Generalization of Word Retrieval Following Semantic Feature Treatment

Abstract

The purpose of this research was to analyze generalization effects following semantic feature treatment (SFT) for aphasia. The effectiveness of SFT at improving accuracy and speed of word retrieval, generalization to untreated words and discourse tasks and the influence of shared features was examined. The three participants improved in retrieval accuracy of treated words. Accuracy of untreated words improved for two participants; retrieval accuracy for words with shared features improved slightly more than for words with no-shared features. Two participants showed variable generalization to discourse tasks and improved speed of accurate responses. Clinical implications and future research directions are discussed.

Proposal

Word retrieval difficulty is a defining characteristic of people with aphasia (Goodglass & Wingfield, 1997). Semantic Feature Treatments (SFT) are one technique thought to improve word retrieval by activating semantic networks associated with the cognitive representations of target words, and is supported by the spreading activation theory of semantic processing (Collins & Loftus, 1975).

Previous SFT studies have documented mostly positive results during confrontation naming and discourse tasks (Conley & Coelho, 2003; Wambaugh & Ferguson, 2007; Boyle, 2004). Differences among studies relate to generalization to untreated words during confrontation naming and discourse tasks. Generalization is important because it extends treatment effectiveness beyond treated stimuli. However, our understanding of generalization following SFT is limited by mixed findings and few investigations that specifically examined generalization to untreated words and discourse.

If generalization to untreated words following SFT occurs there are at least two explanations. Untreated words showing improved naming accuracy may share features with treated words, therefore, through increased strength in activation of shared features during treatment, activation improves naming for untreated words. Alternately, people with aphasia may internalize SFT as a compensatory strategy. This explanation allows for word retrieval improvements regardless of whether untreated words share features with treated words.

The purpose of this, single-subject design study was to examine two possible explanations for generalization following SFT and to replicate and extend studies of SFT effectiveness at improving word retrieval accuracy and speed.

Methods

Participants

Three right-handed people with chronic aphasia participated in this study. Participant 1 (P1) was a 47-year-old male, 32 months post onset of aphasia. His *Western Aphasia Battery-Revised* (*WAB-R*) (Kertesz, 2006) Aphasia Quotient (AQ) score was 55.8 and *Test of Adult and Adolescent Wording Finding* (*TAWF*) (German, 1990) Brief Test score was 10/40. Participant 2 (P2) was a 63.5-year-old male, 90 months post onset of aphasia. His *WAB-R* AQ score was 83.8 and *TAWF* Brief Test score was 20/40. Participant 3 (P3) was a 57.2-year-old female, 134

months post onset of aphasia. Her *WAB-R* AQ score was 58.4 and *TAWF* Brief Test score was 19/40.

Materials

Potential stimuli were 260 colored drawings of object nouns standardized by Rossion and Pourtois (2004). Three members of the research team identified the six features for the target word corresponding to each drawing. Selection of potential target words was similar to previous semantic studies (Boyle, 2004). Across three trials, participants named drawings in a confrontation naming task without feedback. Each participant's experimental stimuli were selected from those named correctly on 1/3 and 0/3 trials. These words were included in a pool of potential stimuli from which 10 treatment stimuli were randomly selected. The remaining words made up a pool of potential control stimuli.

Treatment and potential control stimuli with shared predetermined features were identified and then divided into two stimulus groups: no shared features stimuli (NSF) (i.e., zero features shared with treatment stimuli) and multiple shared features stimuli (MSF) (i.e., three or more features shared with treatment stimuli). Ten treatment stimuli and ten of each of the two different types of untreated stimuli were selected, resulting in three unique stimuli lists for each participant.

Procedures

Participants completed baseline sessions including confrontation naming of drawings associated with the 10 treated and 20 untreated words, and discourse tasks (Nicholas & Brookshire 1993).

Implementing a single-subject design, participants attended 12 probe and treatment sessions. They completed confrontation naming and discourse probes identical to baseline tasks and, after a break, completed the SFT protocol for 10 treated words. Participants each completed three follow-up probe sessions one month after SFT ended.

Data Analysis

Analysis of generalization to discourse tasks included Nicholas and Brookshire's (1993) rules for counting words and correct information units (CIUs) and Boyle's (2010) procedures for analyzing word retrieval difficulties.

