Extended Comprehension Training Leading To Improved Verbal Production: A Treatment Program For The Aphasic Patient

Deanie Kushner, M. A.
Veterans Administration Hospital
Kansas City, Missouri

Will extended practice in listening comprehension result in improvement in verbal production for an aphasic patient even though direct training of production is avoided? The following study was conducted to attempt to answer that question.

The patient was a 47-year-old male who, six months previous to his admission to Kansas City Veterans Administration Hospital, had sustained a head injury following a fall down a flight of stairs. He complained of headache, seizures (which were both focal and generalized), episodes of transient aphasia, and a right hemiparesis. Neurological examination revealed a cortical spinal tract involvement of the left side. Because of continued seizures which were difficult to control with anti-convulsants and because results of multiple and repeated radiologic studies suggested a mass in the left anterior temporal lobe, exploration of that structure was carried out. No evidence of mass or glioma was found; a tentative diagnosis of "terminal axonal degeneration" was made.

A temporal lobectomy was performed in which great care was taken to preserve the angular gyrus in order to avoid the possibility that the patient would develop a persistent aphasia. Recovery was unremarkable with but one exception. The patient did develop aphasia. He was referred to the Speech Pathology Department for evaluation and treatment.

Before treatment began, a battery of tests designed to measure speech and language proficiency was administered. These tests are described below.

PORCH INDEX OF COMMUNICATIVE ABILITY (PICA), Porch, 1967. The PICA was designed to assess and quantify verbal, gestural and graphic abilities. The patient's performance is rated on each of ten items in each of eighteen subtests. One-hundred-and-eighty responses representing a score for each item, a mean for each subtest, a mean of the gestural subtests, the verbal subtests and the graphic subtests and an overall mean for communicative ability are obtained. The PICA produces an estimate of a patient's speech and language behavior that permits evaluation of change through the comparison of tests administered during a patient's recovery from aphasia.

SUBTEST IV - PICA - This subtest samples the patient's ability to recognize common objects, recall their names and express them verbally.

SUBTEST VI - PICA - The patient's auditory input is sampled in this test. The patient is required to decode auditory instructions and to respond by pointing to an object whose function is given verbally by the examiner.

SUBTEST X - PICA - This measure of auditory input requires the patient to associate a single word with an object and to point to each object as it is named by the examiner.

DISCRIMINATING BETWEEN PAIRED WORDS SUBTEST - MINNESOTA DIFFERENTIAL DIAGNOSIS OF APHASIA (Schuell, 1965). In this test phoneme discrimination is examined. Examples of test items are Peas/Bees and Face/Vase.

PEABODY PICTURE VOCABULARY TEST (PPVT). This is a test of comprehension of single words. The patient is required to point to one picture in a set of four when the picture is named by the examiner.

AUDITORY COMPREHENSION TEST (ACT) (Shewan, 1971). ACT measures the patient's ability to comprehend sentences which are presented verbally. The test contains forty-two sentences varied systematically in length, vocabulary difficulty and syntactic complexity. Each response plate contains one correct representation and three foils, or error responses. Each foil differs in one item, for example, in the sentence "The girl is reading a book," the foils differ in the items "girl," "read" and "book."

TOKEN TEST (DeRenzi and Vignolo, 1962). The Token Test is used to evaluate the patient's ability to understand spoken language. Twenty different tokens varying along the dimensions of color, form and size are employed in this five part test. In Parts I - IV the length of the auditory stimulus is systematically increased. In Part V the grammatical complexity of the auditory stimulus is varied. The patient manipulates tokens according to instructions verbalized by the examiner.

STAGGERED SPONDAIC WORD TEST (SSW) (Katz, 1962). This dichotic speech procedure was developed to study dysfunctions in auditory centers of the brain and has been used to identify or support the diagnosis of disorder in various parts of the auditory system. Each test item is made up of two spondaic words presented in a partially overlapped manner. For example, in the item "upstairs, downtown," the first spondee, "upstairs" may be presented to the right ear and the second one, "downtown," to the left. The monosyllables "up" and "town" arrive independently at each ear, while the monosyllables "stairs" and "down" are heard simultaneously, one in the left ear and one in the right. The patient is instructed to repeat all the words he hears; thus he must recall two spondees or four monosyllables per test item.

