

## Language Utilization in Teaching Reading to Left Neglect Patients

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### INTRODUCTION

Patients with right hemisphere brain damage, especially those who demonstrate left side neglect, present clinical management problems different from the left CVA or aphasic patient. Meyers (1978) has described the language of right hemisphere brain damaged patients as "deceptively normal" (p. 49). On the one hand, the patients demonstrate "normal" language abilities when measured on traditional aphasia batteries (LaPointe and Culton, 1969; Meyers, 1978; Stanton, Flowers, Kuhl, Miller and Smith, 1979). On the other hand, "higher" level language deficits such as verbal problem-solving disorders and abstract reasoning difficulties are common (Meyers, 1978). The constellation of deficits in this population includes severe visual-spatial-perceptual disruptions, impulsivity, general inattention and decreased concentration. This constellation is often more apparent than the higher level language deficits and interferes with rehabilitation attempts. When compared with left CVA patients, the right CVA group makes fewer gains in self-care despite longer inpatient rehabilitation (Gordon, Drenth, Jarvis, Johnson, and Wright, 1978) and upon discharge, show greater impairment in self-care and activities of daily living (Forer and Miller, 1980; Lorenze and Cancro, 1962).

Verbal instructions typically are thought to facilitate learning in right brain damaged patients. Though higher level language deficits are present, remaining linguistic abilities can be used to teach compensation for perceptual deficits. Fordyce and Jones (1966) showed that two separate groups of right CVA patients achieved significantly higher scores than left CVA patients on a manual task when instructions were given verbally rather than pantomimed. The authors noted the difficulties in obtaining precise measurement and in controlling relevant variables in the study. They suggested the need for future research in this area. To date few such studies have been completed.

Stanton *et al.* (1979) tested the hypothesis that patients with left neglect following right CVA could learn to use their intact language to attend to the left on a single task. The results indicated that left neglect subjects could learn the task (i.e., using verbal cueing to scan left), but spontaneous generalization occurred only to highly similar tasks. A major criticism of this study was that the task taught was nonfunctional. Since speech and language pathologists are frequently consulted to assess and treat the reading impairments of right CVA patients, we chose to expand the Stanton *et al.* research using reading as the functional task. Reading disturbances in right CVA patients can result from a variety of disorders, including perceptual difficulties, neglect, impulsivity, and reasoning deficits. The scope of our reading programs was limited to training compensation for left neglect. The purpose of this paper is to; 1) present

two severe left neglect cases, 2) propose a left neglect reading program, 3) present results of the reading program for the two cases, and 4) discuss the possible reasons for the differing outcomes.

#### CASE PRESENTATIONS

Case 1 was a 45 year old man with a large, right internal carotid artery (ICA) aneurysm who suffered intraventricular and right caudate hemorrhage in April 1980. His surgeries included trapping of the aneurysm, followed by temporal lobe decompression and temporal tip lobectomy. Transfer to the Rehabilitation Unit occurred two weeks after the final surgery. Upon transfer, Case 1 was lethargic with dense flaccid left hemiparesis, complete left hemianesthesia, a left visual field cut and profound left side neglect. The patient was married with two teenage daughters at home. He had a high school education and was working as a mechanic and assembly line supervisor.

Case 2 was a 49 year old man who suffered a right ICA aneurysm in November 1979. The aneurysm was clipped four days after hospital admission. Transfer to the Rehabilitation Unit took place two weeks after the surgery. Case 2 was described as confused and disoriented upon transfer. His hemiparesis had resolved, yet he continued to exhibit a left homonymous hemianopsia and severe left neglect. The patient was married and had a 12 year old son at home. He had two years of college education. At the time of his injury he was employed as an engineering technician and supervisor.

#### Initial Neuropsychological Data

Case 1 completed a neuropsychological evaluation at nine weeks post onset (wpo). Results from the Wechsler Adult Intelligence Scale (WAIS) (Wechsler, 1955) revealed a Verbal IQ of 96 and a Performance IQ of 58. Additional notes from the neuropsychological report indicated that Case 1 demonstrated severe visual-spatial-perceptual problems with severe left side neglect. The patient was also described as exhibiting impulsivity, judgment difficulties, general inattention and decreased concentration.

The neuropsychological evaluation for Case 2 was completed at three wpo. Verbal and Performance IQ scores from the WAIS were 120 and 61, respectively. Case 2 was also described as exhibiting visual-spatial-perceptual problems with severe left side neglect, general inattention and decreased concentration. Abstract reasoning difficulties, general cognitive deficits, and psychomotor slowness were noted.

