

Introduction

Individuals with severe aphasia and a coexisting apraxia of speech (AOS) have significant communication deficits. Anagram and Copy Treatment (ACT) and Copy and Recall Treatment (CART) have been shown to improve written naming performance for those with moderate to severe aphasia in phase I^{1,2} and phase II³ treatment trials. In addition, Beeson et al.³ reported improvement by several participants in the CART program on verbal repetition tasks, spoken naming of treatment picture stimuli, and spontaneous use of target words in communicative interactions. These unexpected changes were attributed to the participants' exposure to the spoken name of each item during treatment and the voluntary vocal rehearsal of the target words during the writing task.

Beeson and Egnor⁴ tested this hypothesis by comparing the influence of CART plus verbal repetition versus a repetition-only task on spoken naming performance. Participants were provided with a communication device that presented the auditory word for the repetition task during home practice. One of the two participants demonstrated significant improvement in oral naming of target items in the CART plus verbal repetition condition. The authors suggested that the therapeutic effect of repetition in CART results from strengthening the link between orthographic and phonological representations.

De Riesthal⁵ used a similar treatment protocol with an individual with a severe aphasia and AOS. The individual demonstrated significant improvement in the ability to write single words, but did not demonstrate improvement on the

spoken naming task. The participant was able to produce the word in the treatment session when the clinician provided an auditory visual cue; however, due to the AOS, he could not repeat the words during the homework practice task when presented with only the auditory presentation of the word via the communication device.

There is evidence that individuals with AOS may benefit from treatments that include auditory-visual stimuli such as modeling/repetition and integral stimulation^{6,7,8,9}. Moreover, there is evidence that repeated presentations of an auditory-visual stimulus on a speech perception task may improve confrontation naming in individuals with severe aphasia with a coexisting AOS without the individual producing the word directly¹⁰. Improving the ability of an individual with AOS to repeat by providing an auditory-visual stimulus to facilitate spoken word production during home practice may strengthen the link between orthographic and phonological representations and improve spoken naming performance. To date, the influence of adding an auditory-visual component to the repetition task on improving spoken naming in conjunction with the ACT and CART programs has not been examined.

Generalization effects for written naming performance during ACT and CART have been indexed using a binary scoring system. Such a system does not capture responses that are not spelled completely accurately, but are communicative. The 5-point scoring system proposed by Helm-Estabrooks¹¹ captures increments of improvement in spelling single words (See Table 1) and may be more sensitive to generalization effects.

Finally, in previous studies of ACT and CART, the participant and his or her family selected the stimuli to be targeted in treatment. This was done to ensure that the stimuli were meaningful and functional for the participant. In clinical situations, the selection of stimuli may vary and include patient selected stimuli, clinician selected stimuli, or both. There are no data examining potential differences in performance on such stimuli.

The study was designed to answer three questions:

1. Does inclusion of auditory-visual stimuli in the ACT/CART plus verbal repetition treatment result in improved spoken naming of target treatment items?
2. Do the effects of ACT/CART plus repetition treatment generalize to the written naming of untreated items?
3. Are there differences in written and spoken naming performance for items selected by the patient/family vs. the clinician?

Methods

Three individuals with a moderate to severe aphasia and a coexisting AOS participated in the study (see Table 2). Each participant was administered the *Western Aphasia Battery – Revised*, *Cognitive Linguistic Quick Test*, *Pyramids and Palm Trees Test*, and *Johns Hopkins University Dysgraphia Battery*, pre- and post-treatment. Next, the participant with his or her family and the clinician each selected a set of 18 words (36 total) to be targeted in the treatment. The clinician selected pictures, using a traditional clinical decision

approach: nouns and verbs, consideration of length of word, complexity, and attempts to avoid visual similarity when possible. The pictures were divided into 6 sets of 6 pictures (3 from participant choice and 3 from clinician choice). Baseline measures of spoken and written naming performance were obtained for each set.