Results

Confrontation Naming

Data for accurate confrontation naming of treated and untreated words during baseline, treatment, and follow-up sessions for participants P1, P2, and P3 are displayed in Figures 1, 2 and 3 respectively. P1 improved his ability to name the treated words and achieved 100% accuracy for treated words by the 10th of 12 sessions. However, P1 demonstrated limited, inconsistent improvements in naming untreated words both with MSF and NSF.

P2 increased his number of accurately retrieved words from baseline levels for treated and untreated words. He achieved an accuracy level of 100% for treated words by the 4th session. His improved accuracy of treated words with MSF and NSF was maintained at one month follow-up, with MSF accuracy slightly higher than NSF accuracy.

P3 improved her word retrieval accuracy for treated and untreated words reaching an accuracy level of 100% for treated words by session 4. Improvements in untreated words with MSF and NSF were maintained at one month follow-up, with MSF accuracy slightly higher than NSF accuracy.

Visual inspection of P1's speed of accurate word retrieval showed a trend toward faster naming; however, great variability in response was demonstrated overall (e.g., accuracy treated words SD = 0.94) (Figure 1). P2's speed of accurate word retrieval showed some trends toward faster naming for all word lists to varying degrees (Figure 2). Although P2 demonstrated a fair amount of variability in naming speed, his trends toward faster responses were more consistent and showed greater change relative to P1. Figure 3 illustrates P3's average naming speed of each word list and his improvement in average naming speed across the word lists. As with P1 and P2, variability in average naming speed was observed across the word lists and sessions. Notably, this variability decreased following intervention. Similar to P2, P3's trends toward faster responses were relatively consistent and showed larger change relative to P1.

Discourse Tasks

CIU analysis did not reveal significant changes in any of the three participants' discourse (Figure 4). P1 demonstrated slight increases over baselines levels in mean words per minute; however, the measures were variable across sessions.

The average number of T-units per discourse sample and average percent of T-units containing word finding behavior for P1 and P2 are shown in Figure 5. P1's average number of T-units increased slightly demonstrating increased verbal output that was maintained at one-month follow-up. Additionally, P1's average percent of T-units containing word finding behavior decreased from the baseline sessions to the end of the treatment sessions and was maintained at follow-up. P2 did not increase his average number of T-units per discourse tasks, but showed similar decreases in percent of T-units containing word finding behavior that was maintained at follow-up. P3 did not produce enough T-units to compute the word finding analysis measures.

Discussion

Results confirmed the effectiveness of SFT at improving naming accuracy and retrieval speed of treated words, to varying degrees, during confrontation naming tasks for each of the three participants. Some treatment effects generalized to untreated words and to some measures of discourse. Limited support was found for the hypothesis that generalization of treatment effects to untreated words with MSF would be greater than untreated words with NSF. Theoretical and clinical implications will be presented.

References

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Table 1

Participant Demographic Data and Aphasia Type and Severity

Participant	Age (in years)	Gender	Time post-stroke (in months)	Education level (in years)	*WAB-R* classification	*WAB-R* Aphasia Quotient (100)	*TAWF* Brief Test (40)	*AIDS* (100%)
1	47	M	32	14	Broca's	55.8	10	69%
2	63.5	M	90	14	Anomic	83.8	20	84%
3	57.2	F	134	14	Broca's	55.4	19	64%

Figure 1. Participant 1's confrontation naming accuracy and speed of accurate word retrieval for treated and untreated words across baseline, treatment, and follow up sessions. B = Baseline session, T = Treatment session, F = Follow up session.