#### Initial Speech and Language Data

Initial testing for both cases was conducted by Speech Pathology Services at four wpo. Portions of the Minnesota Test for Differential Diagnosis for Aphasia (Schuell, 1965) and a variety of reading assessment subtests were utilized. Results suggested that Case 1 and 2 demonstrated intact language skills, but were severely impaired on all reading tasks. Neither patient was able to match shapes, single words to pictures or written to spoken words without verbal cueing to attend left. Even with cueing, perceptual reading errors (i.e., bark/bank; hay/key) were observed.

## TREATMENT PROGRAM

The two cases demonstrated extensive reading deficits secondary to severe right hemisphere dysfunction with left neglect. The long range goal of speech and language treatment was to retrain reading abilities for use in rehabilitation, along with avocational and vocational pursuits. The goal of the reading program in both cases was to decrease left neglect. The program was designed to utilize intact language skills to cue attention to the left while reading. The five major training strategies of the program were: 1) overt verbalization (i.e., requiring the patients to cue themselves by talking out loud), 2) verbal cueing (i.e., clinician directed cueing), 3) small step program changes, 4) data based program changes and 5) intense repetition. The program progressed from matching stimuli to reading sentences to reading paragraphs. The general progression of the program is presented in Table 1.

## RESULTS

The results of the reading programs will be discussed in terms of changes in reading abilities, nonlanguage parameters, and self-care abilities. For this paper, the reading task selected to illustrate change in both cases is shown in its entirety below. The "Black Sea" paragraph is a seventh grade level paragraph and is 124 words in length. It was presented to the cases as it is shown.

The Black Sea gets its name from the color of its water. In winter its color is very dark. This is caused by fog that settles low over the area and cuts off sunlight.

The Black Sea is 748 miles from east to west; it is 374 miles from north to south. Four countries - Russia, Romania, Bulgaria and Turkey - border the sea. Several large rivers empty into it; the Danube, Dneiper, Don, Bug and Kuban are a few.

The deepest part of the sea is in its south central region. Many ports line the sea. Grain, lumber, and sugar are the main exports that pass through these ports. Fishing is good in the Black Sea and supports many of the people on its coasts.

### Case 1

Speech and language therapy was initiated at five wpo. At that time Case 1 rejected reading the Black Sea paragraph. Figure 1 illustrates the change observed in reading the paragraph during the course of speech and language therapy and follow-up. At 11 wpo, probing indicated that Case 1 could attempt reading the paragraph, though he omitted 76 of 124 words. Training at the paragraph level was conducted over the next three weeks, using large print, double spaced materials and the hierarchy of cueing shown in Table 1. At 14 wpo, Case 1 omitted six words upon reading the Black Sea paragraph.

Table 1. Stimulus and cueing hierarchies utilized in the reading programs for the two cases with left side neglect.

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### STIMULUS HIERARCHY

- A. Matching right with left handed columns of stimuli (five items per column).
1. digits
  2. individual alphabet letters
  3. two-letter combinations (upper case)
  4. two-letter combinations (lower case)
  5. three and four letter words
  6. five and six letter words
  7. antonyms and synonyms
- B. Reading sentences
1. Five large print sentences, equally spaced on each 8-1/2" x 11" page.
  2. Decrease spacing between sentences to double spaced.
  3. Decrease print size.
- C. Reading paragraphs
1. One large print double spaced paragraph per page.
  2. Increase length of #1.
  3. Decrease print size of #1.
  4. Single spaced materials.
  5. Double column materials.
  6. Large print books (i.e., large print Reader's Digest).
  7. Newspapers, magazines, books.