Participants were enrolled in an Anagram and Copy Treatment (ACT) and Copy and Recall Treatment (CART), which included a spoken word repetition task. Each participant was seen for one session per week for ACT plus spoken repetition, followed by six days of home practice with CART plus spoken repetition. To include repetition in the home practice session, the participant was provided with individual video clips of the treating clinician saying each word in the treatment set. The technology for viewing the video clips varied (e.g., portable DVD, Lingraphica). The participant was permitted to replay the video clip three times to generate a correct production before moving on to the next stimulus. Weekly treatment probes were administered to determine improvement in spoken and written naming for treated items, and maintenance probes were administered every fourth session. Treatment for a set of stimuli continued until the patient reached the criterion of 80% accuracy based on the 5-point scoring system (total score for all 6 words/maximum score of 30) for writing the target words over 2 consecutive sessions. Then the next set of stimuli was introduced into the treatment. After reaching criterion, probes for that set were administered every fourth session to assess maintenance of treatment effects.

Results

Question 1: None of the participants met the criteria of 80% accuracy for any of the six word-sets in the spoken naming condition (see Figures 1-3). Participants 1 and 2 only completed two sets due to low performance (mode of 0%). Participant 3 performed best and was able to say the name for a maximum of only 2 items in any set. No generalization to untrained items was observed. Participant 3 was observed to say some of the target words in conversation that she was unable to during treatment probes.

Question 2: Each participant met the criteria of 80 percent accuracy over two sessions for each of the six word-sets in the written-naming condition (See figures 4-6). Participant 1 showed generalization to untrained items on sets 2 and 4. She also demonstrated improvement on the JHU Dysgraphia Battery, with an increase from 25% to 45% accuracy for untrained items on Subtest 8 (written naming).

Question 3: There were no significant differences between participant performance on self-selected words and clinician-selected words.

Conclusion

This study examined whether a home practice with spoken repetition benefits individuals with aphasia and a coexisting AOS. In our cases, only one individual was able to complete home practice successfully. We also found the implementation of the Helm-Estabrooks scoring system provided more specific

feedback on progress and was more sensitive to generalization of improved spelling skills than use of total words or percent words correct. Word writing success with the ACT and CART was not dependent on word preference, personal choice, or clinical linguistic decision making.

References

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Table 1

Scoring system from Helm-Estabrooks¹¹

0 = totally incorrect, illegible, all letters wrong, substitution of a drawing

1 = less than half correct or all right letters in wrong order

2 = half correct, or half letters in wrong order

3 = more than half correct, but not fully correct, or two letters reversed, or letters added to correct word

4 = self- corrected

5 = fully correct on first attempt

Table 2: *Participant Data*

Case	Age	Gender	Months post onset	Lesion	WAB AQ	P&P
1	72	F	38	Left MCA involving frontal & parietal lobes- large acute non-hemorrhagic	12.4	45/52
2	67	M	26	Left MCA frontotemporal parietal subacute infarct	11.7	45/52
3	73	F	26	Left MCA w/ extension into frontal, temporal, parietal lesions; old lacunar infarct in right basal ganglia	47.3	43/52

Note: WAB AQ = Western Aphasia Battery Aphasia Quotient; P&P = Pyramid and Palm Trees Test semantic picture matching

Figure 1. Participant 1's performance in spoken naming condition based on number of words correct.

