

Since the seminal work reported by Howard et al. (1985), semantic treatment has been a preferred approach for word retrieval deficits following aphasia. Positive outcomes associated with semantic treatment for naming both objects (Drew & Thompson, 1999; Wambaugh et al., 2001; Wambaugh, 2003; Kiran & Thompson, 2003; Davis & Harrington, 2006) and actions (Raymer & Ellsworth, 2002; Wambaugh et al. (2002, 2004) have been reported.

A prominent semantic treatment for word retrieval deficits is semantic feature analysis (SFA) (Boyle & Coelho, 1995; Coelho, McHugh, & Boyle, 2000). The procedure has been used with success to improve picture naming for objects (Boyle & Coelho, 1995; Boyle, 2004a, Coelho et al., 2000) and action names (Wambaugh & Ferguson, 2007). While improved object and action naming has been observed for untrained pictures receiving frequent exposures, no such improvements have been observed for untrained action names receiving limited exposure.

Generalization of improved word retrieval on picture naming to discourse production has been an important factor for evaluating the effectiveness of SFA treatment. Improvements to discourse, as measured by correct information unit (CIU) analyses (Nicholas & Brookshire, 1993) have been modest at best. Curiously, Wambaugh and Ferguson found notable improvements in CIU scores in a participant who demonstrated poor response generalization for trained verbs to untrained verbs.

Poor generalization of SFA treatment effects from picture naming tasks to discourse production have led to a reconsideration of the how this might best be improved. Boyle (2004a) suggested that more direct measurement of word retrieval difficulty in discourse would yield more consistent across-context generalization. Boyle (2004b) also used SFA as a compensatory strategy in discourse tasks to facilitate retrieval of failed nouns and verbs. Improved noun, but not verb, confrontation naming and improved measures for discourse were reported. Wambaugh and Ferguson (2007) found that their participant was either unable to or did not apply SFA as a compensatory strategy for difficult verbs in discourse.

In this Phase I investigation, we hypothesized that treatment for improved retrieval of objects and actions in discourse would be best served by targeting such failures as they occur during discourse tasks. Such an approach is appealing because a) it increases the ecological validity of the stimulus items, b) it relies on response generalization rather than stimulus generalization as in most previous studies, and c) improvements in word retrieval should, by default, result in improved discourse production. We also wondered whether such an approach would have positive effects on picture naming, i.e., whether generalization would occur in the reverse direction from which it is typically assessed. SFA served as the treatment approach for the word retrieval failures in this investigation. Our approach was not to train SFA as a compensatory strategy for lexical failures but to use it as a means of improving semantic organization for word retrieval in discourse.

## METHOD

### Participants

Two right-handed women with anomic aphasia participated in this study. Demographic and clinical test results are provided in Table 1.

## Stimuli

*Discourse stimuli.* Picture stimuli appearing in magazines that demonstrated two or more events per picture and questions requesting procedural information were used in this investigation. Each participant received only one exposure to each picture to reduce the effects of increasing familiarity on picture descriptions.

Discourse production was also assessed throughout the study using the pictorial and verbal stimuli developed by Nicholas and Brookshire (1993).

*Confrontation naming stimuli.* Picture naming was assessed using line drawings from the *Object and Action Naming Battery* (Druks & Masterson, 2000).

## Experimental Design

A multiple-baseline design across behaviors with replication was used to assess changes in discourse production as well as generalization to untrained pictures.

*Baselines.* Participants were asked to describe what was happening in two pictures or to respond to two questions requesting procedural information. They were allowed approximately two minutes to respond to each stimulus. Samples were recorded, transcribed, segmented into T-units, entered into *Systematic Analyses of Language Transcripts (Research v.9)* and analyzed for the number of word finding behaviors appearing in each sample. German's (1991) procedures were used for identifying and classifying word finding behaviors. The baseline CIU measure for Participant 2 was extended to improve interpretation as suggested by Wambaugh and Ferguson (2007).

*Treatment.* Discourse samples were collected approximately twice per week and analyzed using the same methods as in the baseline phase. Overt object and action naming errors produced during discourse were identified at the time that they occurred along with their intended targets. Failed targets were described to the participant but not identified. The intended lexical item was then exposed to SFA following the procedures described in previous studies. Target words not receiving treatment during a session were sent with the participant for homework.

The typical SFA chart for noun naming was modified so that a blank text box appeared in the center of the chart to allow written words to be inserted. A version for use with verbs contained the text box for written words and also required the participant to provide a definition and a synonym for the target word in place of the group and action boxes found on the noun chart.

