

Reducing Sentence Production Time in Chronic Broca's Aphasia

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INTRODUCTION

In Broca's aphasia spontaneous speech is awkwardly articulated, telegraphic, and slowed in rate (Goodglass, 1981; Goodglass, Quadfasel and Timberlake, 1964; Benson, 1967). These clients attempt to compensate for their defective speech output by revising, correcting, and restarting their utterances. Some may criticize themselves or give up easily (Cochran, 1983). The impression often gleaned from listening to Broca's aphasic clients is that some patients might communicate more effectively if they would continue their efforts instead of disrupting communication with excessive self-monitoring behaviors.

Go strategies (Whitney, 1975) offer one means of assisting nonfluent clients in moving ahead with communication. These strategies encourage the individual to provide cues (e.g., written word, gesture, first sound) that help initiate speech or "tap" information contained in articulatory and word retrieval searches (e.g., telegraphic string, description) so as to continue a communicative effort. Several reports have shown that client-initiated cueing strategies can improve communicative efficiency of aphasic persons (Golper and Rau, 1983; Tompkins and Marshall, 1982; Marshall, 1976; Berman and Peele, 1967).

Another potential, but untested, means of promoting communicative efficiency with less fluent clients would be to eliminate from the patient's production efforts unnecessary self-monitoring behaviors such as revision, correction, and self-critical statements. This would involve training patients to identify what they do to facilitate communication and what they do to inhibit it. If successful, such an approach might enhance fluency and communication in general. The present study demonstrates how this was accomplished for a chronic Broca's client using videotape observation as a treatment method.

CASE HISTORY

P.B. was a 28-year-old right-handed male who suffered a left-hemisphere injury in a motor vehicle accident in 1974. Residuals of this trauma were a severe compound fracture of the right foot, mild right hemiparesis, and Broca's aphasia. His rehabilitation course was unremarkable except for the healing of the fractured foot which necessitated several surgeries. He had two stints of speech and language treatment. The first spanned the 17 months following his injury. A second involved 20 follow-up sessions five years post-onset.

At 11 years post-onset P.B. requested additional speech and language treatment to assist him in communicating with his family. Results of the Porch Index of Communicative Ability (PICA), (Porch, 1981) showed him to be moderately impaired in all language modalities except writing which was severely compromised. Figure 1 shows P.B.'s Ranked Response Summary on the PICA for the 1985 evaluation, after treatment in 1976, and after follow-up in 1980. In 1985 P.B.'s Overall score on the PICA was 12.26; he was functioning at the same level on the PICA as when discharged from treatment in 1976.

This was substantially higher than when seen in 1980 when his Overall PICA score was 11.31. Deterioration in performance from 1976 to 1980 occurred when he was having difficulty adjusting to living alone, caring for himself, and had several surgeries on his foot. Improvement from 1980 to 1985 coincided with a time during which he met and married his wife, adopted her two children from a previous marriage, and assumed more responsibilities in his home.

Name P. B. Case No. _____
 Age 28 Birthdate 2-28-57 Sex M Race W Handedness R
 Diagnosis Broca's Aphasia Onset 1974
 Date 1976 Overall 12.34 Gestural 14.71 Verbal 12.88 Graphic 8.82
 Date 1980 Overall 11.31 Gestural 13.60 Verbal 11.30 Graphic 8.27
 Date 1985 Overall 12.26 Gestural 14.23 Verbal 13.20 Graphic 9.00

