

Effects of Semantic Feature Analysis on Verb Production in Aphasia

The majority word finding treatment research has focused on the retrieval of object names with positive findings reported for numerous treatments (see Nickels, 2002, for a review). There has been a limited amount of research concerning the treatment of action names (Berndt, Mitchum, Haendiges, & Sanderson, 1997; Fink, Martin, Schwartz, Saffron, & Myers, 1992; Wambaugh, Doyle, Martinez, & Kalinyak-Flizar, 2002; Bastiaanse, Hurksmans, & Links, 2005). Treatments that promote improved object naming may or may not facilitate improved action naming. Evidence suggests that verbs and nouns are processed differently (Damasio & Tranel, 1993; Shapiro, Pascual-Leone, Mottaghy, Gangitano, Caramazza, 2001). Verbs obviously carry different information than nouns and may be considered to be relatively more complex in comparison of nouns (Bastiaanse, Edwards, & Rispens, 2002). Consequently, it cannot be assumed that treatments developed for object naming will be appropriate for the treatment of action naming.

The purpose of this investigation was to examine the effects of a treatment for action naming with four participants with aphasia. The treatment chosen for study, Semantic Feature Analysis (SFA; Boyle, 2004; Boyle & Coelho, 1995; Coelho, McHugh & Boyle, 2000; Conley & Coelho, 2003) has been shown to have promise in improving naming of trained, as well as untrained object names. Furthermore, the treatment technique allowed for modification to accommodate application to actions so that various aspects of meaning could be targeted.

Method

Participants

Four individuals with chronic aphasia and significant word finding difficulties served as participants (see Tables 1 and 2 for participant characteristics and pretreatment assessment).

Experimental Stimuli

Participants were asked to name 100 drawings depicting actions obtained from *An Object and Action Naming Battery* (OANB; Druks & Masterson, 2000), on two separate occasions. Forty items were selected based on the performance on the OANB and were divided into four sets of 10 items each. Each set was matched as closely as possible for factors that could influence retrieval or production: frequency, age of acquisition, number of syllables, syllable structure, phonetic complexity, familiarity, imageability and visual complexity (Berndt et al., 1997; Kemmerer & Tranel, 2000; Druks and Masterson, 2000) (Appendix A). The argument structure was also balanced across lists in terms of number of one and two place argument verbs.

For two participants (participants 1 and 2), an additional set of items (Fiez & Tranel, 1997) were utilized to select stimuli to allow for adequate balancing across lists.

Experimental Design

Single-subject multiple baseline designs across behaviors and subjects were used to examine the effects of treatment on the retrieval of action names. For each subject, two lists of actions were designated for treatment, one list was designated for continuous exposure (probing) but was not treated, and the remaining list was designated for pre-/post treatment measurement only.

The behaviors of interest were measured repeatedly prior to the initiation of treatment (i.e., baseline phase). Then, treatment was applied to one of the word lists while repeated probing was continued. When the criteria for terminating treatment was reached (see below), treatment was withdrawn from the first list of words and was applied to the second list. Probing was conducted continuously until treatment was terminated with second list and follow-up probes were conducted at two and six weeks.

Dependent Variable. The behavior of interest was the accuracy of verbal naming of the experimental stimuli (i.e., 40 pictures).

Baseline Phase. Baseline probes were extended across participants. For baseline and treatment probe procedures and scoring see Appendix B. A multidimensional scoring system was utilized to score responses (Wambaugh, Cameron, Kalinyak-Fliszar, Nessler, & Wright, 2004). See Appendix C.

A stable baseline was established for all four lists for each participant prior to initiating treatment. Stability was determined prior to the initiation of the study as no more than 20% variability in responding with no increasing performance over the final three baseline probes.

Treatment Phase. Probes identical to those conducted during baseline, were completed at the beginning of each session prior to treatment.

Maintenance and Follow-up Phase. Maintenance of naming the initially trained word list was measured during subsequent training of the second list. Follow-up probes were conducted for all four sets of action pictures at two and six weeks post-treatment.

Treatment

A modified version of SFA treatment was used to accommodate the use of verbs instead of nouns as the pictured target stimuli. The same training procedure utilized by Boyle and Coelho (1995) was employed, but the features that were targeted were appropriate for verb retrieval. A semantic feature diagram was used to elicit features from participants. See Appendix D for diagram with features and Appendix E for specific treatment procedures.