*Probes.* Probes assessed changes in discourse production and generalization to untrained pictures and were administered approximately every four sessions to reduce the effects of repeated exposure.

*Reliability.* Point-to-point agreement between judges exceeded 90% for all calculations.

## RESULTS AND DISCUSSION

*Verbal productivity.* Participants demonstrated variable performance for the number of words produced per T-unit. Nonetheless, comparing the mean for the final four sessions to that observed at baseline, Participant 1 increased her verbal productivity by 17% (Figure 1) while Participant 2 increased by 38% (Figure 2).

*Word finding in discourse.* Again, performance was characterized by substantial variability. The average number of word-finding behaviors in discourse for Participant 1 over the final four sessions decreased by 18% ( $d=1.65$ ) while for Participant 2, word-finding behaviors actually increased by 16%. This finding is likely attributable to the improvement in verbal productivity and the increased opportunities for word retrieval failure. The average percentage of CIUs increased by 14% for Participant 1 and by 10% ( $d=1.39$ ) for Participant 2 which, using the data reported by Brookshire and Nicholas (1994) exceeds, in both cases, any expected increases (5.5%) that might have been attributable to repeated sampling.

Changes in the patterns of the primary word-finding behaviors were investigated. For Participant 1, word finding difficulty was characterized by empty speech followed by reformulations, and perseveration (Figure 3). For Participant 2, the primary type of word finding difficulty was perseveration followed by reformulation and repetition (Figure 4). These patterns did not change substantially over the course of treatment.

*Naming for untrained items.* Participant 1 reduced her naming errors for pictured objects from 10 to an average of 3 over the last two probes and from 15 to an average of 8 for pictured actions. Errors when naming pictured objects decreased from 33 to 20 for Participant 2 on the final two probes and from 24 to an average of 17 for pictured actions.

The results are promising with regard to developing a more ecologically-valid approach to treating word-finding difficulties following aphasia. The findings will be discussed in terms of ways to improve the materials and design of the study for future investigations concerning this approach.

## REFERENCES

- Boyle, M. & Coelho, C.A.(1995). Application of semantic feature analysis as a treatment for aphasic dysnomia. *American Journal of Speech-Lanuage Pathology*, 4(4), 94–98.
- Boyle, M. (2004a). Semantic feature analysis treatment for anomia in two fluent aphasia syndromes. *American Journal of Speech-Lanuage Pathology*, 13(3), 236–49.
- Boyle, M. (2004b, May). *Discourse treatment for word retrieval impairment in chronic aphasia*. Poster presented at the 34<sup>th</sup> annual Clinical Aphasiology Conference, Park City, UT.
- Brookshire RH, Nicholas LE. (1994). Speech sample size and test-retest stability of connected speech measures for adults with aphasia. *Journal of Speech and Hearing Research*, 37(2), 399–407.
- Coelho, C.A., McHugh, R., & Boyle, M. (2000). Semantic feature analysis as a treatment for aphasic dysnomia: A replication. *Aphasiology*, 14(2), 133–42.
- Davis, C.H., & Harrington, G. (2006). Intensive semantic intervention in fluent aphasia: A pilot study with fMRI. *Aphasiology*, 20(1), 59-83.
- Drew, R. L., & Thompson, C. K. (1999). Model-based semantic treatment for naming deficits in aphasia. *Journal of Speech, Language, and Hearing Research*, 42, 972–989.
- Druks, J., & Masterson J. (2000) An object and action naming battery. Philadelphia, PA: Taylor & Francis.
- German, D. J. (1991). *Test of Word Finding in Discourse(TWFD): Administration, scoring, interpretation, and technical manual*. Austin, TX: Pro-Ed.
- Howard, D., Patterson, K., Franklin, S., Orchard-Lisle, V., Morton, J. (1985). Treatment of word retrieval deficits in aphasia: A comparison of two therapy methods. *Brain*, 108 (4), 817-29.
- Kiran, S., & Thompson, C. K. (2003). The role of semantic complexity in treatment of naming deficits: Training semantic categories in fluent aphasia by controlling exemplar typicality. *Journal of Speech, Language, and Hearing Research*, 46, 608–622.
- Nicholas, L.E., & Brookshire, R.H. (1993). A system for quantifying the informativeness and efficiency of the connected speech of adults with aphasia. *Journal of Speech and Hearing Research*, 36(2), 338–50.
- Raymer, A.M., & Ellsworth, T.A. (2002). Response to contrasting verb retrieval treatments: A case study. , 16(10/11), 1031–46.
- Wambaugh, J.L. (2003). A comparison of the relative effects of phonologic and semantic cueing treatments. *Aphasiology*, 17(5), 433-441
- Wambaugh, J.L., Cameron, R., Kalinyak-Fliszar, M., Nessler, C., & Wright, S. (2004). Retrieval of action names in aphasia: Effects of two cueing treatments. *Aphasiology*, 18(11), 979–1004.
- Wambaugh, J. L., Doyle, P. J., Martinez, A. L. and Kalinyak-Fliszar, M. (2002) Effects of two lexical retrieval cueing treatments on action naming in aphasia.. *Journal of Rehabilitation Research and Development* 39:(4) , pp. 455-466.