### CUEING HIERARCHY

- A. Sentence level
1. Clinician instructs, "Tell yourself out loud, 'Look to the left'," for each line of print. Patient responds by self verbally cueing, "Look to the left," for each line.
  2. If the patient does not follow clinician's directions to self verbally cue, feedback is given immediately to do so.
- B. Paragraph level
1. Decrease clinician directed self verbal cue to every other sentence, with introduction of clinician cue, "Look all the way to the left and find the word \_\_\_\_\_," on intervening sentences.
  2. Decrease clinician directed self verbal cue to every fourth line, with cue, "Look all the way to the left and find the word \_\_\_\_\_," on intervening sentences.
  3. Drop clinician directed self verbal cue, using the cue, "Look all the way to the left and find the word \_\_\_\_\_," for each sentence.
  4. Reduce clinician cue to, "Remind yourself" at the end of each line.
  5. Decrease frequency of cueing to every other line.
  6. Decrease frequency of cueing to every fourth line.
  7. No cueing given.
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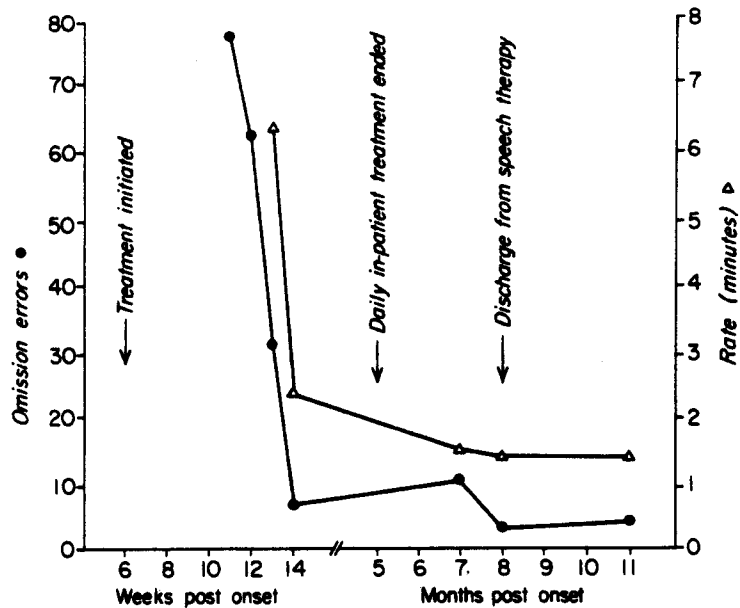


Figure 1. Omission errors and time required for Case 1 to read the "Black Sea" paragraph during treatment course and follow-up.

Case 1 continued to exhibit few left omissions on large print, double spaced paragraphs of increasing length. Reading rate progressively improved. Separate pages of single spaced materials, then double column materials, were introduced into the reading program. Finally, the patient began reading from newspapers, magazines and standard-size print books during the treatment sessions. When discharged from speech and language therapy (eight months post onset) and during follow-up testing (11 mpo), the patient was demonstrating negligible omission errors on the Black Sea paragraph (two and three omissions respectively). He read the passage in 1.5 minutes (82 wpm). Reading comprehension was at the 7.6 grade level as measured by the Reading for Understanding (Thurstone, 1959) test.

Upon discharge, selected subtests from the Halstead-Reitan Neuropsychological Battery for Adults showed that Case 1 continued to exhibit severe visual-spatial-perceptual problems with left side neglect. He was dependent in some areas of self-care. Due to this dependence he required an attendant during the day while his wife worked. The attendant assisted with ADL's and was viewed as necessary to insure safety at home.

### Case 2

Figure 2 represents the change in reading performance on the Black Sea paragraph during the course of treatment for Case 2. When speech and language therapy was initiated at four wpo the patient omitted 58 words. Following four weeks of training (eight wpo), the patient read the paragraph with three omission errors. As with Case 1, once errors were negligible on

large print double spaced paragraphs, reading stimuli of increasing length, standard print size, and of greater functional use (i.e., newspapers, magazines, etc.) were introduced into the treatment program. Once a vocational goal had been set for the patient, speech and language therapy time was spent teaching him to transfer printed stimuli from a page to tabular form. At the time of discharge from therapy at 16 wpo, the patient could read the Black Sea paragraph with one omission error at a rate of 113 wpm.