At 1 MPO of aphasia, the patient's overall percentile score on the PICA was 24, indicating that his overall communicative ability was markedly impaired. His performance on the other tests reflected this degree of impairment, e.g., percent correct on the PPVT was 6, percent correct on the Token Test was 20. His verbal production was characterized by both intelligible and unintelligible perseverations, difficulty in imitating words, difficulty in verbalizing names of objects and people, and numerous refusals to engage in verbal output tasks.

Treatment Program

The treatment program chosen was designed by Winitz and Reeds (1975). The program stresses a particular strategy . . .training comprehension of language while avoiding direct training of verbal production. Although the total program includes training for a number of grammatical units, only the "noun, alone" program was used with this patient.

The program incorporates a problem-solving approach to improvement in comprehension. Initially, the patient is asked to associate one word, e.g., "pencil" with a picture of pencil, then to indicate his comprehension by touching the picture. This picture appears before the patient in one of four squares. The position of the correct response is randomly varied. At first, only one response is possible; the other three squares are blank. As the lesson progresses, words previously learned are repeated as foils so that a correct choice has to be made from two, three, and finally, four pictures. Thus, difficulty of choice is progressively increased as the newness of the items diminishes. As new pictures are introduced, old ones are faded out. Later in the program, old pictures are presented for the purpose of review.

Treatment Procedure

Before training was initiated, the patient was asked to name 19 different pictures which later appeared in the comprehension training program. His responses were scored and a baseline was obtained for verbal production.

A word about scoring is appropriate here. The multi-dimensional scoring system employed in the PICA was used, with one exception. Related responses were scored as errors. All scores above seven were considered correct responses; scores that were seven or below were regarded as errors.

Training of comprehension began as the patient was instructed to point to pictures named by the clinician. Following a correct response, the program was advanced. After an error, the clinician repeated the name of the picture and pointed out the correct response. Then, the program was advanced and training continued.

When the score for comprehension reached 80 or above for two out of three sessions, scoring of verbal production began. Preceding every session, thereafter, the patient was asked to name the 19 pictures appearing in the treatment program. No direct training of production was provided. Each session lasted thirty minutes; if 106 frames in the program were completed before that time, the program was presented from the beginning once again.

The patient was treated for one month, beginning at 1 MPO of aphasia. A "no treatment" period occurred at 2 MPO when he left the hospital. At 3 MPO he returned, and treatment was conducted until 4 MPO when the patient left, again. Thus it was possible to measure both comprehension and production during treatment periods and following periods of no treatment. It was possible, also, to obtain scores for the battery of tests after each of these periods.

Results and Conclusions

The data showed that the patient steadily improved in listening comprehension over time.

FIGURE 1

However, his verbal production scores, which began at zero before treatment, began to increase toward the end of the first treatment period, declined after a period of no treatment, and began to rise again when

treatment was reinstated. Scores on some tests in the battery showed similar trends; that is, some test scores either declined or remained stable after a period of no treatment, and began to rise again after reinstatement of treatment procedures.

TABLE 1

Another finding involves the patient's performance on the SSW Test. You will recall that each test item is made up of two spondaic, or four monosyllabic words. The first monosyllable may be presented to the right ear, the second and third words simultaneously to opposite ears, and the fourth monosyllabic word to the left ear, alone. The test item begins in each ear half the time so influence of ear performance is eliminated when the words are examined in order of their presentation. Table 2 shows the number of errors for each monosyllable.

TABLE 2

For most patients, the number of errors for the noncompeting words (1 and 4) are about equal. The competing words (2 and 3) are more difficult, but here, too, most patients produce an equal number of errors on 2 and 3. For this patient, the number of errors on competing words are about equal, and greater than the number of errors on the words in the noncompeting conditions. However, performance on monosyllable 4 was far poorer than performance on monosyllable 1. In fact, the number of errors on the last word was as great as the number of errors on the competing words. This suggests that a memory factor, perhaps a retention span limit, was superimposed on the patient's performance on the SSW Test. It appears that he was able to maintain and repeat the first word fairly well, but that he had difficulty repeating the other three words.

Looking at performance on the SSW Test over time, the first two monosyllables seem to reflect general recovery, as number of errors tended to decrease over time. However, the last two monosyllables followed the pattern of treatment with the comprehension program. Number of errors on these last words decreased when the comprehension program was being used and either remained stable or increased in the no treatment condition. Thus, it seems reasonable to say that training had a positive effect on the patient's ability to retrieve these words.