- Wambaugh, J.L., & Ferguson, M. (2007). Application of semantic feature analysis to retrieval of action names in aphasia. *Journal of Rehabilitation Research and Development* 44(3), 381-394.
- Wambaugh, J.L., Linebaugh, C.W., Doyle, P.J., Martinez, A.L., Kalinyak-Fliszar, M., & Spencer, K.A. (2001). Effects of two cueing treatments on lexical retrieval in aphasic speakers with different levels of deficit. *Aphasiology*, 15(10/11), 933–50.

Table 1. Participant information and standardized test results.

	Participant 1	Participant 2
Age	77	62
Gender	F	F
Native language	Serbian	Filipino
Primary language	English	English
Education	16	20
Occupation before retirement	Inspector	Physician/Nurse
Time post onset of aphasia (months)	2	14
Site of lesion	Medial left parasagittal frontal lobe	Left insula and internal capsule genu
<i>Western Aphasia Battery</i>		
Fluency	9	6
Comprehension	9.9	7.1
Repetition	9.4	8.8
Naming	7.8	5.3
Aphasia Quotient	90.2	70.3
Reading	98	10.8
Writing	77	13.5
Language Quotient	90	66.5
Aphasia classification	Anomic	Anomic
Correct Information Units (CIUs)		
Total Word Count	807	362
Total CIUs	548	140
%CIUs	68	39
<i>Object &amp; Action Naming Battery</i>		
Objects (List A) – 81 items	71	48
Actions (List A) – 50 items	35	26