Participant 1
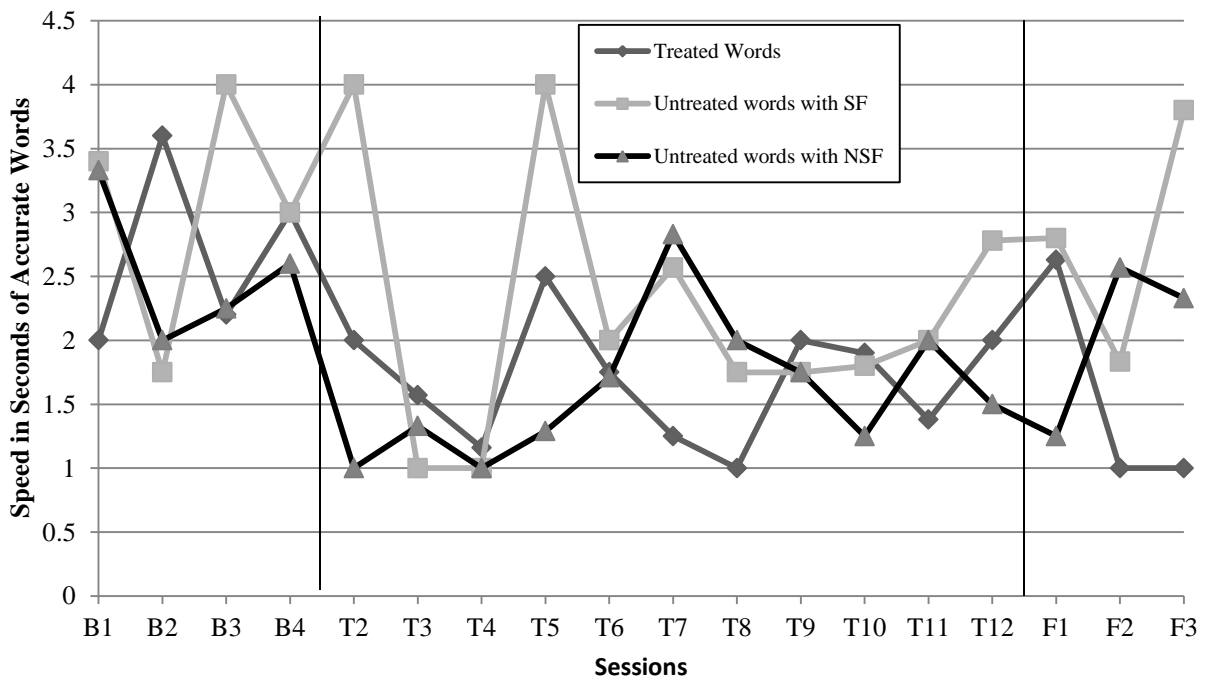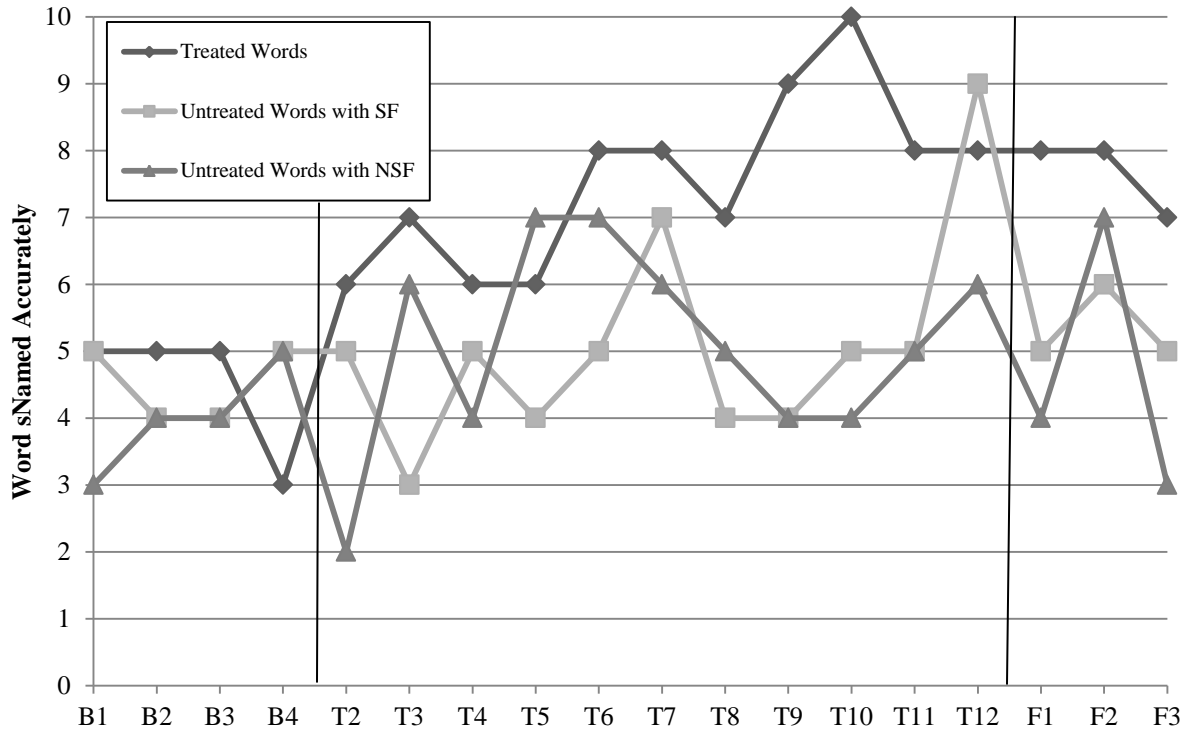
Figure 2. Participant 2's average naming accuracy across for three