

The Treatment of Developmental Dyspraxia of Speech: A Case Report

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Background. Mr. J.C., a 30-year old veteran, came to the Memphis V.A. Hospital in July, 1976, desiring treatment of a chronic articulation problem. He indicated that, if unresolved, the problem could cause him to have problems getting jobs in the future. J.C. related that he had always had "trouble talking" and never had received any treatment for the problem. He indicated that his family, his friends in the small town where he had been raised, and his former teachers had all noticed his difficulty "making sounds," but apparently he was never pressured to do anything about it. J.C. did report some teasing by peers when he was young, but this was not a major problem for him.

A few years ago J.C. was recruited by the Marine Corps. He apparently did not have to speak very much during entry examinations. Later, as he began to advance in rank, he was exposed to a variety of pressures to improve his speech and finally was refused the rank of E6 and granted a medical discharge because of his articulatory deficit. After his discharge, J.C. enrolled in a trade school to study accounting; and when he came to us, he had been achieving a "straight A" performance level.

Evaluation. Upon comprehensive examination, hearing, intellectual status, language abilities, and neurologic status were all found to be within normal limits. The neurologist did record that "...lingual oral movements are slow and dyspraxic,..." However, no other neurologic deficits were noted. A motor speech evaluation yielded the following observations:

1. Inconsistent articulatory errors, primarily consonant substitutions and omissions; more prominent in polysyllabic words or verbal tasks which were more propositional.
2. Stereotypic articulatory substitutions, glottal stops, or omissions in certain words, yielding an impression of infantile speech.
3. Extreme difficulty in producing /p t k/; extremely slow, irregular rate, inconsistent sound substitutions, oral groping behavior.
4. Circumlocution in spontaneous speech.
5. Few self corrections in spontaneous speech, many more in repetition tasks.
6. Rate of speech in all situations slower than normal.

Assessment. The aforementioned speech characteristics were felt to be consistent with those reported by Yoss and Darley (1974) in their discussion of developmental dyspraxia of speech. Therefore, this became our diagnosis. We were struck by the variability in articulatory errors, primarily substi-

tutions and omissions, that occurred when J.C. was asked to repeat polysyllabic words or sentences. He would try to correct the output many times groping orally for the correct position, but failing miserably.

In spontaneous speech, J.C. apparently had developed some consistency in articulation over the years by habitually substituting sounds that he could say or glotal stops for more difficult articulatory gestures. He also consistently omitted certain sounds, including some glotal plurals in casual speech. These stereotypic patterns yielded the impression of infantile speech. When asked how he approached harder words while speaking, he reported that he had developed the ability to choose synonyms that were easier to pronounce (i.e., circumlocution). He also reported that he had noticed that he did better when he spoke more slowly.

With these data and the resulting impressions, we proceeded to plan a program of treatment that would directly attack J.C.'s ability to alter articulatory output, especially noting his insight and motivation.

Video Sample #1: A videotape sample was played for the participants, illustrating the patient's speech status before treatment. This 3 minute videotape sample was taken from the initial speech evaluation. It highlighted J.C.'s extreme difficulty and variability in pronouncing phrases like "statistical analysis."

Treatment. With these data in hand, we proceeded into therapy. The number of times per week J.C. was seen during this nine month period varied between twice and three times weekly, and finally, during our final sessions, only once weekly. All therapy sessions were 50 minutes. Because our feeling was that J.C. represented a case of congenital dyspraxia, our goal became one of increasing J.C.'s awareness of strategies which he might develop in order to become increasingly intelligible at a more normal speaking rate.

The therapy protocol, observed at different periods of time, might be considered to be consistent with those approaches to articulation therapy which have been advanced by Van Riper (1963), McDonald (1964) and Backus and Beasley (1951). Each of these approaches was used in various ways and to various degrees. Obviously, some aspects of therapy were devised by us and we are left with the credit or blame, as the case may be.

