Choice of Stimulus Modes in Treating Apraxia of Speech: A Case Study

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Recent years have shown exciting advances and refinements in the treatment of apraxia of speech in adults; however, the clinician's search for the answer to "How do I help this patient talk?" continues. In our never ending search for the answer, a major problem, not yet solved by research, is the choice of specific stimulus modes which maximize verbal output in apraxia of speech. Stimuli may be presented in any mode: auditory, visual, graphic, tactile, gestural, or any combination of these. If we know which of these is facilitory for a given patient, then practicing the production of sounds, words and phrases in this condition will help build a system of internal cues to improve voluntary production. The problem, of course, is in determining which of these modes is a facilitory condition for each individual with apraxia of speech.

We are confronted by variability from patient to patient, and by individual patients who exhibit variability from moment to moment and from day to day in their verbal production; therefore, when we try out a variety of stimuli on a given patient it may be difficult to determine if differences result from our choice of stimuli or patient variability. The literature is fraught with confusion relative to the best stimulus modes. Johns and Darley (1970) found that apraxic subjects repeated words more accurately when combined auditory and visual (watching the clinician) stimulation were used rather than auditory stimuli alone. Webb and Love (1977) found imitation of spoken words to be superior, while reading the printed word was the least effective cue for patients with Broca's aphasia. Results of a study by LaPointe and Horner (1976) suggested that the auditory mode alone most facilitated phonemic accuracy. On the other hand, Dabul and Bollier (1976) reported good results using visual stimulation alone (watching the clinician) to facilitate verbal production. Rosenbek (1978) sums up the problem: "The good clinician winnows through all the possibilities, and selects those (stimuli) that will help the individual patient. There is a limited amount of literature to aid in the sorting."

It becomes obvious that patients vary in their response to specific stimulus modes. It seems to be an individual matter, up to the clinician to ascertain. Once the clinician chooses the appropriate mode, he or she must continually question its efficacy. Again the question arises: How does one choose the stimulus mode, and evaluate its effects? Until recently my approach to choice of stimulus modes was an enlightened combination of instinct, trial and error and objective documentation. The first step was to try a variety of modes with an individual and choose the ones producing the most correct responses. Next I would proceed through a therapy program using these stimulus modes, smugly documenting progress. But always lurking in the background would be questions: How do I know this particular regime effected the changes? What would have happened had I chosen another mode or none at all?

During the 1978 Clinical Aphasiology Conference, discussion centered on the use of single subject research designs and time series measurements (Davis, 1978; LaPointe, 1978; Salvatore, 1978) as methods of clinically documenting the effectiveness of treatment strategies. Because I had always considered myself a purely "clinical type," the words "research," "experimental design," and "statistics" have routinely given me chills, fever and a rash. However, the CAC discussions made it clear that research design can and should assist in designing and documenting treatment. It was obvious that use of some form of time series design might answer some questions in the routine course of apraxia and aphasia therapy. The following is a report of a case representing this point.

CASE PRESENTATION

D.B., a 49 year old man, sustained a right hemisphere CVA in June of 1978, resulting in left hemiplegia, moderate apraxia of speech and mild aphasia. He had been blind since birth. He was first admitted to our center as an inpatient 8 months after onset. It was reported that he had been seen by three speech pathologists during this time, had improved for several months, and then seemed to plateau. Previous therapists had used standard language therapy employing real objects which D.B. could feel, verbal imitation, phonetic placement and Melodic Intonation Therapy (Sparks and Holland, 1976). He was referred to our center primarily for ambulation training; the referring physician was skeptical about the benefits of speech and language therapy, but thought the "social interaction would do him good."

The initial evaluation, using a nonstandard version of the Porch Index of Communicative Ability (Porch, 1967) suggested that verbal functioning was at the 51st percentile. D.B.'s speech was characterized by one and two word responses emitted with struggle behavior and self corrections. His verbal output was typical for apraxia of speech and agrammatism. Auditory comprehension was good. On questioning it was found that D.B. had been an excellent Braille reader, but had not attempted this since his stroke. A subjective evlauation of his reading from a Braille magazine suggested that his Braille reading was grossly intact.

It seemed natural to utilize Braille in some way to rebuild D.B.'s disordered speech and language system, but the time and effort involved in making up braille stimulus items seemed exhaustive if auditory stimulation alone would do the same thing. Also, in the back of my mind was the gnawing fear that if he improved maybe it would be due to social interaction as the physician had stated. For those reasons a plan was devised whereby auditory stimuli alone would be used for two weeks, braille plus auditory stimulation for two weeks, then return to auditory stimulation alone and back to Braille plus auditory for the final series, in this way comparing the effects of two stimulus modes without withdrawing therapy altogether.

The ultimate goal was to improve D.B.'s verbal output, specifically his ability to fluently produce simple sentences. The task involved formulation of a sentence given a spoken noun. Baseline measures were taken over four sessions; D.B. was asked "In a complete sentence, tell me what you do with each of these"; then responses to each spoken noun were scored using the PICA 15 point scoring system. D.B. was unable to formulate complete sentences at this point (see Figure 1); his imitation of simple sentences after the clinician involved self-corrected and related errors.