word lists across baseline, treatment, and follow-up sessions.
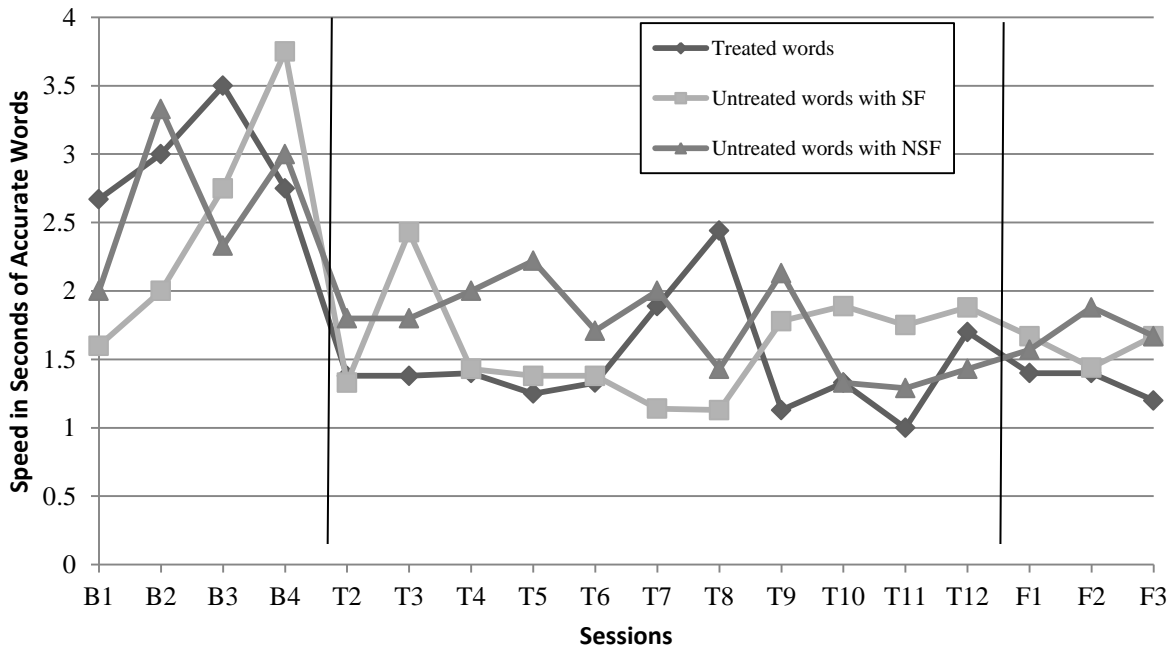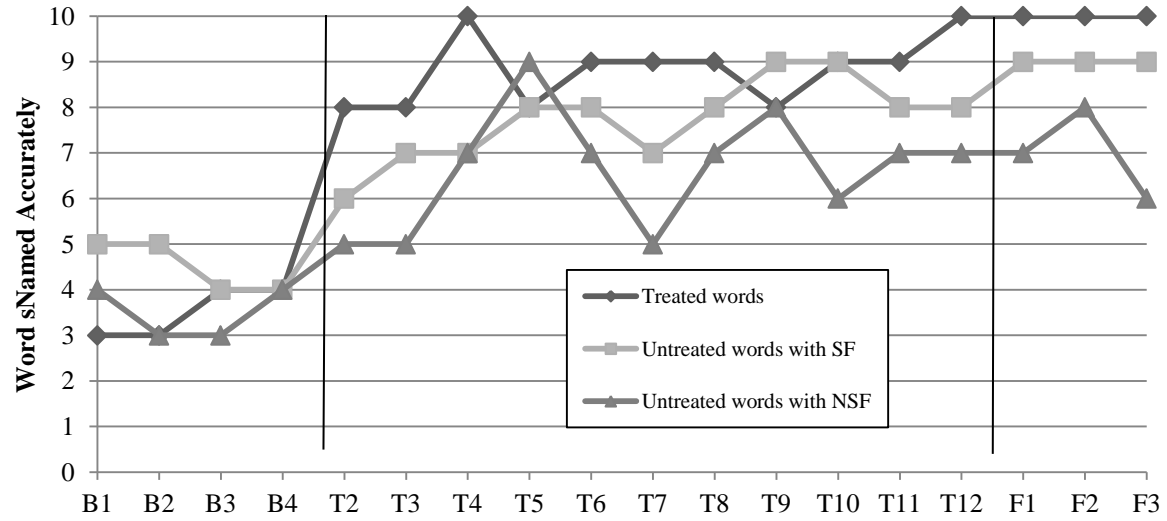
Participant 2

