Rationale and Development of a Step-wise Auditory Comprehension Improvement Program Administered to Aphasic Patients by Family Members

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A small step treatment program was designed to improve an aphasic patient's auditory verbal comprehension. The program was kept as simple as possible so that a family member could administer it. The patient was 29 years old, 19 months post CVA, and achieved an overall percentile of 75 on the Porch Index of Communicative Ability (Porch, 1967). She comprehended single words well, scoring no errors on the first three auditory disturbances subtests of the Minnesota Test for the Differential Diagnosis of Aphasia (Schuell, 1965). She had a digit span of four and scored five correct out of the 21 items on Part V of the original Token Test (DeRenzi and Vignolo, 1962). The patient's mother and a friend administered the auditory comprehension program at home over a one-month period. The program was similar to the one described later in this paper. After completing the program, the patient scored 16 on Part V of the Token Test. Her score was 15 eight weeks later. The patient's ability to move through the program, the ease with which the friend and mother learned to administer the program, and the improved Token Test scores were encouraging. The program was revised before it was used again.

Program Description

The purpose of the program is to improve the auditory verbal comprehension of patients who demonstrate excellent single-word comprehension but deficient processing of sequential verbal material. As patients progress through the program, they are exposed to auditory commands in which the sequential elements are more and more difficult to process. Patients learn to comprehend longer sentences of specific types by diminishing their reliance on certain manners of presentation which facilitate verbal information processing. As a result of the program, patients are expected to gain strategies that will lead to more efficient verbal information processing.

Throughout the program, a patient's task is to follow oral commands to touch or manipulate objects. The same objects are used at all steps: spoon, book, cup, pencil, quarter, thread and key. To achieve small program steps, commands vary in length, type, and manner of presentation.

Length of Command

The program has four levels. Level I involves touching or manipulating two objects, Level II three objects, Level III four objects, and Level IV five objects.

Type of Command

Four types of commands are used. Within each program level, the heirarchy of command types is as shown by the examples in Table 1. At

Steps A and B for each level, patients are required to touch objects identified by name. At Steps C and D, they touch objects identified by function. At higher steps, E-F at Level I and E-H at other levels, patients manipulate objects identified by name. Finally, they manipulate objects some of which are identified by name and some by function. (Steps G-H at Level I and I-L at other levels.)

Table 1. Examples of the Types of Commands Used in the Small-step Program.

	Level I (Two Objects)
Steps A-B:	Touch the key and pencil.
C-D:	Touch the ones used for reading and unlocking.
E-F:	Put the cup on top of the quarter.
G-H:	Put the one for sewing beside the book.
	Level II (Three Objects)
Steps A-B:	Touch the cup, thread and spoon.
C-D:	Touch the ones used for sewing, eating and spending.
E-H:	Put the pencil behind the book, and pick up the cup.
I-L:	Turn over the cup, and put the one for eating in front of the quarter.
	Level III (Four Objects)
Steps A-B:	Touch the pencil, thread, book and key.
C-D:	Touch the ones used for writing, sewing, reading and unlocking.
E-H:	Put the spoon behind the quarter and the thread under the key.
I-L:	Put the one for unlocking in front of the thread and the quarter under the one for drinking.
	Level IV (Five Objects)
Steps A-B:	Touch the book, key, cup, pencil and thread.
C-D:	Touch the ones used for reading, unlocking, drinking, writing and sewing.
E-H:	Put the pencil beside the key, the quarter inside the book, and turn over the thread.
I-L:	Touch the thread, put the book behind the one for spending, and the one for sewing inside the cup.

Manner of Presentation

Two manners of presentation are built into the program: command repetition and slow presentation rate. In the repetition conditions, a command is said twice before a patient follows it. Slow rate is achieved by inserting pauses approximately two seconds long within commands. Commands are either repeated or non-repeated and are presented either with or without one or more pauses.

The manner of presentation for each step is as indicated in Table 2. There are eight steps at Level I. Each of the four command types are first presented with a repetition (Steps A, C, E and G), and in successive steps without repetition (Steps B, D, F and H).

Table 2. Manners of command presentation at each step.