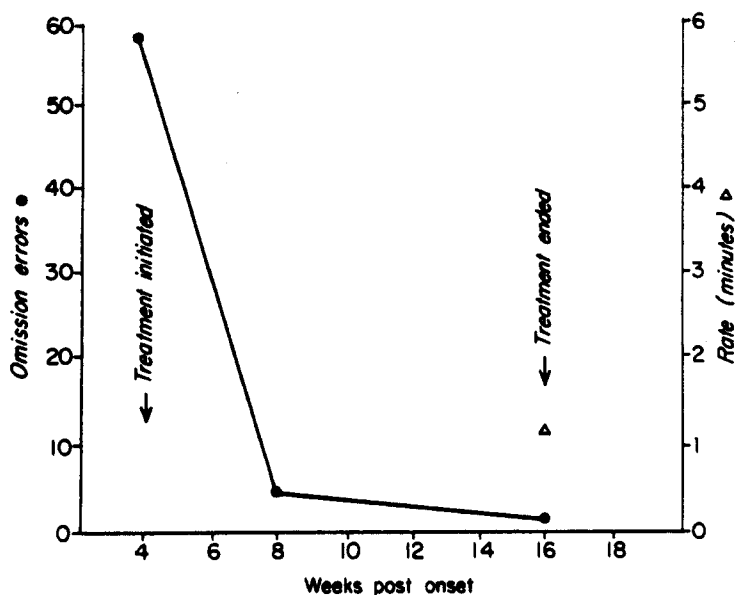


Figure 2. Omission errors and time required for Case 2 to read the "Black Sea" paragraph during treatment course and follow-up.

Upon discharge (four mpo) the complete Halstead-Reitan battery was readministered to Case 2. At that time, he obtained a Verbal IQ of 123 and a Performance IQ of 83 on the WAIS. The testing summary stated that Case 2 continued to show significant difficulties in spatial-manipulation and problem-solving. Problems with visual scanning and tendency to neglect on the left were also reported. Despite the remaining perceptual deficits, Case 2 was able to return to work in a slightly modified capacity. As part of his job he was required to transfer stimuli from blueprints to tabular form. Case 2 returned home without needing assistance for ADL's. Although safety was mentioned as a concern, the patient did not require supervision and could stay alone at home.

#### DISCUSSION

In summary, both patients continued to demonstrate visual-spatial-perceptual problems and left neglect at time of discharge from the hospital. Despite such deficits, both were functional, independent readers when speech and language therapy was discontinued. However, the rehabilitation outcomes of these patients differed. Case 1 was unable to return to work and was dependent in several areas of his life, while Case 2 returned to work and was independent in self-care and ADL's. The current cases support the Stanton et al. (1979) research that suggested that patients with left neglect can learn via systematic language cueing to attend to the left. Further, review of our results suggests that a functional task, namely reading, can be improved when language is used as a cueing system. The

systematic training of language utilization in reading did not generalize for both cases. Case 1 appeared to be limited to using language cueing to compensate for neglect only while reading. Case 2 apparently generalized this cueing strategy and was able to compensate for a variety of deficits in addition to reading.

There are several possible explanations as to why dissimilar rehabilitation outcomes resulted for the two cases. First, Case 1 clearly sustained more extensive brain damage following his aneurysm than Case 2. Evidence to support greater degree of brain damage in Case 1 comes from postoperative notes and from the degree of his residual physical involvement when compared to Case 2. For this reason, the extent of generalized learning impairment in Case 1 may have exceeded that of Case 2. This could account for the limited ability of Case 1 to "spontaneously" generalize the compensatory strategy which he learned for reading.

A second plausible explanation for the discrepancy in rehabilitation outcomes was the different level of Verbal IQs for the two cases. Case 1 had "normal" verbal abilities (i.e., Verbal IQ = 96). The remaining verbal skills for Case 2, however, were "superior" (i.e., Verbal IQ = 123). It seems likely that Case 2 might more readily make use of the highly verbal nature of the training program. In both cases the approach of training was to teach to the patient's stronger modality, yet there was an obvious advantage for Case 2 to capitalize on such an approach when compared to Case 1.

Finally, the amount of verbal cueing used in the overall rehabilitation programs could have differed between the cases, with Case 2 receiving a language-based program on a larger scale than Case 1. This might have resulted from the particular therapists the patients had during their stay and/or their responsiveness to different treatment approaches. If Case 2 received more language-based therapy while hospitalized it could help explain his ability to generalize compensatory strategies to a wider variety of situations than Case 1. We cannot objectively evaluate this hypothesis in retrospect.

These results raise a number of research questions for speech and language pathologists who are involved in the clinical management of right hemisphere brain damaged patients. First, further research is needed to determine the relative effectiveness of different treatment strategies. Many clinical efforts with left neglect patients focus on increasing attention to perceptual cues (Diller, Ben-Yishay, Gerstman, Goodkin, Gordon, and Weinberg, 1974) rather than the utilization of language as a cueing strategy. We are suggesting that language may be a more powerful and generalizable cueing strategy than a perceptually based one, especially for individuals with strong verbal skills. Of course, this hypothesis requires empirical testing. Exploration of the use of language cueing strategies in other areas of rehabilitation, including self-care and mobility, is also needed. Secondly, since there may be predictive value in assessing the remaining language skills in right hemisphere brain damaged patients, speech and language pathologists need to develop comprehensive and standardized evaluation batteries for this population. Finally, there is a need for speech and language pathologists to take a more active role in educating other rehabilitation team members as to the value of utilizing language in training. A unified, interdisciplinary approach to training right hemisphere brain damaged patients could lead to increased effectiveness of rehabilitation.