Figure 3. Participant 3's average naming accuracy across for three word lists across baseline, treatment, and follow-up sessions.
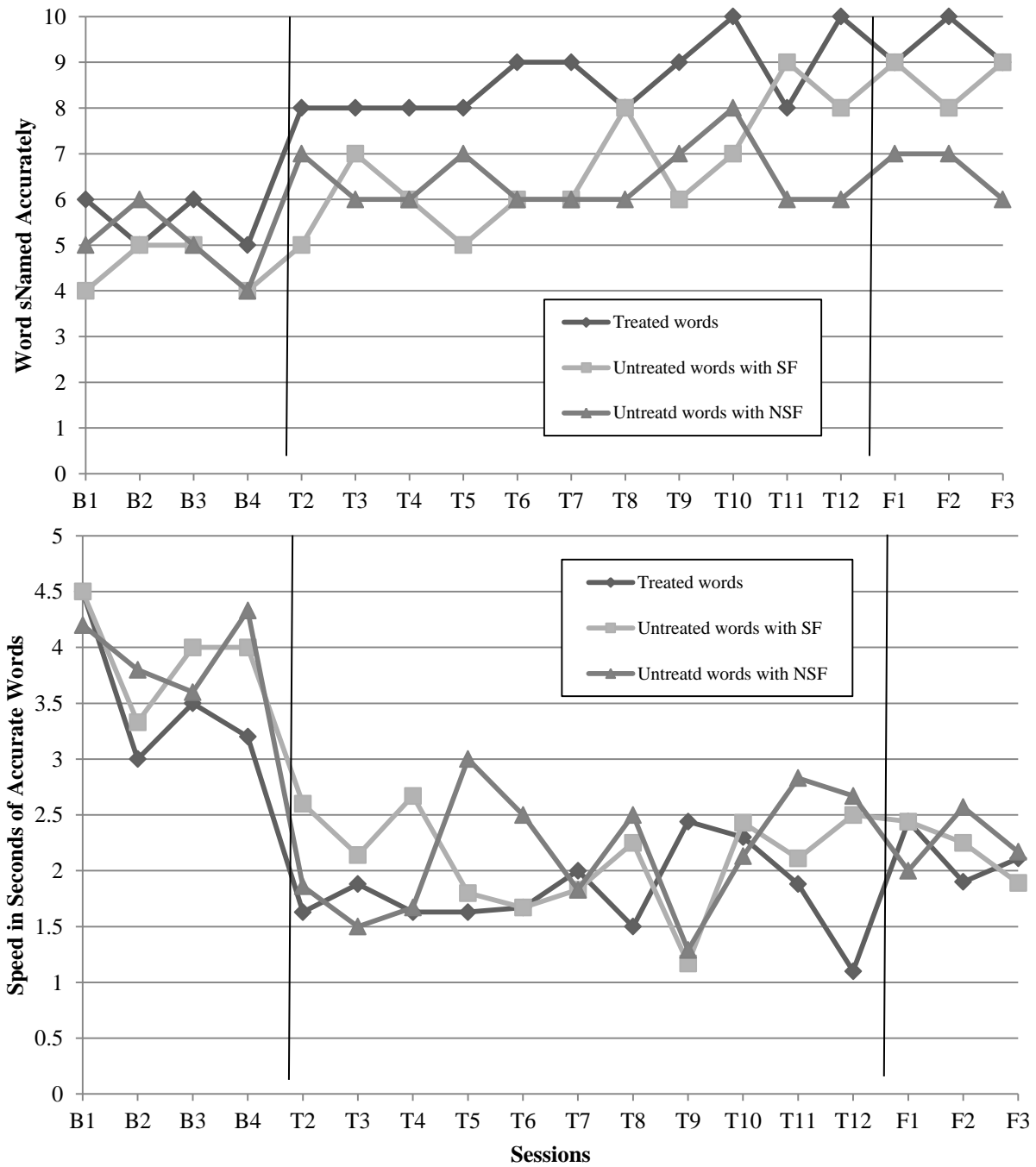
Participant 3