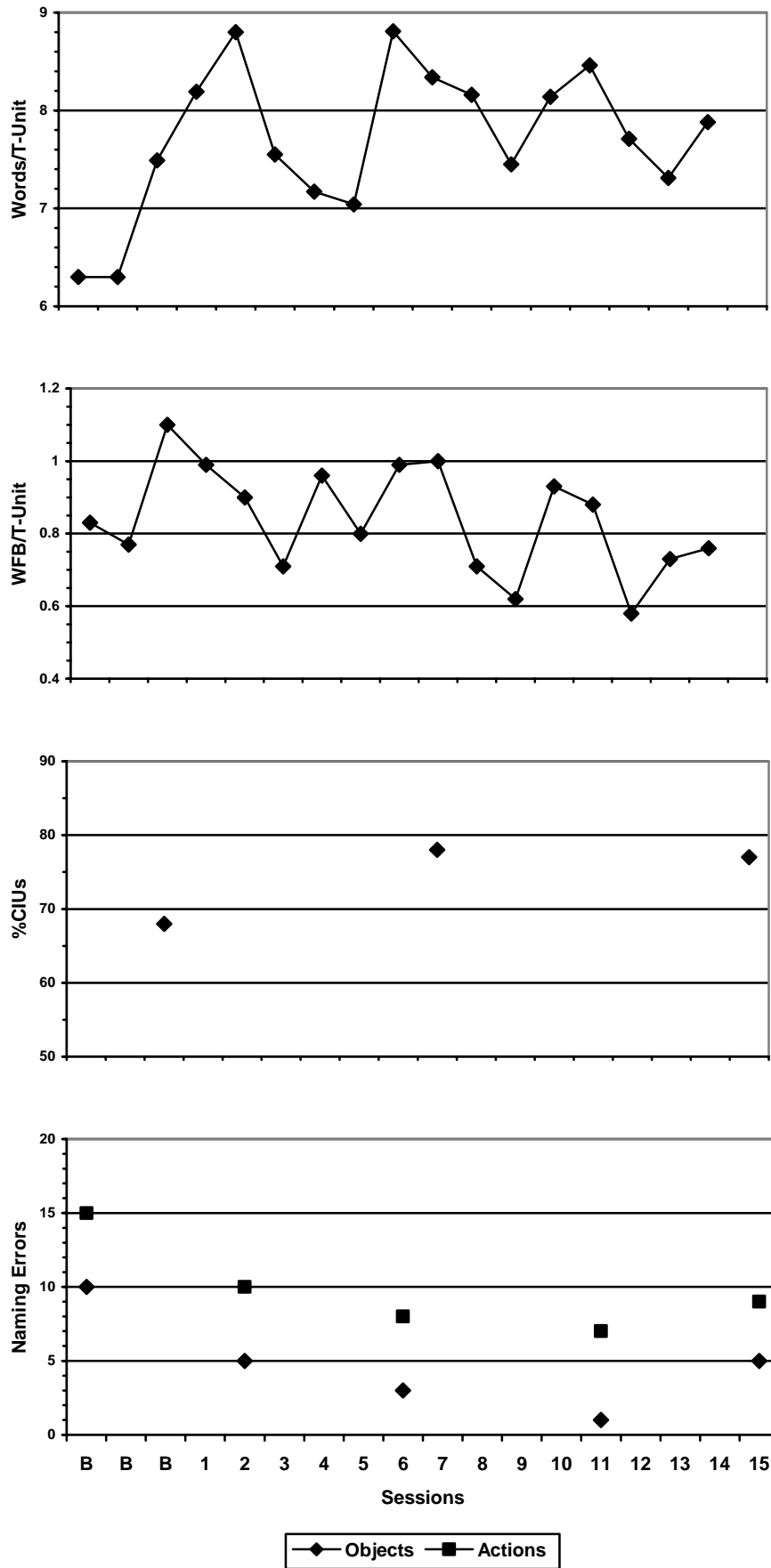


Figure 1. Discourse and word finding performance for Participant 1.