Level I

Step	Manner of Presentation
A	Repeated
B	Non-repeated
C	Repeated
D	Non-repeated
E	Repeated
F	Non-repeated
G	Repeated
H	Non-repeated

Levels II, III and IV

Step	Manner of Presentation
A	Repeated
B	Non-repeated
C	Repeated
D	Non-repeated
E	Repeated; Pause
F	Repeated: Non-pause
G	Non-repeated; Pause
H	Non-repeated; Non-pause
I	Repeated: Pause
J	Repeated: Non-pause
K	Non-repeated; Pause
L	Non-repeated: Non-pause

Levels II, III and IV have 12 steps each. Steps A, B, C and D are presented as for Level I. For each type of object manipulation command, commands are first presented with a repetition and a pause (Steps E and I). At the next highest steps, they are presented with a repetition but no pause (Steps F and J), with no repetition but with a pause (Steps G and K), and finally with no repetition and no pause (Steps H and L).

Program Procedures

At each step, a patient is presented 20 commands of the specified length, type and manner of presentation. Plus-minus scoring is used. If a response is correct, the examiner scores appropriately and presents the next item. If the response is not correct, the patient receives the command

again as specified for that step. If that second attempt is not correct, the response is demonstrated. Criterion for moving to a higher step is 16 correct responses out of 20 commands on the first presentation.

The First Five Patients

Procedures

The revised program was administered to four patients by family members and to one patient by a graduate speech pathology student. The patients' ages, time post aphasia onset, the levels of entry into and termination from the program are shown in Table 3.

Table 3. Age, time post onset, levels of entry and termination from the program, and number of program steps completed for each aphasic patient.

Patient	Age	Time Post Onset	Level of Entry	Level of Termination	Number of Steps Completed
1	60	14 years	II A	IV C	27
2	69	1 year	I A	III B	10
3	70	1 year, 3 months	I A	II F	14
4	71	2 years, 7 months	I A	II L	20
5	73	10 years	III A	IV C	15

Each patient was given several pre-tests. Picture pointing span was determined by presenting strings of unrelated words which varied in length from two upward. After hearing a string of words, a patient pointed to the appropriate pictures. Span was the largest number of pictures to which the patient pointed in sequence on at least one of two trials. Word repetition span was determined in a similar manner. Ability to follow commands was assessed by having a patient follow 28 oral and 28 written commands. The commands were similar to those used in the program but with different objects. Each element of a command was scored, for a total 272 possible points for each set of 28. Auditory comprehension was further assessed by administering the identification by sentence subtest of the Neurosensory Center Comprehensive Examination for Aphasia (Spreen and Benton, 1969). That subtest is similar to the original Token Test.

The family members attended training sessions during which they received a description of the program, a demonstration of the manner of presenting commands, and an explanation of the scoring and step progression. The information was also given in writing. Family members and patients worked at home for 15 to 30-minute blocks of time approximately five days a week. They returned to the Speech Clinic in the meantime as problems arose. As they continued on the program, they were in contact with the speech/language pathologist at least once a week.

Results and Discussion

On their return visits after the initial training, family members and patients demonstrated how they had worked at home. The training had been insufficient in some cases. Family members would have benefitted from more practice trial runs with the clinician before taking the program home. The spouses of patients 2, 3 and 4 had problems either with using the score sheet or in making appropriate decisions about when to move to a next program step. One spouse had not presented commands as specified. When her husband missed an item, she changed the next items to make them easier. The spouse of patient 3 reprimanded her husband when he missed items. That couple was not able to work together, and the program was stopped.

After the return visits, the family members of patients 2, 4, and 5 had few problems with program administration. Patient 1, who received the program from a graduate student, left the program voluntarily after completing 27 steps. The other patients were terminated from the program because of failure to progress beyond some level. When a patient failed to progress from any step during a one week period, the family member consulted the clinician by phone and/or returned to the clinic. On some occasions, family members erred in administering the program. At other times, patients could not progress, and the clinician introduced new program steps to enable them to reach criterion level. The patients were helped either by an additional repetition, more pauses, longer pauses, longer intervals between commands, or by returning to a previous level. In every case, when a patient had difficulty at some step and required program alteration, the patient continued to have difficulty at higher steps and the program was soon terminated.