We decided to begin therapy by presenting a sound initially in isolation and then within a word; that is, progressing from simple to complex, a notion that's been with us for some time. The first two sounds to be emphasized were /p/ and /f/. /p/ was chosen for pretty traditional reasons J.C. frequently had correct production of it in the initial position of a single word, although he misarticulated it in the final position. The /p/ is easy to see, supposedly occurs early in development, and should be one with which he could experience some initial success. /p/ was also chosen because J.C. misused it, although correctly producing it, by substituting /p/ for /f/, especially in the final position. For example, /cop/ for /cough/. It was decided then that we would begin with /p/ and upon its successful production in therapy, we would move to /f/. The same types of rationale for choosing a sound continued to be appropriate as therapy progressed.

The initial sessions of therapy consisted of the presentation of a new sound and a review of sounds presented in former sessions. The approach was sort of "building on a foundation" in nature. First the sound was presented and practiced in isolation. Then the sound was presented in ten monosyllabic words. J.C. was to imitate the word first with maximal cues:

looking at the investigator's mouth, seeing the word written and following a correct production. The the cues were faded: first with the mouth covered, then without a correct production, and finally by only seeing the word written.

After a few of these initial sessions, it became apparent that J.C. performed equally well whether in imitation of a correct production or by looking at the printed word. By reversing the ordering of the fading of cues, and looking at J.C.'s subsequent performance, we were struck by the fact that the written word served as the most feasible and workable cue to him. We didn't change our strategy at that time, however, but continued therapy sessions as initially outlined until all of those sounds with which J.C. had experienced difficulty were presented. We had become aware, however, that for J.C., the final therapy approach which might be most appropriate would be to move him from rehearsal in view of the written word, to rehearsal from imagining the word written, and hopefully from there to more spontaneity and less rehearsal of any form.

Therapy progressed from emphasis on the sound in isolation, in monosyllabic word, in polysyllabic word, in short and then longer sentences. Reading passages were introduced. Previously introduced words were continuously reviewed at all of these levels. Rather long homework assignments, reflecting the point in therapy, were given from the outset. There was no waiting for generalization techniques. Additionally, J.C. was constantly reminded that no magic was being performed, that we were looking for a strategy or technique that would work for him. For him this would be imagining a visual cue.

We found also that, as a side benefit, J.C. became increasingly aware of his own speech and began to hear differences which he was not able to hear initially.

Video Sample #2: A 5 minute tape sample was used to illustrate segments from the treatment program. Isolated sequences taken from a number of therapy sessions illustrated 1) the sound-in-isolation to word to phrase sequence of treatment; 2) the McDonald approach used to facilitate J.C.'s visual image of the word; 3) and a variety of tasks including word repetitions, picture naming, and oral reading.

Progress. The progress data on the tasks measured are summarized in Table I. First, note the distribution of articulatory errors at the first recording (July, 1976). You can see that the substitutions and omissions far outnumber the distortions. This would certainly be consistent with the data reported by Yoss and Darley (1974) and thereby with our diagnosis of developmental dyspraxia of articulation.

Now look at the pattern of errors during treatment. In Figure 1 you can see the orderly pattern of reduction in substitutions and omissions on the reading task. Yet the pattern of recovery in distortions was quite unpredictable. We think these data also support the diagnosis and certainly illustrate the effect of the therapy described.

Viewing the data a bit more carefully, some of the dynamics of the recovery process become more apparent. Figure 2 illustrates articulatory errors as a function of rate on the reading task. As errors reduced and were finally eliminated in May, 1977, speech rate first decreased during treatment, plateaued, then increased at the final recording, practically to the original rate. J.C.'s reading rate, however, was always markedly slower than normal.

Table 1. Progress Data For Oral Reading And Picture Description Tasks, And Summary Of Observations Made From Data.