One presentation of the 10 treatment items constituted one trial. Participants typically completed one trial during one treatment session. Participants received two to three sessions per week for approximately 45-60 minutes each. Treatment was provided by an ASHA certified speech language pathologist. Treatment was applied to one set of pictures until the participant reached at least 90% accuracy in naming the trained actions in two out of three probe sessions or until 12 treatment sessions were completed.

Results

The percentages of actions named correctly in probe sessions by participants 1-4 are depicted in Figures 1-4 respectively.

Participant 1 (Figure 1) demonstrated stable low levels of correct responding during baseline. There was a moderate increase in production of action names after the application of treatment to list 1, but criterion was not met. Accuracy levels of 70-80% were achieved prior to and after the conclusion of treatment. After the application of treatment to list 2, criterion was reached in 5 sessions. There were negligible changes in production of untreated action names, indicating a lack of generalization as well as a lack of repeated exposure effects. (note: the fourth list was inadvertently probed repeatedly rather than being limited to pre-/post treatment probing; however since potential exposure effects were not evident, this error did not compromise control for exposure). Maintenance of treated items was strong during follow-up probes.

Participant 2 (Figure 2), also exhibited low levels of correct responding during baseline. For lists 1 and 2, criterion was reached after application of treatment in 5 and 3 sessions, respectively. There was no change for untrained items on the exposure control and pre-/post-treatment lists. Follow-up data at 2 weeks remained relatively stable. Follow-up data at 6 weeks were not yet available.

For Participant 3 (Figure 3) minimal change was observed with the application of treatment to list 1. List 2 has recently been submitted to treatment and gains are also not evident yet. Barring unforeseen events, treatment application and follow-up probing will be completed within the next 9-10 weeks.

Participant 4 (Figure 4) achieved performance criterion for list one following 7 treatment sessions. Treatment was then applied to list 2 and criterion has not yet been reached although gains in performance have occurred. Treatment and probing is expected to be completed within 9-10 weeks.

Discussion

The results of this investigation thus far indicate positive acquisition effects of treatment for three of the participants. However, there were no positive generalization effects to untrained experimental items.

Discussion will include possible explanations for differential responding across individuals, implications for clinical application, and directions for future study.

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Table 1. Participant Characteristics

Characteristic	Participant 1	Participant 2	Participant 3	Participant 4
Age	48	60	55	60
Gender	Female	Male	Male	Male
MPO	276	66	79	21
Years of Education	16	12	14	11

Table 2. Pretreatment Assessment Results

	Participant 1	Participant 2	Participant 3	Participant 4
<i>Test of Adolescent/Adult</i>				
<i>Word Finding</i>				
Raw Score (107 Possible)	19	46	16	24
Comprehension	97%	97%	90%	99%
<i>Verb & Sentence Test</i>				
40 possible on each				
Verb Comprehension	38	36	29	39
Sentence Comprehension	20	14	22	28
Grammaticality Judgment	23	31	33	32
Action Naming	20	16	12	7
10 Possible on each				
Filling in Finite	7	3	0	2
Filling in Infinitives	8	7	0	4
20 Possible				
Sentence Construction	16	0	0	0
<i>PICA</i>				
Overall	12.89	12.17	10.72	11.75
Percentile	75	65	48	60
<i>Object & Action Naming Battery—Nouns Only</i>				
	71/81	65/81	38/81	49/81
<i>Psycholinguistic Assessment of Language Processes in Aphasia</i>				
<i>Word Rhyme</i>				
Auditory	49/60	46/60	43/60	50/60
Written	45/60	36/60	29/60	34/60
<i>Word Semantic Association</i>				
High Imageability	11/15	11/15	11/15	11/15
Low Imageability	8/15	9/15	7/15	4/15
<i>Auditory Comprehension</i>				
Verbs/Adjectives	35/41	33/41	30/41	31/41
<i>Assessment of Intelligibility of Dysarthric Speech</i>				
Word Level Intelligibility	92%	80%	84%	94%
<i>Coloured Progressive Matrices (36 Possible)</i>				
Total	33	31	26	33
<i>Western Aphasia Battery</i>				
Aphasia Quotient	77.4	83.4	52.9	66.9
Classification	Conduction	Anomic	Broca's	Broca's