Throughout the study, some advantages to using this approach to treatment became apparent. It was observed that as the patient associated the sound of a word with the picture of the word, he began to rehearse, and as he rehearsed, he self-corrected until, quite frequently he was producing the correct word.

Another advantage seen or, in this case, <u>not</u> seen was a lack of the types of nonverbal struggle behavior often observed during the training of verbal tasks. In fact, there appeared to be no evidence of frustration on the part of the patient during training of listening comprehension.

Although from the results of this study it seems to be a reasonable assumption that training of comprehension can have a positive effect on

the ability of aphasic patients to improve in verbal production, these results should be regarded as preliminary, as only acquisition of single lexical items was studied. Additional research with a wide range of linguistic structures is needed before it can be concluded that comprehension training will lead to improved verbal production for the aphasic patient.

References

DeRenzi, E. and Vignolo, L.A. The token test: A sensitive test to detect receptive disturbances in aphasics. Brain 85, 665-678 (1962).

Dunn, L.M. Peabody Picture Vocabulary Test. Circle Pines, Minn.: American Guidance Service, Inc. (1965).

Katz, J. The use of staggered spondaic words for assessing the integrity of the central auditory system. J. Aud. Res., 5, 327-337 (1962).

Porch. B.E. Porch Index of Communicative Ability. Palo Alto, Calif: Consulting Psychologists Press (1967).

Schuell, H. The Minnesota Test for Differential Diagnosis of Aphasia. Minneapolis: University of Minn. Press (1965).

Shewan, C.M. and Canter, G.J. Effects of vocabulary, syntax and sentence length on auditory comprehension in aphasic patients. Cortex, 7, 209-226 (1971).

Winitz, H. and Reeds, J. Comprehension and Problem Solving as Strategies for Language Training. The Hague: Mouton & Co. (1975).

TABLE 1. Performance scores on tests administered throughout the treatment program

Test	Type of Measurement	Conditions and Scores					
		Pre-Treatment 1 MPO	Treatment 2 MPO	No Treatment 3 MPO	Treatment 4 MPO	No Treatment 5 MPO	No Treatme 6 MPO
Porch Index of Communicative Ability (PICA)	Overall Percentile Rank	24	44	44	65	72	
Subtest IV	Subtest $\overline{X}$	5.5	7.1	6.6	11.9	11.8	
Subtest VI	Subtest $\overline{X}$	9.8	12.8	14.1	14.1	14.4	
Subtest X	Subtest $\overline{X}$	8.8	12.3	12.3	14.4	14.4	
Discrimination Between Paired Words (MODA)	% Correct	67	88	83	100	100	
Peabody Picture Vocabulary Test (PPVT)	% Correct	6	46	48	52	65	
Auditory Comprehension Test (ACT)	% Correct	40	50	52	57	71	
Token Test	% Correct	20	15	21	39	51	
Staggered Spondaic Word Test (SSW)	% Correct	17	20	26	48	44	34

(page 85)

TABLE 2. Number of errors per monosyllabic word during "treatment" and "no treatment" periods

SSW TEST PERFORMANCES

	1ST MONOSYLLABLE	2ND MONOSYLLABLE	3RD MONOSYLLABLE	4TH MONOSYLLABLE
PRE-TREATMENT 1 MPO	27	42	36	36
TREATMENT 2 MPO	26	36	34	32
NO TREATMENT 3 MPO	18	31	33	36
TREATMENT 4 MPO	11	25	27	20
NO TREATMENT 5 MPO	12	26	28	23
NO TREATMENT 6 MPO	10	26	33	36