	7-14-76	9-29-76	12-1-76	3-2-77	5-25-77
<u>*ORAL READING</u>					
Rate (syllable/min.)	119	57	76	71	105
Substitution errors	25	4	4	2	0
Omission errors	19	4	4	1	0
Distortion errors	5	8	1	3	0
Total artic errors	49	16	9	6	0
Self corrections	2	9	9	10	0
Corrected artic errors	2	5	5	4	0
<u>**PICTURE DESCRIPTION</u>					
Rate (syllable/min.)	98	68	58	44	104
Substitution errors	7	3	2	1	4
Omission errors	5	3	3	1	4
Distortion errors	1	1	1	1	1
Total artic errors	13	7	6	3	9
Self corrections	1	2	0	2	0
Corrected artic errors	0	0	0	0	0

OBSERVATIONS:

1. Articulatory errors were eliminated in ORAL READING.
2. In PICTURE DESCRIPTION errors also were reduced, except for the last sample where errors increased when rate increased.
3. Substitutions/omissions exceeded distortions with the former exhibiting an orderly pattern of recovery.
4. Although rate of speech showed a marked decrease during treatment, the initial/final evaluation rates were comparable. However, the maximum rates were less than those observed in a small sample of normal speakers on the same tasks.

*Phonemic transcriptions were made of standardized recordings of patient reading "My Grandfather" (up to word "...respect"). Normal rate from analysis of 4 normal readers was 250-280 syllables/min.

**The first 30 seconds of the patient describing a standard picture were analyzed. Normal rate from 4 normal speakers was 190-210 syllables/min.

Similar data, depicted in Figure 3 for the picture description task, bring out an interesting point. In this more open-ended task, the error pattern mirrors that of rate. Without the direct aid of a visual cue as on the reading task, J.C. apparently had to rely more on a slower rate to control his articulation. So, without thinking about it, as his rate increased during the last evaluation, so did the errors.

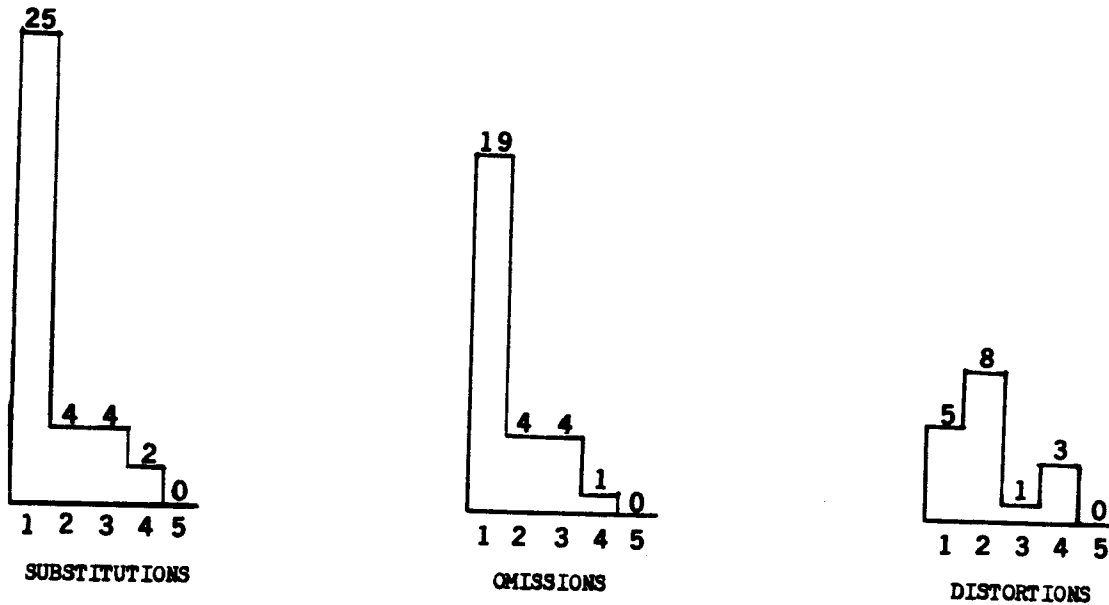


Figure 1. Articulatory errors (substitutions, omissions, and distortions) recorded on the oral reading task for the 5 time-interval measurements.

These data certainly seem to support our observation that J.C. had developed a "visual imagery" strategy to control his articulation. When he could see the words he could control his speech better; but without circumlocution, when he spoke spontaneously, he had to slow his speech significantly to reduce errors.