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## DISCUSSION

Q: I want to pursue a statement that you just made about the influence of language on training. A couple of years ago I worked with a patient very similar to one of the cases you talked about this morning. This man was highly educated. He had been to law school, etc. In training him to do reading tasks I took the kind of approach you are recommending. I would have him read aloud and he would often read only the right half of the page. I would constantly say, "Doesn't that sound odd to you?" He was very concrete in his behavior. He would say, "Yes, that sounds strange to me," but he didn't seem to know how to use the language he had available to him. Would you comment?



A: You and I are using the term "language training" to mean different things. If I understand you correctly your use of the term implies a much higher level process than mine. You are asking the patient to use his language to make some judgment about the logic of material being read. I agree that this use of language would be very difficult, especially in the early stages of recovery. In the early stages of treatment our "language-based" training is very concrete. In effect, we are simply asking the patient to answer the question, "Have you looked so far to the left that there are no more words on the line?" We are asking him to make no judgments about whether or not the sentence makes sense. Although I believe it is important gradually to build to cueing techniques like the one you describe, you need to start with easier, more concrete language-based techniques.

Q: I've heard people using the labels "neglect" and "denial." There's also a term "hemi-inattention." What is the difference between these terms?

A: I don't feel that the labels used in association with "neglect" are clearly defined and well differentiated within the neuropsychology literature. They are often used interchangeably within texts, patient reports, and in conversation among professionals. You often need to specify what phenomena you are talking about when you use a term like "neglect" or "inattention." Generally, I view left homonymous hemianopsia or a left field cut as a pure sensory deficit. Patients with an isolated field cut usually do not demonstrate learning deficits and are able to compensate for their neglect by turning their heads to the left. They can learn to accommodate for the problem. "Denial," I feel, is more of a problem with body schema or body awareness. I see the problem arising from the patients being unable to comprehend their deficits or being oblivious to the disability. "Neglect" and "inattention" I feel can be used interchangeably. I view the labels as referring to an integrative disorder rather than to an isolated sensory or perceptual disturbance. Patients suffering from neglect can perceive stimuli, when they respond to a single stimulus and then extinguish when stimuli are presented simultaneously (i.e., double simultaneous stimulation testing). However, these patients are unable to integrate incoming perceptual stimuli on a consistent basis. They are not able to make sense out of their world. The fact that these patients cannot integrate perceptual stimuli contributes to their learning deficit. They usually are unable to spontaneously compensate for their deficits and have difficulty learning to compensate for their problems.

Q: Did your patients have any residual weakness on the left?

A: Both patients were hemiparetic initially. However, the left hemiparesis had resolved for Case 2 by the time he was transferred to the Rehabilitation Unit, which was two weeks after his surgery. Case 1 remained hemiparetic.

Q: Was it spastic or flaccid hemiparesis?

A: Flaccid.

Comment: The reason I asked the question is because one of the neurologists I work with says that this factor can complicate training. He claims

that rehabilitation outcome is often better with patients who have spastic hemiparesis rather than flaccid. Therefore, flaccidity may be an issue to consider when interpreting outcomes of training studies.

Q: Is there differential recovery from neglect on different tasks? If so, this may influence the results you have presented.

A: I agree that this is an extremely important issue and hope to look at it systematically in the future. The only thing I have right now in the way of data is from my Master's thesis. There were 12 subjects involved in that study. We gave them an assessment battery that included reading, writing, copying, and grooming tasks. Though we did not look at the data statistically, it did not appear that the subjects neglected differently between the tasks (i.e., if they neglected severely on grooming tasks, they would do so on the paper and pencil tasks too). It did not appear that reading somehow spontaneously recovered while no other skill did so. Yet, in Case 1 presented here you do see a large discrepancy between the skills he was trained on and those he was not trained on.

Q: Are there other measures along with reading that you are taking during the sessions or other areas to which you are thinking perhaps these patients are not able to generalize?

A: Not at this point. I would like to do so and am planning on doing so.

Comment: You can't say that these patients didn't "generalize," because they did generalize to other paragraphs in their reading training.

A: I agree. I don't feel I can answer the question, "Did they generalize?" because "generalization" must be defined very specifically before you can address such a question.