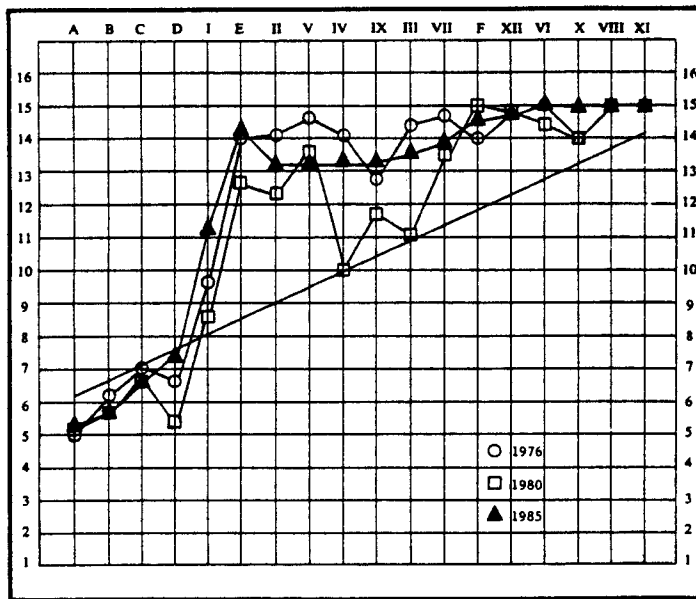


Figure 1. Ranked Response Summary of the Porch Index of Communicative Ability (Porch, 1981) after treatment in 1976, follow-up in 1980, and for the 1985 evaluation.

Spontaneous speech. Appendix A contains P.B.'s description of the "Cookie Theft" picture from the Boston Diagnostic Aphasia Examination (BDAE) (Goodglass and Kaplan, 1973) for the 1985 evaluation (before treatment). His speech was hesitant and contained articulation errors. He had difficulty retrieving words and the syntactic variety of his utterances was restricted. He could formulate sentences of six to eight words but it took him a long time to do so because he revised, restarted, and corrected himself frequently. Finally, he called attention to his defective speech by laughing, criticizing himself, and making parenthetical remarks in what appeared to be a nervous reaction to his aphasic impairments. We hypothesized that treatment to eliminate these behaviors might make him a better communicator.

TREATMENT

Our program with P.B. was not undertaken to improve his linguistic skills. Instead, we hoped to help him become sensitive to and reduce behaviors that interrupted speech, called attention to his defective output, and did not contribute to communication. We hypothesized that if he could learn to identify interrupting and nonproductive events and eliminate them,

the result would be reflected in shorter sentence production times and more fluent speech. Accordingly, we trained P.B. to do this by critiquing videotaped examples of his sentence productions. We assessed the effects of this training using an A-B-A withdrawal design (McReynolds and Kearns, 1983).

Three sets of 10 black-and-white line drawings of action pictures served as experimental stimuli. Baseline measures involved timing P.B.'s productions and counting the number of sentences within each set that were produced within a specified optimum time period. A sentence was operationally defined as an intelligible, utterance of four or more words containing both a subject and predicate. A 10-second time period was designated as an optimum production time (OPT) on the basis of preliminary work with P.B. on the sentence production task.

Measurements. When the examiner presented the picture an audible "click" was recorded on the tape recorder to mark the start of the trial. When P.B.'s responses had been transcribed and checked for accuracy, each utterance was timed with a stopwatch. Timing commenced with the click preceding each sentence, and ended after the last word in the sentence. All values were rounded to the nearest full second. To check the reliability of these measures, 100 randomly selected productions were timed independently by a second examiner unfamiliar with the study, and a second 100 were retimed by the examiner who timed all productions. Measures of intraexaminer and inter-examiner agreement were 86% and 88% respectively, and examiner disagreements were never greater than two seconds. When OPT percentages had stabilized for each set of stimuli, the treatment phase of the study was initiated.

One set of 10 pictures (Set 1) was used for training. On every training trial P.B. was asked to formulate a sentence about each of the 10 pictures following standard instructions.

All responses were videotaped. Then the videotape was replayed for P.B. He was asked to review and critique his performance, specifically noting behaviors that facilitated or inhibited communication. When necessary, the clinician stopped the tape and discussed P.B.'s observations with him. He was reinforced by the clinician for his observations, but neither maladaptive nor appropriate behaviors were identified for him. Each trial was intended to prompt him to evaluate his performance and to apply knowledge of results gained through self-observation in succeeding trials. Each training session contained two trials.

Probes. Probe measures for trained items were obtained before each session. These measures duplicated those of the baseline period. Training continued until P.B. had achieved 80% OPT on the trained items for two consecutive probes. Because we expected P.B. to increase his OPT percentages on the trained items, regular probe measures were also made for a second set of 10 pictures (Set 2), for which baseline measures were available. This was done to determine if practice on the sentence formulation task without the benefit of videotape review would result in increased OPT percentages. Finally, to determine if training would generalize to items that were neither trained nor probed regularly, identical probe measures were made on a third set of baselined items (Set 3), after the 6th and 10th treatment sessions.

