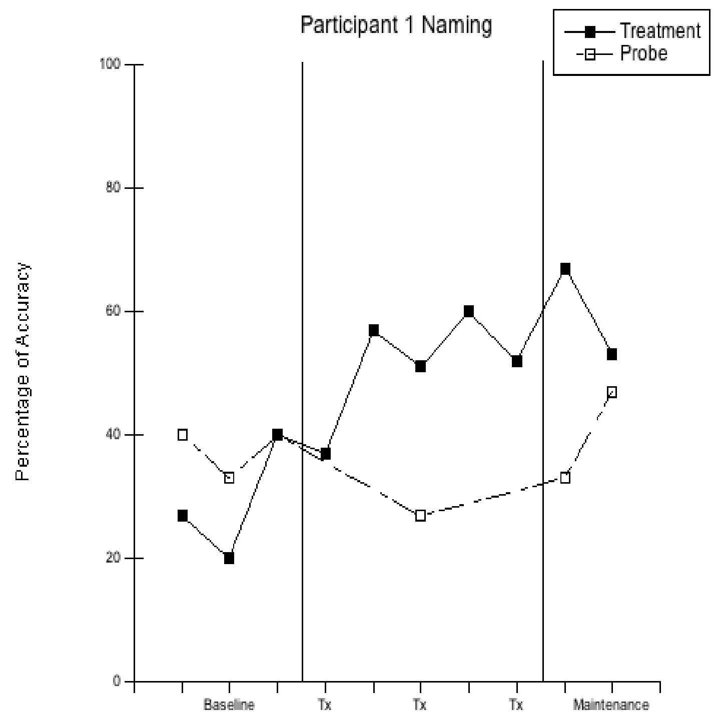

Figure 1: Percentage of Accuracy for Naming

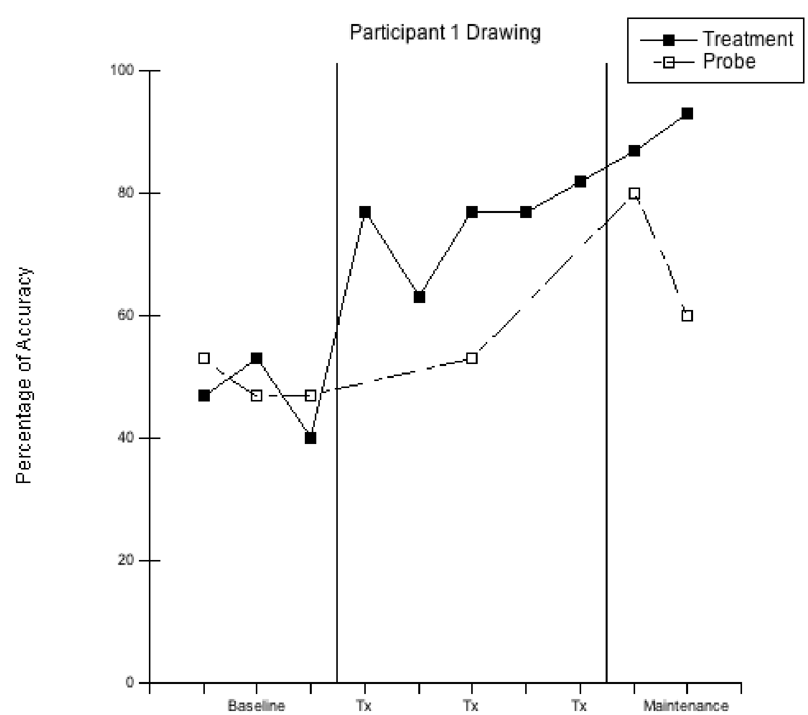

Figure 2: Percentage of Accuracy for Drawing

Figure 3: Pre-Treatment Drawing

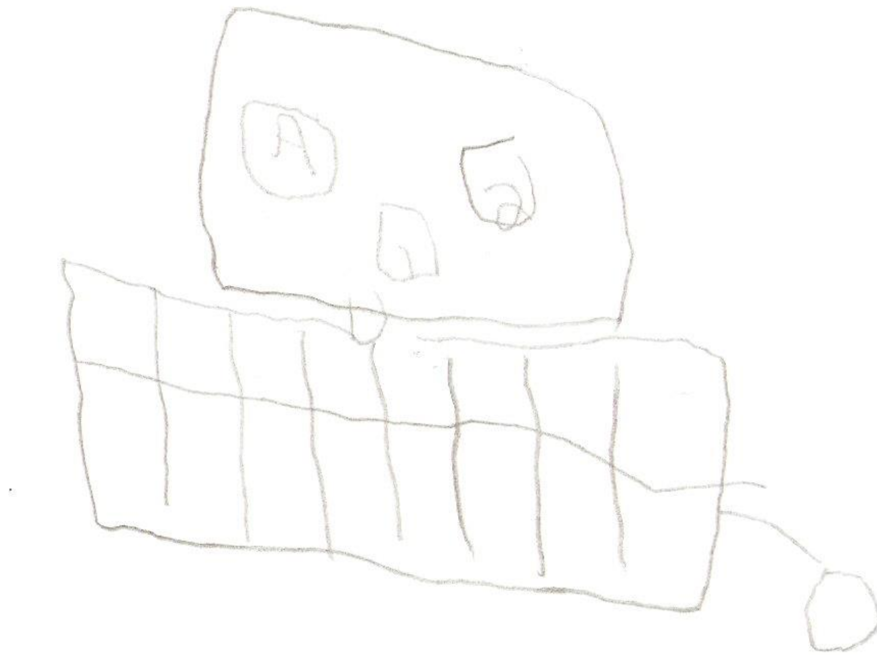

Figure 4: Post-Treatment Drawing