Appendix A

Mean Values for Each Variable for Each Word List Across Participants

Participant 1

Item	LOP	Syllable	Frequency	Familiar	Age	Image	Visual
List 1	5.8	2.1	34.00	2.22	2.26	3.17	3.50
List 2	5.8	2.1	29.10	2.87	2.26	3.17	3.15
List 3	5.7	2.1	31.80	3.34	2.03	3.39	3.53
List 4	5.6	2.1	35.00	2.94	2.34	3.07	3.39

Participant 2

Item	LOP	Syllable	Frequency	Familiar	Age	Image	Visual
List 1	5.6	2.0	52.30	3.26	1.50	3.70	3.42
List 2	5.7	2.0	49.70	3.61	1.50	4.04	3.28
List 3	5.9	2.0	51.60	3.45	1.64	3.71	3.50
List 4	5.6	2.0	52.40	3.61	1.56	4.14	3.55

Participant 3

Item	LOP	Syllable	Frequency	Familiar	Age	Image	Visual
List 1	5.5	2.0	63.90	3.72	2.45	4.29	3.66
List 2	5.5	2.0	65.10	3.81	2.75	4.13	4.03
List 3	5.5	2.0	70.10	3.62	2.75	3.97	3.85
List 4	5.6	2.0	66.70	3.68	2.65	3.93	3.67

Participant 4

Item	LOP	Syllable	Frequency	Familiar	Age	Image	Visual
List 1	5.6	2.0	71.40	3.91	2.39	4.11	4.05
List 2	5.4	2.0	75.40	4.01	2.40	4.05	4.09
List 3	5.5	2.0	72.30	3.79	2.47	4.00	4.29
List 4	5.6	2.0	72.30	3.79	2.51	4.19	3.77

LOP: Length of phonemes

Syllable: Syllable length

Frequency: Frequency

Familiar: Familiarity

Age: Age of acquisition

Image: Imageability

Visual: Visual complexity

Appendix B – Probe Procedures

1. Participant asked to “use an action word to describe each picture”.
 - A. Clinician presents each item randomly one at a time
 1. A response interval of 15 seconds was allowed for each picture.
 2. If participant’s response was a noun, he/she were prompted with the same initial phrase to use a verb to describe the picture. This prompt was provided a maximum of 3 occasions per probe session.
 3. No feedback was given during probe sessions other than general encouragement (i.e., you are doing a good job, etc...).
 - B. A score of 7 or higher, using multidimensional scoring system (see Appendix C below) was considered a correct response.

Appendix C - Multidimensional Scoring System

Score	Description
9	Accurate, immediate (<5 seconds)
8	Accurate, delayed (>5 seconds)
7.5	Uninflected or incorrectly inflected
7	Self-corrected
6A	Phonemic paraphasia (i.e., single phoneme substitution)
6B	Phonemic paraphasia (i.e., recognizable word with more than one sound substitution; at least 50% of sounds correct)
5.5	Partial retrieval (noun form, word embedded in a more complex form)
5	Semantic paraphasia (semantically related word)
5N	Noun for verb semantic paraphasia
4.5	Semantic paraphasia containing phonemic paraphasia
4	Appropriate gestural response or written response
3	Circumlocution
2.5	Tangential Speech
2	Neologism or unintelligible word
1	Perseveration
0	No response or “I don’t know”

Appendix D – Semantic Feature Diagram



Appendix E - Treatment Procedures

1. Clinician presents picture of target item in center of semantic feature chart.
 - A. Clinician requests naming response from participant.
 1. If correct response - verbal feedback is provided (i.e., “That’s right. Now let’s go through the features”).
 2. If incorrect response – verbal feedback is provided (i.e., “Not quite. Let’s see if we can trigger it by going through the features”).
 - B. Regardless of whether naming response is correct or incorrect, the participant is guided through semantic features for target item.
 1. Clinician writes features in the appropriate location on the feature chart after the participant identifies them. Clinician writes all appropriate features provided by the participant.
 2. If participant is unable to provide a feature, the clinician provides an appropriate feature both verbally and in writing.
 3. Clinician completes all features even if correct naming response occurs while reviewing features.
 - C. After completing all the features, the clinician requests a naming response again.
 1. If correct response - verbal feedback is provided (i.e., “That’s right”) and new stimulus item is presented.
 2. If incorrect response – the clinician will model the target word and request a repetition. If correct production is still not elicited the clinician will attempt integral stimulation to elicit the target word.
 3. With incorrect response – clinician reviews the features again with participant by providing a neutral beginning for each feature (e.g., “the person who usually does this is...”). If the participant is unable to complete the phrase, the clinician will complete it.
 - D. After completing all the features, the clinician requests a naming response again.
 1. If correct response - verbal feedback is provided (i.e., “That’s right”) and new stimulus item is presented.
 2. If incorrect response – clinician provides a model of the correct response and new stimulus item is presented.