We were concerned about the error-to-rate relationship after the last evaluation, so we looked at the data another way, using the system proposed by Yorkston and Buekelman (1977) at last year's C.A.C. When rate was plotted against information output in Figure 4, you can see that there was a steady decline in both variables up to the last measurement where they increased enough to surpass the initial levels. Remember (Fig. 3), articulatory errors had also steadily decreased on this task before finally increasing with an increase in rate. But it's important to note that the number of errors did not return to the levels measured at the outset, even with an increase in rate. This, along with the data in Figure 4 was encouraging, because this is where we were headed: to reduce errors with as normal a rate as possible.

Very obviously, added to J.C.'s self-confessed habit of circumlocution, he had developed a somewhat effective means of controlling his speech. From the progress data, you can see that as therapy progressed, self corrections increased as evidence of improved monitoring and self awareness. There was also the obvious slowing of rate to gain control; and finally, we noted that J.C. could use a mental image of the written word as a self cue to hit the articulatory targets more accurately. All of these things apparently helped because J.C. made measurable progress.

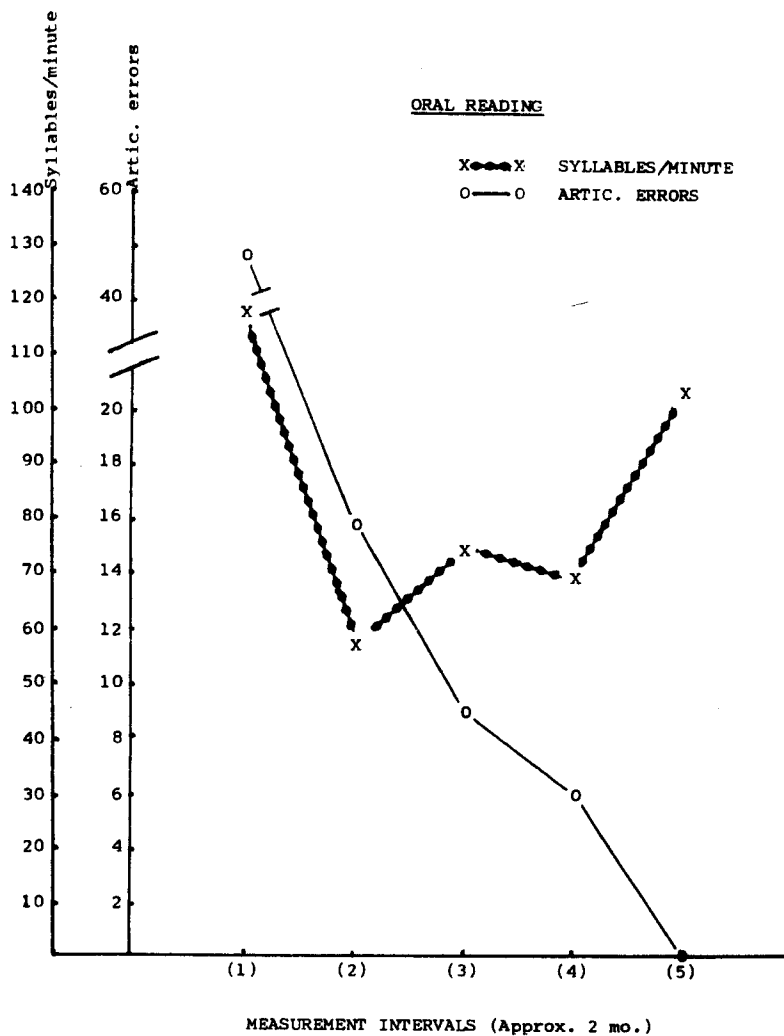


Figure 2. Reading rate and total articulatory errors recorded on the oral reading task for the 5 time-interval measurements.

We hypothesize that further therapy could have promoted further improvement; but, unfortunately, treatment was terminated May, 1977, because J.C. moved to California. We wonder: Did he spontaneously improve or regress? Did the skills he learned promote his employment or allow him to socialize more easily? We certainly hope so! But even without these data, we feel that we have demonstrated the efficacy of a structured, individualized therapy program for an individual who suffers from developmental dyspraxia of speech, even with an adult who had never had any therapy. If the patient is motivated, as J.C. was, therapy is indicated.