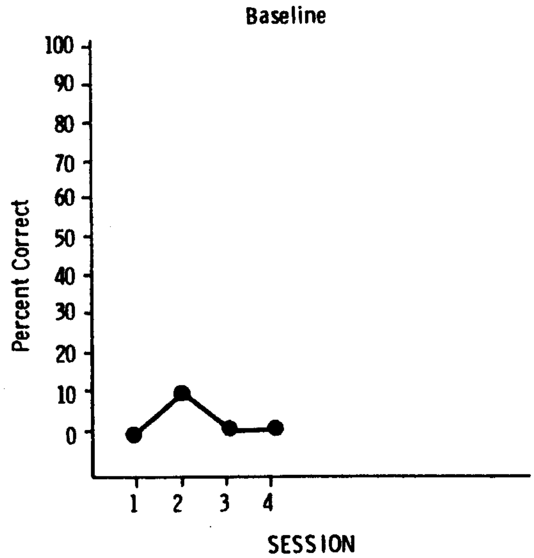

Figure 1. Baseline: Formulating a spoken sentence given a noun.

Training on sentence production was initiated using modification of the 8 step continuum described by Rosenbek et al. (1973). The first training procedure involved auditory stimulation alone. Each session consisted of practicing production of 10 target sentences in the form PRONOUN - VERB - ARTICLE - NOUN, as follows:

1. Clinician produced sentence (such as; "I drive a car.") Client and clinician produced in unison.
2. Clinician produced sentence, client repeated.
3. Clinician produced sentence, client repeated three times.
4. Clinician asked a question, client produced sentence.

At the end of each session a probe was completed by asking the patient to give a sentence with each of 10 nouns; responses were scored and the percent correct was graphed to chart progress as shown in Figure 2.

At the end of two weeks the hierarchy was revised to include braille stimulus cards as well as auditory stimuli as follows:

1. Clinician produced a sentence while client followed in braille. Client and clinician produced in unison while client followed in braille.
2. Clinician produced sentence, client read aloud from braille card.
3. Clinician produced sentence, while client followed in Braille; client repeated (no braille) three times.
4. Clinician asked a question, client produced sentence.

Again probes were completed after each training session as in the first training procedure and recorded as shown in Figure 3.

After two weeks on training phase 2 involving braille plus auditory stimulation, we returned to the original hierarchy, eliminating the braille cues; then went back to the auditory plus braille condition for the final series of sessions. After the final series several probes were taken to determine performance on this task during a "no treatment" period. The results are charted in Figure 4.

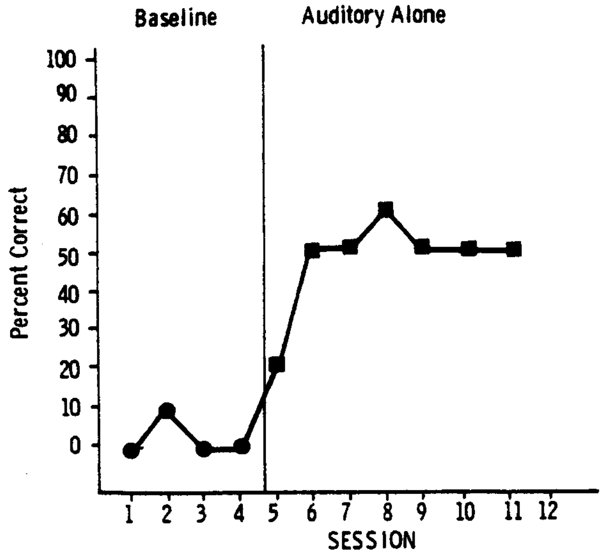

Figure 2. Formulating a spoken sentence given a noun: Training with auditory stimulation alone.

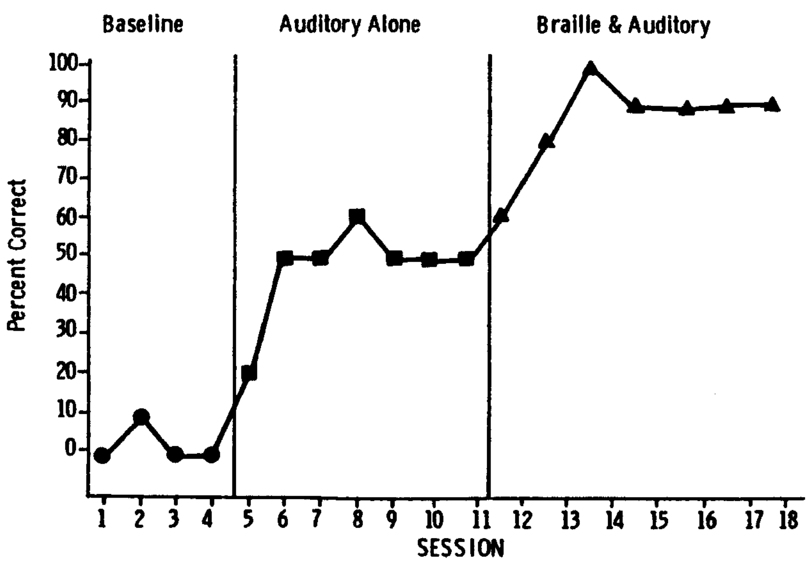

Figure 3. Formulating a spoken sentence given a noun: Auditory stimulation and auditory plus braille training.