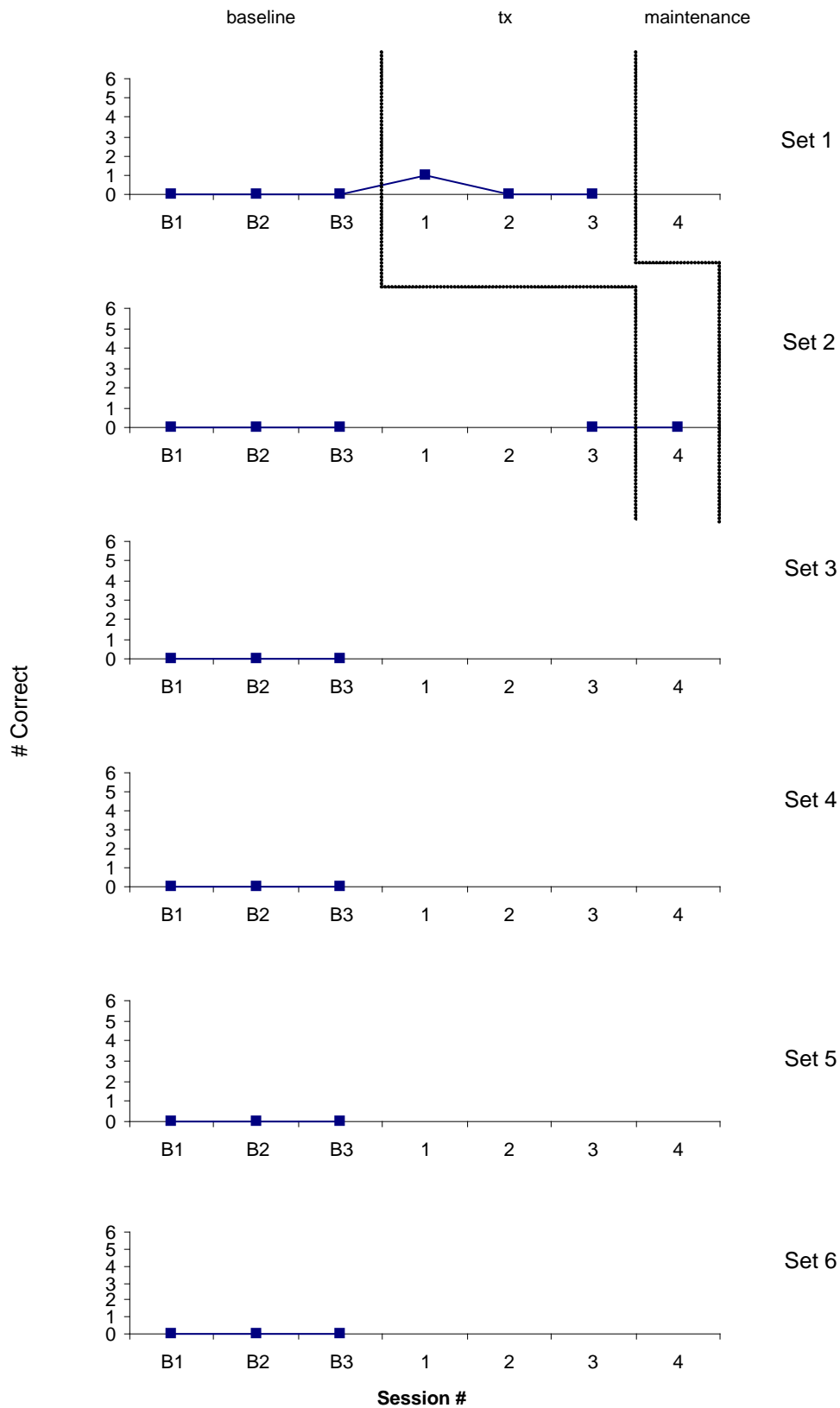


Figure 2. Participant 2's performance in spoken naming condition based on number of words correct.