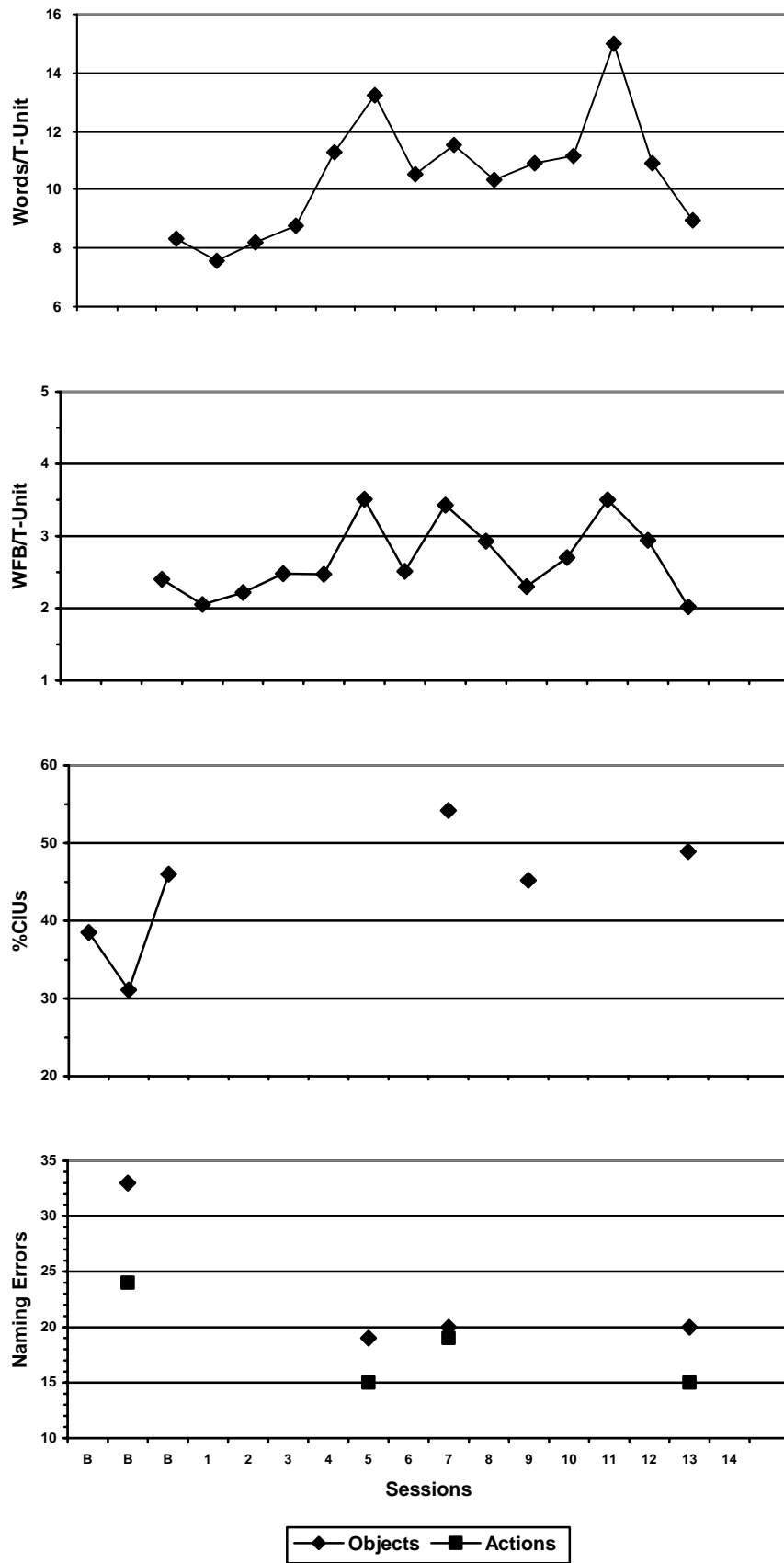


Figure 2. Discourse and word-finding performance for Participant 2.



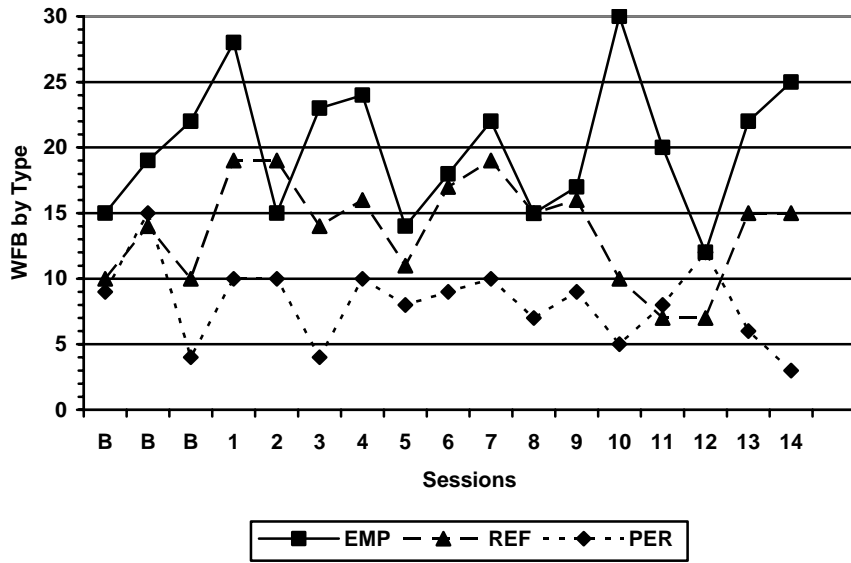


Figure 3. Word-finding behaviors during treatment for Participant 1.

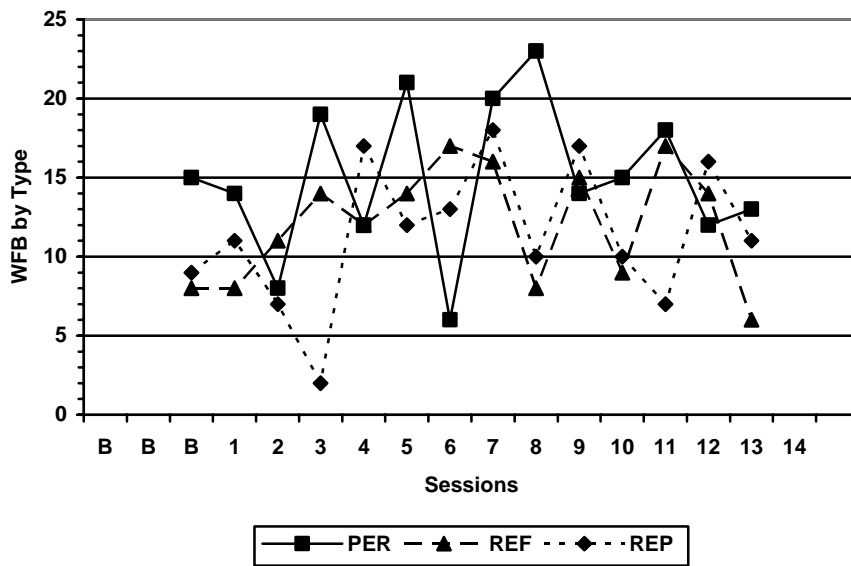


Figure 4. Word-finding behaviors during treatment for Participant 2.