USING REINFORCEMENT THERAPY AND PRECISION TEACHING TECHNIQUES WITH ADULT APHASICS*

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Summary—This paper describes a treatment procedure combining reinforcement therapy with precision teaching techniques, applied to four adult aphasics. The subjects ranged in age from 46 to 78 yr and all demonstrated positive speech and language changes which coincided with category changes on the Minnesota Test for Differential Diagnosis of Aphasia. The results are discussed in terms of justifying further use of the procedure for the brain injured adult patient with language deficit.

Most professionals engaged in rehabilitating the adult aphasic regard aphasia primarily as an interference with language processes resulting from brain injury. More specifically, as described by Beery and Eisenson (1956), an aphasic individual has difficulty dealing with symbols; consequently, functions involving the symbolic processes of language are disturbed. These processes include reading, speaking and writing and understanding spoken language. The essential task in the treatment of adult aphasia is to communicate with the patient and to stimulate disrupted processes to function maximally. Although traditional aphasia therapy has often been devoid of systematic procedures and reinforcement schedules (Darley, 1972), operant methodologies have received consideration by some communication disorders specialists working with the neurologically impaired (Rosenberg and Edwards, 1964; Keenan, 1966; Holland, 1968). However, as indicated by Holland (1970) much more evaluation is required before acceptance of these principles is justified. Hopefully the results of this investigation will contribute to the understanding and value of operant methodology and continuous measurement procedures in the treatment of brain injured adults.

The purpose of this study was to examine reinforcement therapy and precision teaching techniques (Kunzlemann et al., 1970) as instruments of change in a specific language deficient group of adult aphasics.

SUBJECTS

The subjects, four aphasic (two female and two male) patients, were selected from speech and language therapy programs in a convalescent center and in a private speech and hearing clinic in Spokane, Washington. All had been diagnosed by the attending physicians as aphasic due to cerebral vascular accidents (CVA’s). Ages ranged from 46 to 78 yr with a mean of 66 yr. They had been aphasic from one month to 10 yr prior to the initiation of this project.

All the subjects showed a right-sided motor dominance before their strokes; post-traumatically they evidenced...
varying degrees of right hemiparesis. Three were ambulatory, one with the aid of a walking cane, and the other was bedridden. Two were able to use the right arm and hand for fine motor activity such as holding a pencil, and the others were completely unable to grasp objects of any size. Gathering of extensive information was impossible because of the sparse amount of data available in the subjects' files. Brief histories of each subject follow:

Subject No. 1, male, age 46, had been employed as an auto and heavy equipment mechanic until his CVA on December 2, 1970. He was bedridden.

Subject No. 2, male, age 66, suffered a CVA approximately 10 yr ago. He had also been under convalescent care for the past 5 yr due to an esophageal stricture. The subject was ambulatory with the aid of a walking cane.

Subject No. 3, female, age 72, was living at home until she suffered a CVA on February 25, 1972. She was ambulatory.

Subject No. 4, female, age 78, suffered a CVA approximately 5 yr ago. She was admitted to the convalescent facility in early 1971 due to a broken right hip. She was bedridden.

ASSESSMENT AND RECORDING METHODS

The Minnesota Test for Differential Diagnosis of Aphasia, M.T.D.D.A. (Schuell, 1965) was used to identify the response deficits of each subject. This test provides a clinical rating scale from 0 to 6 (worst), categorically ranking the understanding of spoken language, speech, reading, and writing. Single items within these categories were specified for acceleration or deceleration (Skinner, 1968).

A six-cycle graph (Daily Behavior Chart, 1970), a systematic and useful means of charting progress (Kuzenmann et al., 1970), was chosen for recording the data. Baseline response rates

\[ \text{rate of response per minute} = \frac{\text{number of responses}}{\text{time}} \]

for each subject's selected deficit were charted on the graph over five 1-hr sessions.

Reinforcement contingencies were then introduced in which the therapist awarded the subject "tally" marks for desired responses during seven sessions following baseline. The accumulated "tally" marks, presented on continuous schedule, were not redeemable for other rewards. The charting patterns were shown and discussed with subjects at the end of each session, and in agreement with Johnson (1971) this activity served as a positive reinforcing event.

During the last five sessions contingencies were withdrawn and responses recorded to determine maintenance of behavior for the total number of 17 sessions. The subjects were also retested with the M.T.D.D.A. to determine if the rate changes (on the six-cycle graph) coincided with category changes on the M.T.D.D.A. Acceleration of desired behavior resulting in category improvement were assessed by percentages of median response rate change. Therapy procedures were held constant throughout all phases of the experiment.

PROCEDURES AND RESULTS

For Subject No. 1, whose initial diagnosis with the M.T.D.D.A. (Schuell, 1964) indicated moderate expressive deficits due to mild dysartria, apraxia, and anomia, therapy involved two tasks. First, grammatical closure drills required the client to supply the missing word in a series of sentences (e.g. the grass is green, the sky is ——. His median error rate for the three specified periods were 1-8 (baseline), 1 (contingency: tally marks), and 0-5 (non-contingency), a 50% median error response deceleration from contingency to non-contingency, and a 73% median error deceleration from baseline to non-contingency. (See Chart No. 1).