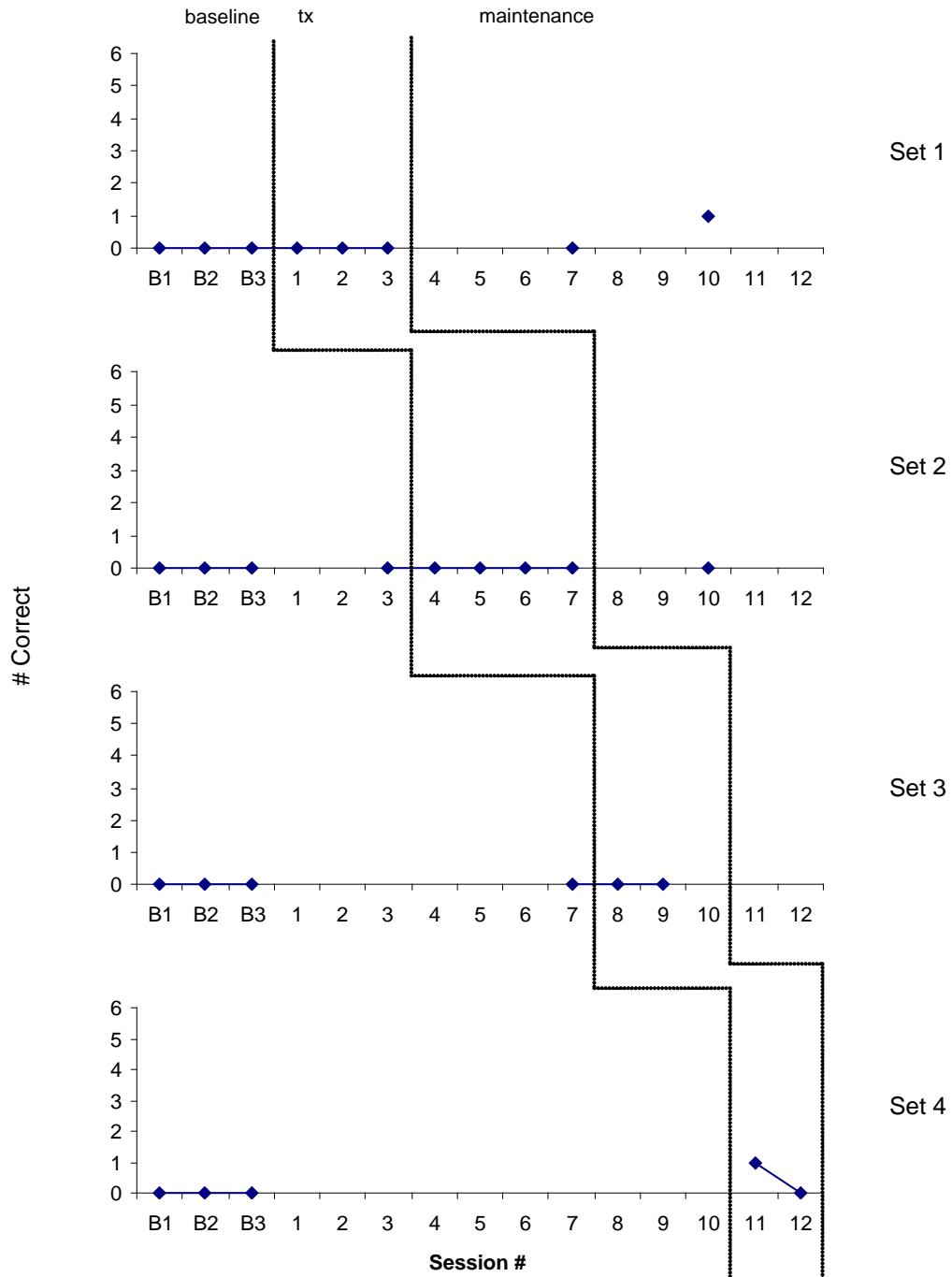


Figure 3. Participant 3's performance in spoken naming condition based on number of words correct.