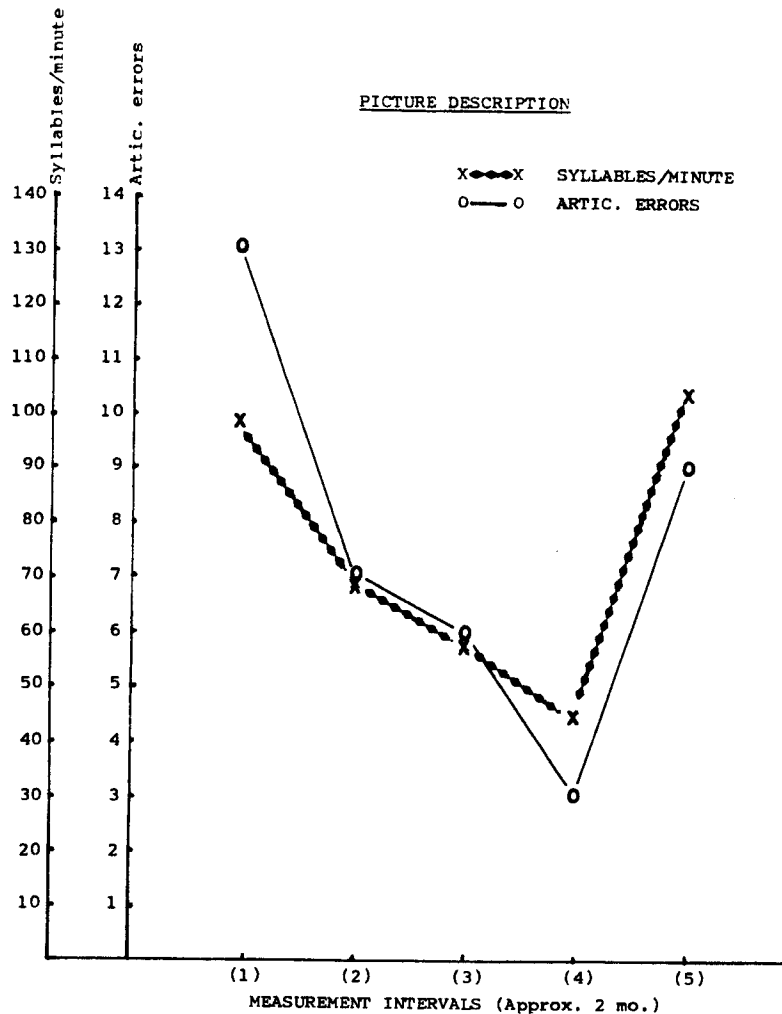


Figure 3. Speech rate and total articulatory errors recorded on the picture description task for the 5 time-interval measurements.

Video Sample #3: One final segment was played to illustrate the progress made by the patient. Samples were extracted from the first and final evaluations, using standard comparisons of such tasks as word and sentence repetition, oral reading, and picture description. All samples illustrated the patient's improved articulation, especially when he utilized the strategy of slowing rate of output.