Secondly, since this individual also demonstrated a misarticulation of voiced and unvoiced /th/ sounds, word list drills with these two phonemes in the initial, medial, and final positions were utilized as stimulus materials. The subject's initial baseline median error rate was 7-4, but his contingency median error rate rose to 8-7 when he was requested to effect more precise articulation. However, he then demonstrated a fairly sharp error decrease during the last four of the seven sessions of the contingency period. In the non-contingency period his error rate was 1-5, thus indicating a 17% median response acceleration of errors from contingency to non-contingency. (See Chart No. 2). By improving these two pinpointed behaviors, the subject's speech category on the M.T.D.D.A. changed from a class 3 (i.e. some conversational speech but marked difficulty in expressing long or complex ideas), to a class 1 (i.e. converses easily with occasional difficulty).

For Subject No. 2, expressive difficulties were indicated by the M.T.D.D.A. scores. He had great difficulty initiating speech due to anomia, dysarthria, and dyspraxia. Also, he had only two lower anterior teeth and the edentulous condition may have impaired correct
articulation. The first therapy task was to improve articulation; specifically, to include all the final consonants in word production. Word list drills were used as stimulus materials. In view of his having many teeth missing, labial-dental and lingua-dental sounds were judged as an acceptable response if correct placement was approximated. The subject's median error rate decreased from 4.5 errors per minute during baseline to 1.7 with contingency, to 1.4 during non-contingency resulting in a 40% median error response change from baseline to contingency, a 37% median error response change from contingency to non-contingency, and a 62% median error response change from baseline to non-contingency. (See Chart No. 3).

The second task was a grammatical closure drill like that employed for Subject No. 1. The subject was required to supply the missing word in a series of sentences (e.g. Please pass the salt and ———-). again, the subject's median error rate decreased from 2.9 (baseline) to 1.4 (contingency) to 0.9 (non-contingency) errors per minute. Percentage of median error rate change was 52% from baseline to contingency, 36% from contingency to non-contingency, and 69% from baseline to non-contingency (Chart No. 4).

The subject's improvement changed his categorical speech classification on the M.T.D.D.A. from 5 (i.e. expresses needs and wishes in limited or defective manner) to 2 (i.e. conversational speech with mild difficulty finding words or expressing ideas).

For subject No. 3, the M.T.D.D.A. results indicated a significant receptive deficit. She could not identify...
common objects or body parts. The therapy task was object identification in which the subject was asked to point to the desired real or pictorial object (e.g., point to your knee, show me a picture of the bed). Her initial baseline median error rate was 2.7 errors per minute, decelerating to 1.4 during the contingency period, and to 1.2 during non-contingency, resulting in a 48% median error response change from baseline to contingency, a 14% median error response change from contingency to non-contingency and a 56% median error response change from baseline to non-contingency. (See Chart No. 5). The subject’s improvement changed her “understanding what is said” category on the M.T.D.D.A. from 4 (i.e., follows simple conversation but requires repetition) to 1 (i.e., follows radio program or general discussion with only minimal difficulty).

For Subject No. 4, the M.T.D.D.A. results revealed an extreme receptive deficit. The desired behavior was object identification in which she responded by pointing to the object named. Her baseline median error rate was 9.4 errors per minute, decelerating during contingency to 2.8 and during non-contingency to 1.4. Percentage of median error response rate change was 18% from baseline to contingency, 41% from contingency to non-contingency and 59% from baseline to non-contingency. (See Chart No. 6). The subject’s improvement changed her M.T.D.D.A. classification on “understanding what is said” from a 6 rating (i.e., usually responds inappropriately because she does not understand) to a 3 (i.e., follows most conversation but sometimes fails to grasp essentials).

DISCUSSION

All four subjects manifested an observable decrease in error rate in the course of 17 1-hr sessions spanning a maximum time period of eleven weeks. Within the therapy context, it was demonstrated that tally marks used as reinforcers, supplemented by charting procedures, produced a change in the specified language behaviors of the four adult aphasics of 46 to 78 yr. It was evident that the subjects found this method to be motivating, as they often reported satisfaction in understanding the significance and relevance of not only the particular therapy task, but also of their progress in terms of error rate, vis-a-vis charting.

Three salient aspects of the investigation emerged: (1) The methodology provided a systematic account of therapy and patient progress. It enabled the therapist to easily present materials and directions in a uniform manner. The reinforcements, being readily recognized by the clients, aided in clarifying lesson objectives. (2) The procedure provided a means of continuous and long-term record of client response and therapy activity. (3) Because of the relative simplicity of this technique, the writers believe that this approach can be used effectively with paraprofessionals. A program identical or similar to this could very possibly be continued by a trained aide under the periodic supervision of a certified therapist, as a part of the normal routine in an extended care facility.

On the basis of the above findings it seems justifiable to infer that reinforcement therapy supplemented with precision teaching techniques should be considered as a method which has positive applicability in aphasia therapy. This treatment plan helped implement behavior changes within the physical contexts identified in this project, with the administration of therapy in a clinic room, at the bedside, and to a bedridden subject.

REFERENCES


DAILY BEHAVIOR CHART (1970) Behavior Research Company, Box 3351, Kansas City, Kansas 66103.