Withdrawal. In the withdrawal phase of the study, baseline measures were reinstated for all three sets of pictures one, two, and four weeks after reaching criterion on the treated items.

RESULTS AND DISCUSSION

Figure 2 shows OPT percentages for the trained (Set 1), probed (Set 2) and untrained (Set 3) items for baseline, treatment, and withdrawal periods. P.B.'s OPT increased on the trained items. He made negligible changes on probed items, and did not change on the untrained items. OPT percentages for the trained set of items (Set 1) increased steadily from the start of treatment through the third treatment session, dropped in session 4, increased for sessions 5 and 6, dropped for sessions 7 and 8, and then increased for session 9 when criterion was reached (80% OPT for two consecutive probes). When treatment was withdrawn, OPT percentages dropped slightly for each follow-up probe. The OPT percentages for the regularly probed items (Set 2) increased only slightly from the baseline period, and no changes were seen during withdrawal. OPT percentages for the items that were neither trained or probed regularly showed no improvement.

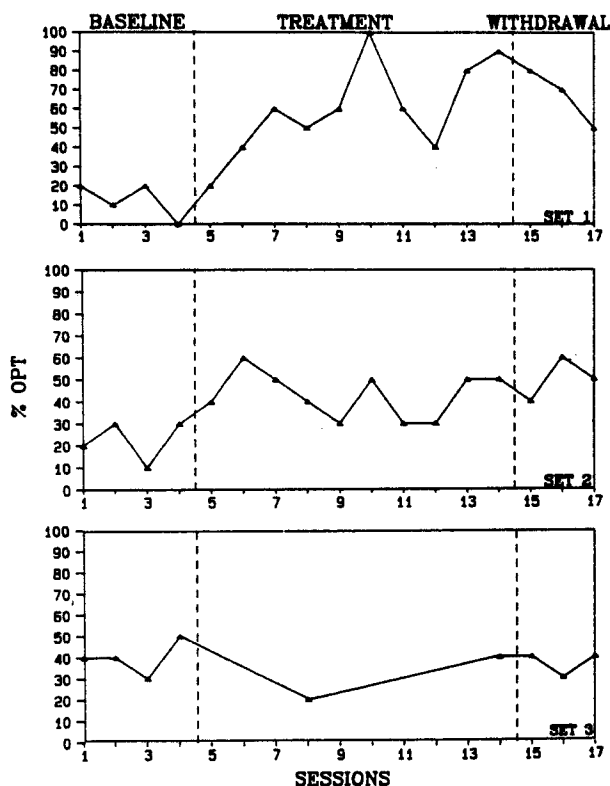


Figure 2. Percentage of Optimum Production Times (OPT) for Treated (Set 1), Probed (Set 2), and Untrained (Set 3) items for Baseline, Treatment, and Withdrawal periods.

Figure 3 shows the mean number of words and mean number of disruptors (e.g., restarts, revisions, self-corrections, etc.) per sentence for the baseline, treatment, and withdrawal phase for the trained, probed, and untrained items. These data clearly illustrate that the primary factor responsible for increased OPT percentages (see Figure 2) was a drop in the number of disruptors in P.B.'s sentence productions. Reductions in disruptive behaviors occurred immediately after videotape review was initiated and were noticeable for all three sets of items; trained, probed, and untrained. It would have been possible for P.B. to increase OPT percentages by using fewer words per sentence. However, this did not occur because the mean number of

words per sentence remained relatively constant throughout all phases of the study.

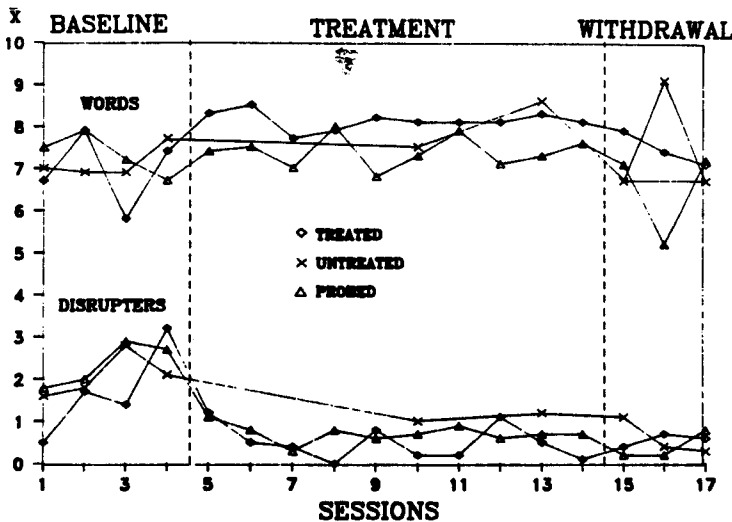


Figure 3. Mean number of words and mean number of disruptors per sentence for Treated (Set 1), Probed (Set 2) and Untreated (Set 3) items for Baseline, Treatment, and Withdrawal periods.