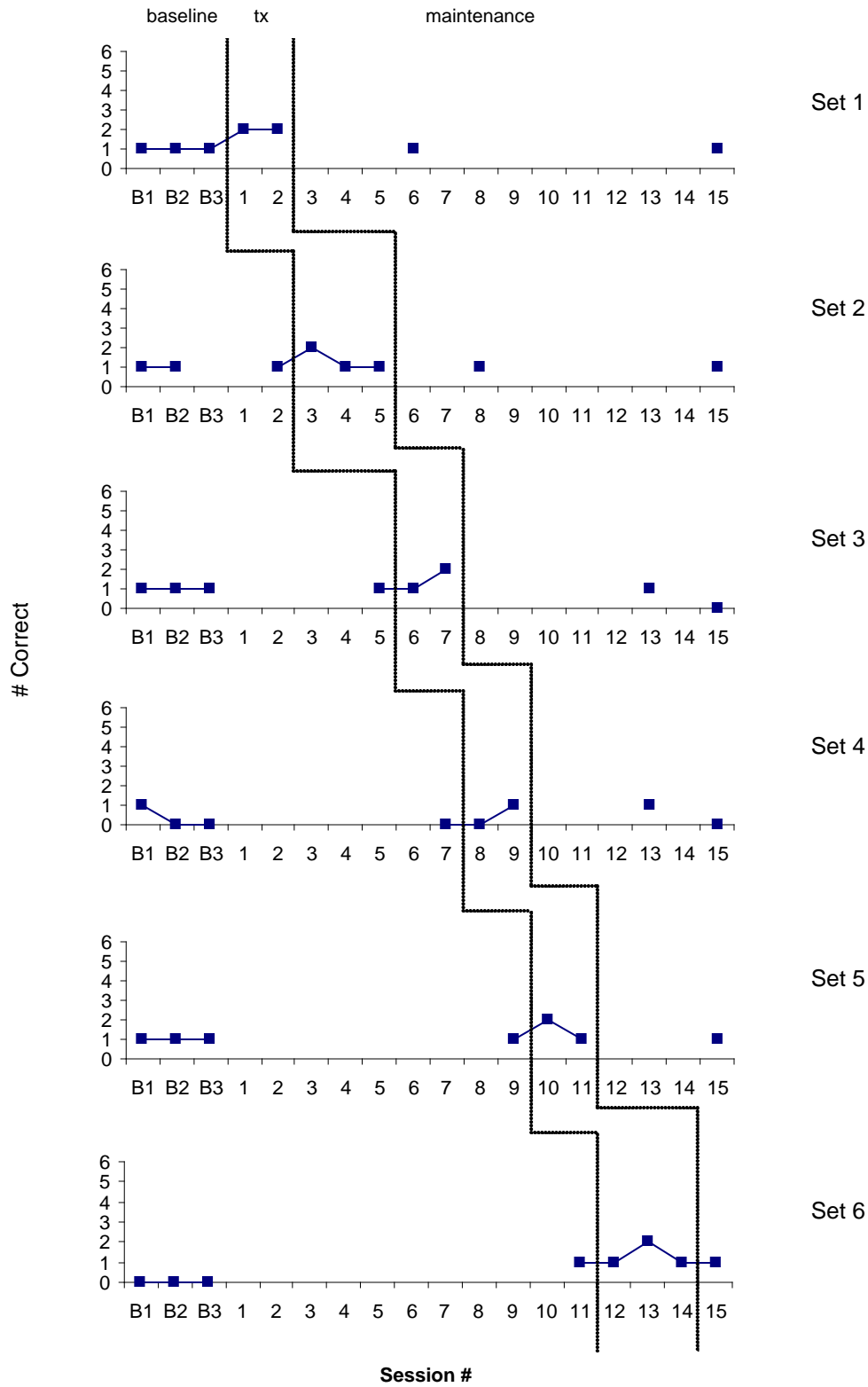


Figure 4. Participant 1's performance in the writing condition as percent accuracy on the 5-point scoring system and total word score.