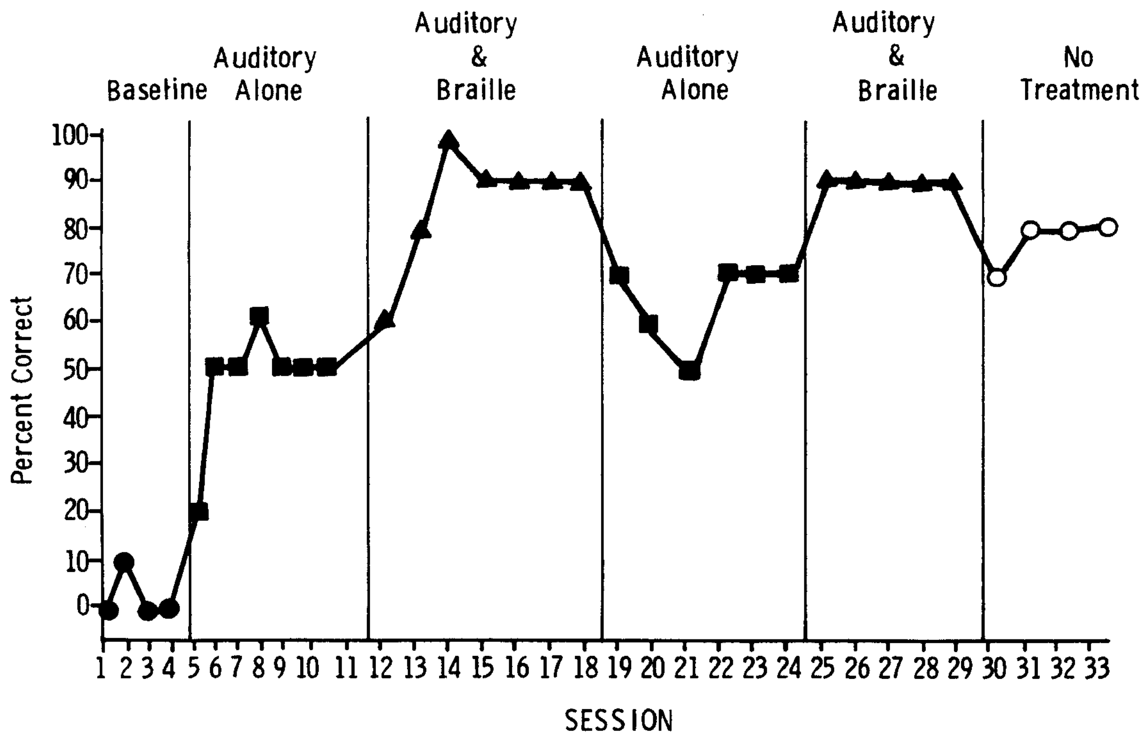

Figure 4. Formulating a spoken sentence given a noun after training under two conditions.

The results suggested that braille plus auditory stimulation served as a more powerful stimulus in eliciting verbal responses than auditory stimulation alone. And the fact that D.B. regressed when braille was deleted suggested that appropriate choice of stimuli did have an affect on verbal output beyond simple social stimulation. It also appeared that braille and auditory stimuli served as reorganizers of verbal systems, since permanent change in sentence formulation was effected when treatment was finally terminated.

Even though encountering a blind apraxic patient is doubtless a rare occurrence, several conclusions might be drawn from this study. First it is apparent that choice of stimulus modes is an individual matter. It is important to question our choice of stimulus modes and to carefully evaluate treatment strategies for each individual patient. In the case reported here, braille had not initially been considered as a choice, when in fact it appears to have been the best choice. As clinicians we must not be satisfied just with improvement, but we must strive to achieve maximum improvement in minimum time. Figure 4 suggests that D.B. might have improved with auditory stimulation alone, but probably not as quickly nor as much.

The second conclusion relates to the use of a withdrawal design in determining the effectiveness of modes chosen. Once familiar with basic concepts of experimental design, it is not difficult to plan such withdrawal designs in therapy. For those clinicians who routinely score responses and document daily progress, application of some of the principles of research design simply involves advance planning and good organization. This is not to imply that the product will constitute a "scientific marvel" generalizable to mankind, but rather it improves understanding and organization of treatment for a given patient. Considering the time and financial constraints often encountered in servicing our patients, maximizing results and accounting for their effectiveness are critical. The program I have described proved to me that application of principles of research design is important in planning effective treatment programs, especially in highlighting the individuality of patient responsiveness and in illustrating the efficacy of individual programs.

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