Figure 4. CIU analysis across baseline, probe and follow up sessions for P1, P2, and P3.
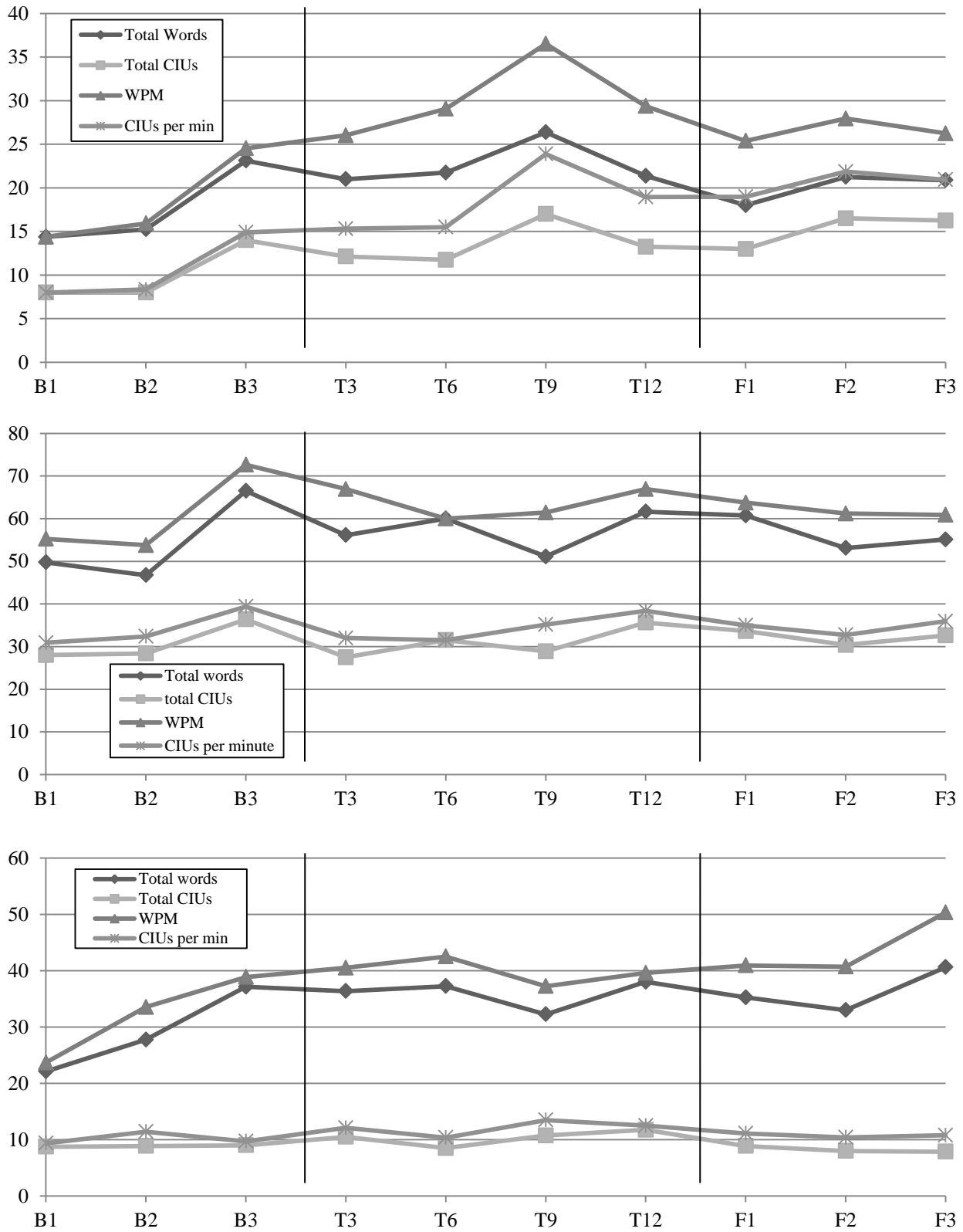
Figure 5. P1 and P2's average total t-units and average percent t-units containing word finding behavior across various discourse tasks for baseline, treatment, and follow up sessions.