Figure Captions

Figure 1. Percent of items named correctly in Probes by Participant 1

Figure 2. Percent of items named correctly in Probes by Participant 2

Figure 3. Percent of items named correctly in Probes by Participant 3

Figure 4. Percent of items named correctly in Probes by Participant 4

Figure 1. Participant 1

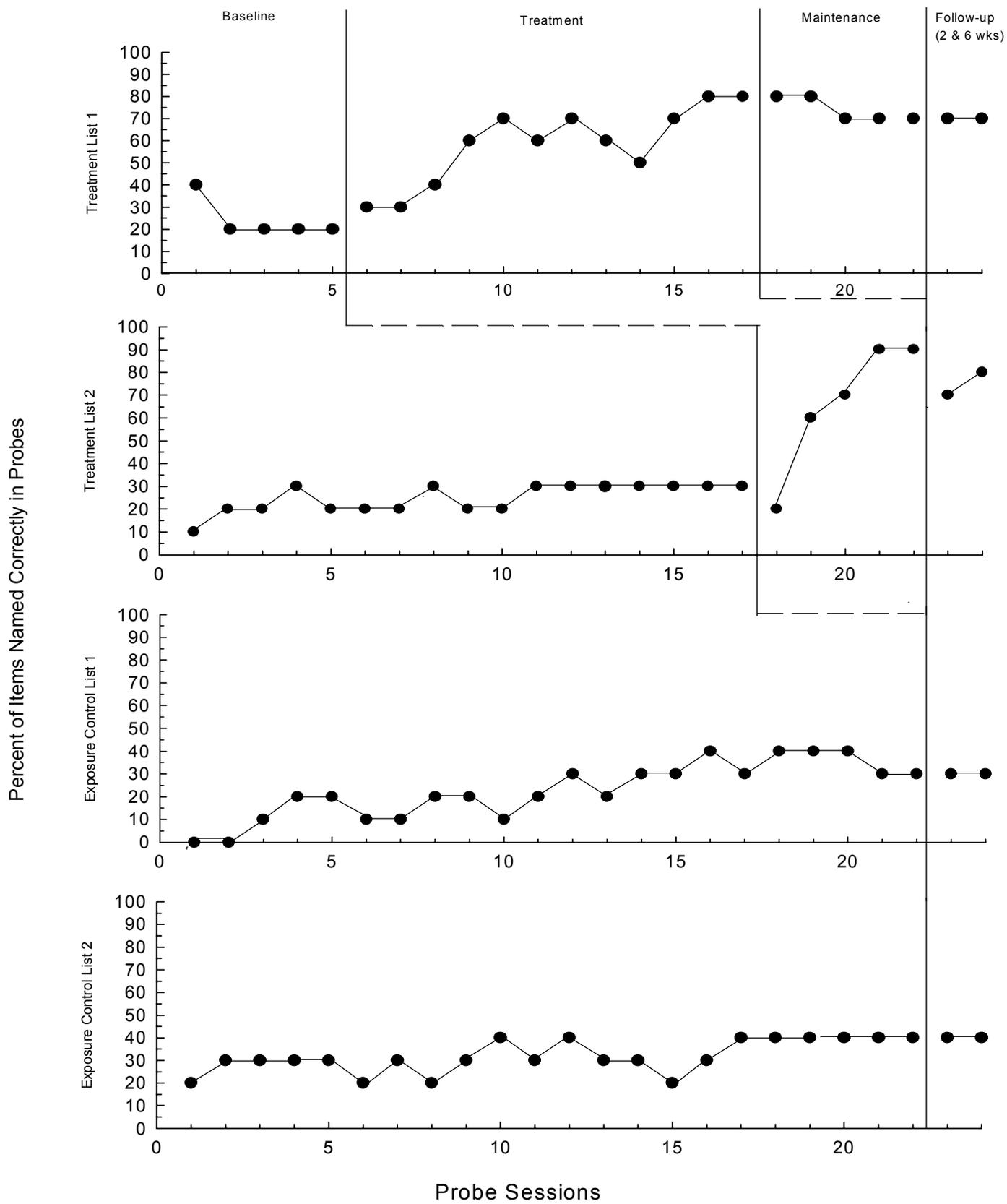