Family members' problems with program administration were fewer than those related to patients' moving through the program. Family members indicated discouragement and boredom when patients had difficulty reaching criterion level. This experience taught us the inadvisability of having family members work with a program that has not already been shown effective for the patient's disorder. We also learned to give only a few steps of the program to family members at a time. Family members appeared overwhelmed at seeing how many steps the program contained even though they were told not to expect to complete all steps.

Results of pre- and post-test are shown in Table 4 for patients 1, 2, 4 and 5. Identification by sentence was the final test administered, and thus that test may be invalid in some cases due to fatigue effects. All patients had higher post-test scores in following oral commands, and three patients also obtained higher post-test scores in following written commands. Patient 1 showed improvement of considerable magnitude on all measures, apparently due to the program. Recall that she was 14 years post aphasia onset.

The program was of questionable benefit to patients 2 and 4. Those patients moved slowly through the program and did not improve significantly on all post-tests. Patient 5 had little opportunity for post-test improvement because of relatively high pre-test scores. A comprehension disorder as mild as she presented would probably not be of much clinical concern.

In order to determine some possible reasons for the apparent failure of patients 2 and 4, their program performance was analyzed as well as the nature of their auditory comprehension disorder. A patient's level of entry into the program was determined by picture pointing span. For example, a patient with a span of two started at Level IA, involving two objects. The

Table 4. Results of pre vs. post-test comparisons for patients who completed the auditory comprehension improvement program.

Patient	Picture Pointing Span		Word Repetition Span		*Following Oral Commands		*Following Written Commands		*Identification by Sentence	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	3	6	3	5	61	89	71	93	52	93
2	3	3	2	3	58	79	76	88	72	74
4	2	2	1	1	54	62	30	43	50	59
5	4	4	2	2	79	95	97	99	95	96

*Scores are reported in terms of percentage of possible points.

nature of the auditory comprehension disorder of Patient 2 precluded his starting at span level. That patient performed inconsistently when presented commands in succession, and performance deteriorated across commands. He was helped by a lengthening of the intervals between commands and by working for no more than 10-15 minutes at a time. The auditory comprehension program as written may be inappropriate for patients with great fluctuation in performance across test items. Perhaps some program modification would be helpful to extend the number of commands the patient can follow in succession. Modifications might include interspersing relatively easy commands among those specified for a step, and then in subsequent steps reducing the number of easy commands, or presenting the commands in shorter blocks than 20 items and gradually lengthening the list.

To be selected for the program, patients demonstrated relatively good single-word comprehension but some breakdown in following sequential verbal commands. They also were able to point to each object used in the program when the object was named. Our screening for single-word auditory comprehension should have been more strict. Patients 2 and 4 had particular difficulty with vocabulary items in the commands identifying objects by function. Those patients spent little time on Steps A and B, in which objects were identified by name, but Steps C and D, in which objects were identified by function, were the most difficult for them. Patient 2 was presented Level IC commands 25 times, and Patient 4 received Level IIC commands 20 times. In contrast, Patient 1 moved easily through the program, averaging 1.4 runs per step, and she improved on all post-tests.

Patients 2 and 4 had slightly lower single word auditory comprehension test scores than Patient 1. They each missed two items on Part I of the original Token Test, while Patient 1 made no errors. Patients 2 and 4 scored 55/72 and 67/72 points respectively, on the word discrimination subtest of the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan, 1972), while Patient 1 scored maximum points.

It is concluded that the poor auditory comprehension program performance of Patients 2 and 4 was related in large part to their deficient single-word comprehension. Patient selection criteria currently include prompt responses in identifying all major vocabulary items in the program.

For patients who show difficulty identifying objects by function, steps which specify function are eliminated.

We hypothesize that the program is effective in improving the auditory verbal comprehension of some aphasic patients who have excellent single word comprehension but deficient auditory processing of sequential verbal items. Our next phase in developing the program is to conduct a treatment study to determine more specifically which aphasic patients are able to benefit from the program and why.

References

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