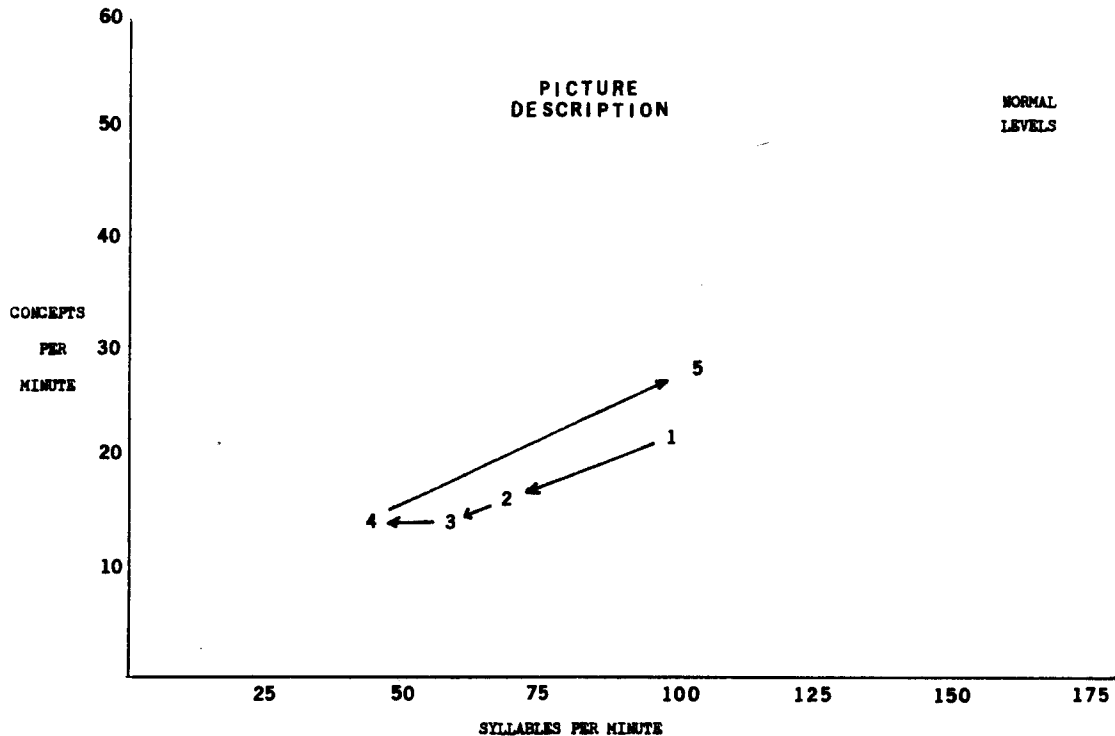


Figure 4. Information output (concepts per minute) as a function of speech rate for the 5 measurement periods. "Normal levels" are indicated for comparison.

References:

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- Yoss, K.A. and Darley, F.L. Developmental apraxia of speech in children with defective articulation. J. Speech Hearing Res. 17:399-416, (1974).

Discussion.

- Q. I think he demonstrates the exact thing that I was talking about yesterday in my paper (concerning tongue twisters). He uses exactly the same

strategy that we do in handling novel tongue twisters. The patient has to bring articulatory awareness up to consciousness, ...internalize the coordinate system; phonetic structure, or the articulatory patterns that are used in speech; he has to use slow rates. He would have to use a syllable by syllable, phone by phone, or segment by segment kind of utterance.

I was asked yesterday whether in tongue twisters we tend to stress unstressed syllables and I responded (positively). He (J.C.) tended to do that, too...also... As the normal speaker becomes proficient through practice with a particular tongue twister, rate will improve; the same thing with (J.C.).

- A. It might then be a good idea for clinicians to practice hard tongue twisters to gain some empathy for what the dyspraxic is going through.
- Q. Did you look initially at articulation errors to see if they were rule governed?
- A. We did some traditional (testing), like the McDonald, Goldman-Fristoe, and others; and we did do a language assessment of comprehension of phonemic structures to determine if plural or "ed" omissions were phonemic or morphologic in nature. We did not find that they were.
- Q. Did the errors follow developmental patterns or some other systematic pattern?
- A. I think we got a mixed bag. There were a number of errors that did not fit into developmental patterns. There were a lot of consistent patterns that he had developed that we think were communicative in their consistency. He would use sounds that he could say and consistently substitute them for others that he could not as well as an extensive repertoire of synonyms in circumlocution.
- Q. Assuming that he is a case of developmental apraxia of speech, have you thought of comparing your data with both the Yoss data and that involving acquired apraxia of speech to see which camp he might best fit in?
- A. We think our patient is more consistent with the patterns talked about by Yoss and Darley than with those reported in the "acquired" literature.
- Q. What is this patient's educational history, especially early on...did he have trouble learning to read, etc.?
- A. He reported no difficulty learning to read and, as I indicated, he was doing well in trade school studying accounting when he came to us. He also reported no other language problems other than "talking funny" as he put it. His IQ was measured at 107 by our psychologists.