Figure 2. Participant 2

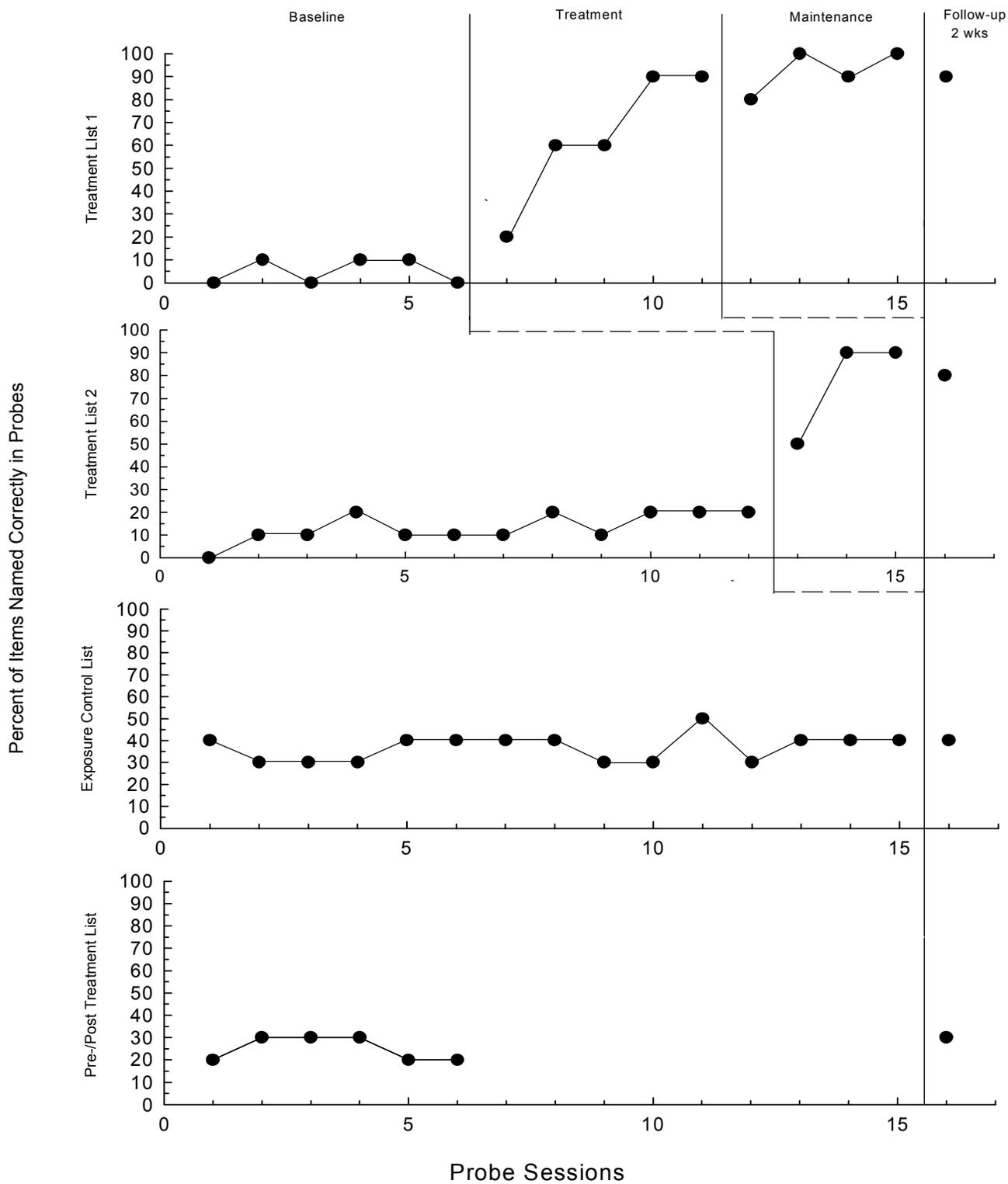


Figure 3. Participant 3

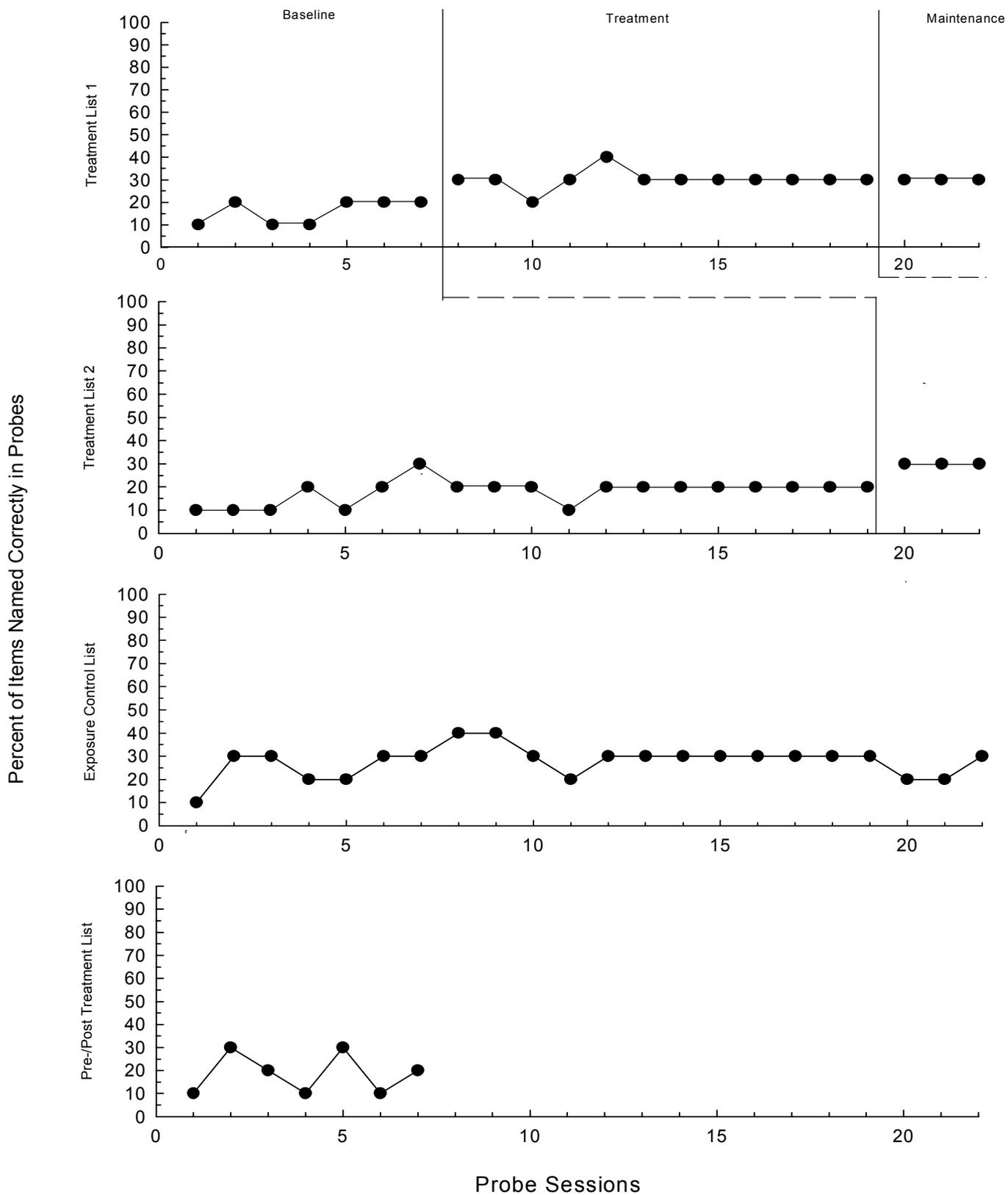


Figure 4. Participant 4