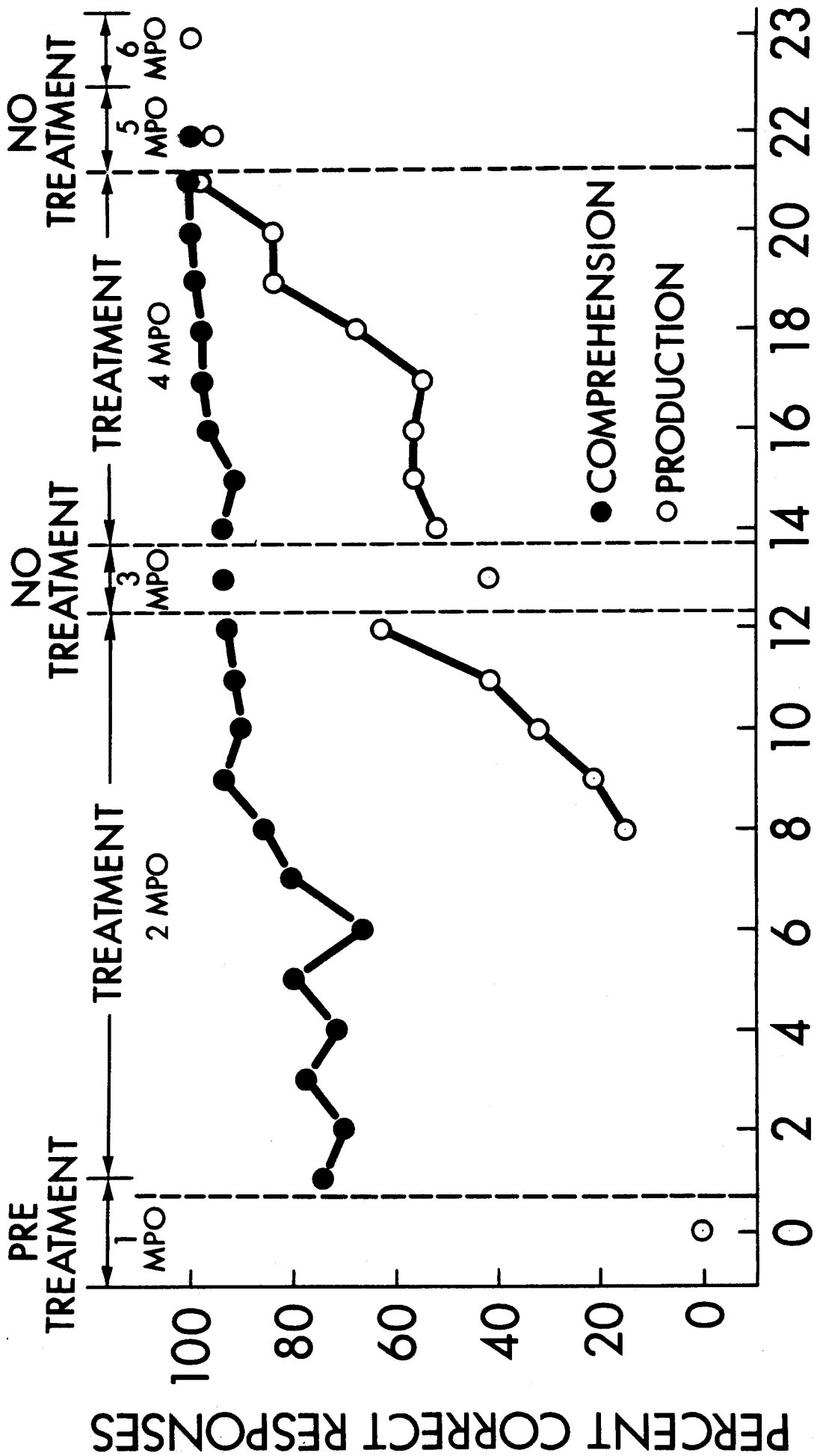

FIGURE 1. Performance on comprehension tasks and production probes during periods of treatment and periods of no treatment.

REFERENCES

DeRenzi, E. and Vignolo, L. A. The token test: A sensitive test to detect receptive disturbances in aphasics. Brain 85, 665-678 (1962).

Dunn, L. M. Peabody Picture Vocabulary Test. Circle Pines, Minn.: American Guidance Service, Inc. (1965).

Katz, J. The use of staggered spondaic words for assessing the integrity of the central auditory system. J. Aud. Res., 5, 327-337 (1962).

Porch, B. E. Porch Index of Communicative Ability. Palo Alto, Calif: Consulting Psychologists Press (1967).

Schuell, H. The Minnesota Test for Differential Diagnosis of Aphasia. Minneapolis: Un. Minn. Press (1965).

Shewan, C. M. and Canter, G. J. Effects of vocabulary, syntax and sentence length on auditory comprehension in aphasic patients. Cortex 7, 209-226 (1971).

Winitz, H. and Reeds, J. Comprehension and Problem Solving as Strategies for Language Training. The Hague: Mouton & Co. (1975).