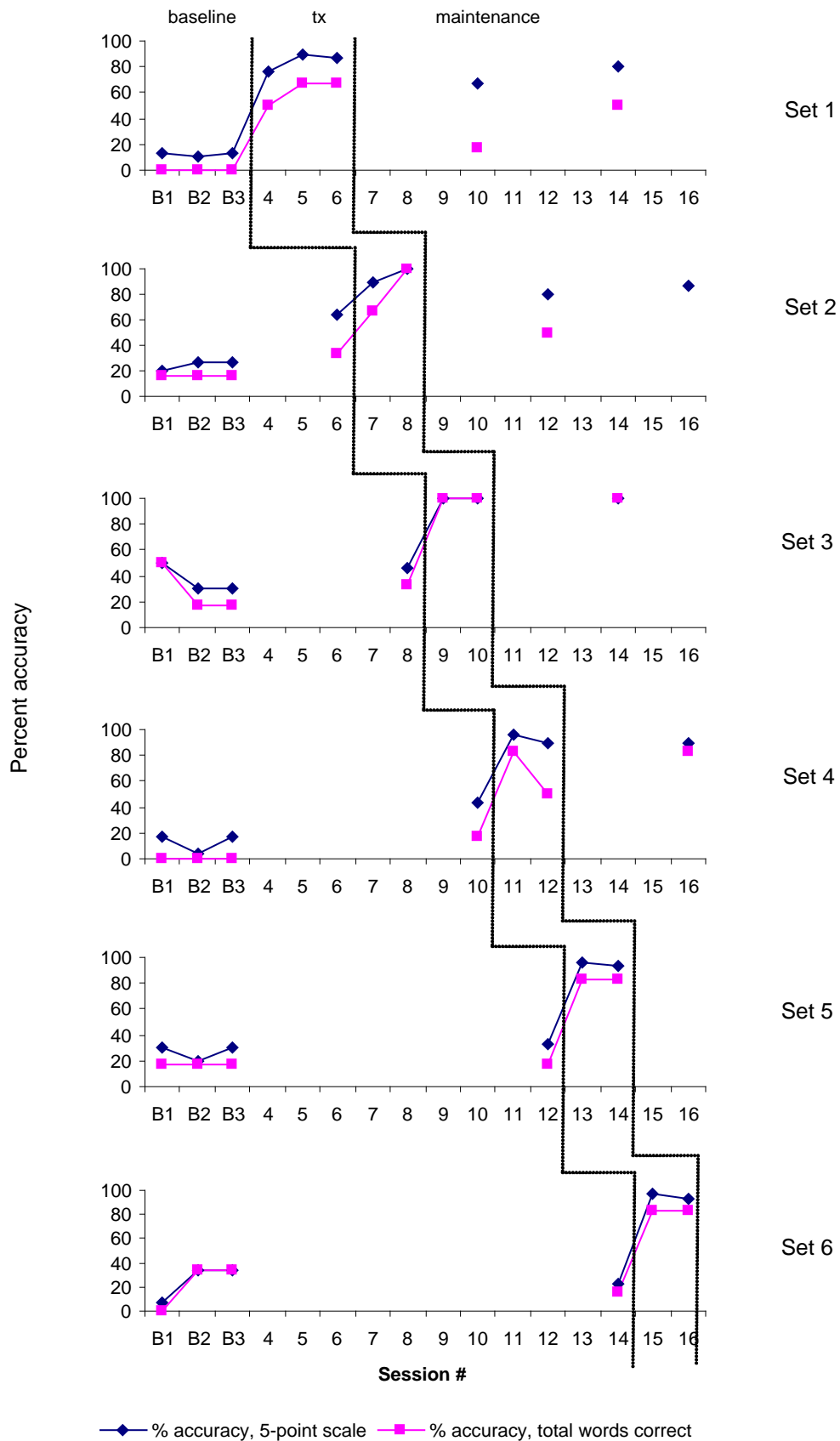


Figure 5. Participant 2's performance in the writing condition as percent accuracy on the 5-point scoring system and total word score.