Table 1 shows Overall, Modality, and Subtest means for the PICA before and after training. No major changes are seen for any of these PICA measures following the videotape training. Appendix A provides comparisons of P.B.'s verbatim picture descriptions of the "Cookie Theft" picture from the BDAE. This task was administered before training, after treatment sessions 6 and 10, and during withdrawal. Analysis of these transcriptions revealed that P.B. produced increasingly more speech, both in terms of content units and syllables per picture description, as training progressed.

The effects of videotape training were seen immediately in the client's decreases in sentence production times. This occurred because he reduced the number of disruptive behaviors within his sentence productions. Interestingly, a decrease in disruptors occurred for all three sets of items, but OPT increases were seen only for trained items. This may have occurred because P.B. received more practice on the trained items than the probed and the untreated items. On the other hand, videotape review may have alerted him to the presence of behaviors that interfered with his speech. Once he reduced these behaviors he could profit from the production practice. P.B.'s response to the videotape process also seemed to support this observation. When he first saw himself on videotape, he was keenly interested in what he perceived himself as doing "wrong." After identifying, criticizing, and finally eliminating many disruptive behaviors, he seemed to tire of the review procedure.

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 Table 1. Overall, modality, and Verbal Subtest Means on the Porch Index of Communicative Ability (PICA), (Porch, 1981) before and after re-institution of treatment.

	Before Treatment	After Treatment
Overall PICA X	12.26	12.22
Gestural X	14.23	14.20
Verbal X	13.20	13.05
Graphic X	9.00	9.00
Subtest I (Sentence Formulation)	11.30	11.30
Subtest IV (Naming)	13.30	11.70
Subtest IX (Sentence Completion)	13.40	13.30
Subtest XII (Repetition)	14.80	14.90

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 While encouraging, results obtained with this one client should be interpreted cautiously. Findings do suggest, however, that videotape review may be an effective means of helping less fluent aphasic clients become more cognizant of disruptive speech behaviors. The results of this study also point out the need to go beyond our standard test measures in assessing treatment effects with chronic aphasic patients. Although our patient did not show pre- and post-treatment changes on PICA scores, he did show description task. Since treatment focused on improving spontaneous discourse, and this is what occurred, clinicians would do well to follow the suggestion of Kearns (in press) and not only measure what is worked on in treatment directly, but support these measurements with corroborative measures.

Finally while P.B.'s language reflected that of Broca's aphasia with a focal lesion, much of his behavior was characteristic of the CHI patient--impulsive, uncontrolled, and inappropriate. The possibility exists that VTR observation sensitized him to these behaviors and their elimination in turn affected his speech performance. Accordingly, we may serendipitously have developed a procedure for treatment of mild CHI patients.

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APPENDIX A

Verbatim transcriptions of P.B.'s descriptions of the Cookie Theft picture for 1985 treatment trial.

Before Treatment

Well cookie jar. Boy boy fall. Cookie jar. And mother um sink. Turn on sink and um running over.

After Session 6

The lady is um in the kitchen. Kitchen is messy cause um water come onto the floor. And the boy have cookie jar and fell down. The lady, the boy, the kid, not the kid, the girl hold the chair.

After Session 10

Oh no. The boy in cook-cookie jar gonna fall down. The mother is, the mother is, the mother is drying the dishes. The sink running over the water stop. The boy, the girl, the girl is "Please had me cookie."

During Withdrawal

The lady washing down, down, not down! The lady is drying plates. Water on and flooded. Spout on to the floor. The boy climbing up the ladder to get to cookie jar and almost fell off. The lady, the boy, no, the girl had the cookie to sister or brother. The lady off, ha, that's hard, off into space.