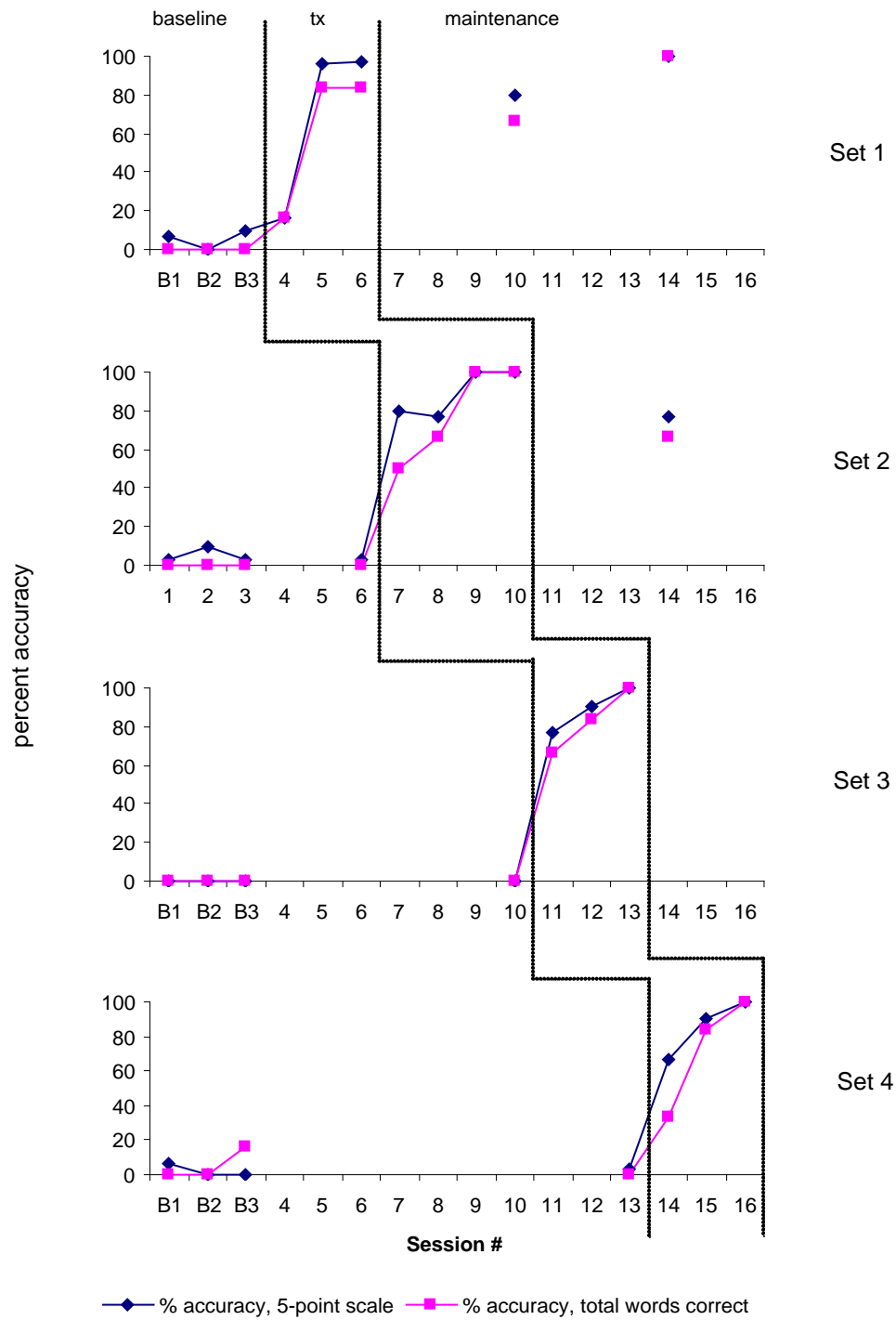


Figure 6. Participant 3's performance in the writing condition as percent accuracy on the 5-point scoring system and total word score.

