The Case for Collaboration Between the Speech Pathologist and Neuropsychologist

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The primary reason for discussing this case is to emphasize what we feel is a sometimes overlooked potential for interaction between the neuropsychologist and speech pathologist. Marsha and I had intended to demonstrate that collaboration by presenting this paper together but unfortunately she couldn't be here today so I will try to give you some idea of our clinical interaction.

Like any professional, the focus of the neuropsychologist is somewhat variable. However, most would agree that a basic similarity between speech pathology and neuropsychology is that both are heavily involved in diagnostics. The degree of standardization of those diagnostics may vary in both fields but the main objective is still the determination of a patient's skills and deficits.

Specifically, the speech pathologist focuses primarily upon language skills while the neuropsychologist's spectrum is somewhat broader, including the measurement of psychometric intelligence, memory and concentration, problem solving, and sensory and motor skills. In addition, the normative population typically used by the neuropsychologist has no evidence of brain damage whereas an aphasic population is more typically used as the normative standard by the speech pathologist. From my point of view the most important reason for collaboration between the two disciplines is to gain additional information about the patient through additional observation and the use of a wider variety of tasks encompassing a wider variety of difficulty levels.

That gives you an idea of some theoretical reasons why collaboration between neuropsychology and speech pathology might improve patient care. Now, we shall focus on a specific example of how that interaction has been achieved at the Albuquerque Veterans Hospital.

H.D. is a 54 year old man, who at the time of his stroke was a claims representative for Social Security and prior to that had been secretary for the Base Commander in Albuquerque. He had considerable responsibility on his jobs and considered himself a competent employee. He reports that he was and is a perfectionist in everything he does. H.D. was also working on a Masters Degree in Political Science. From a theoretical point of view, the fact that he was left handed was important; on the Oldfield Handedness Questionnaire he reported he performed 10 of 17 activities with his left hand and 3 of 7 activities he reported doing with his right hand were activities he had been taught to do (i.e., write, draw, eat). There is no evidence of left handedness in his family.

On the day prior to his stroke, H.D. noticed some numbness and slight weakness of his left side, and came to Albuquerque for a complete physical. While the physician was monitoring pressure changes on the globe of the eye

as he pressed the right carotid artery, H.D. had a stroke. He was transferred to the Veterans Hospital and upon regaining consciousness was left hemiparetic with a left sensory loss, left homonymous hemianopsia and a verbal apraxia. His brain scan and EEG were consistent with a right fronto-central involvement.

H.D. was seen at 2 weeks post onset for neuropsychological evaluation. Testing was limited by minimal cooperation and decreased verbal output as well as by extreme depression. To give you an idea of his speech difficulties and lack of affect I'd like to show a video tape of his performance on language testing at 2 weeks post stroke. (Video Tape at 2 weeks post stroke.)

Speech was slow and halting with distortion of initial phonemes and poor prosody. At two weeks post onset, parts of the Verbal section of the Wechsler Adult Intelligence Scale were administered. Although this test typically requires verbal responses, I allowed H.D. to both write and speak his responses. Figure 1 demonstrates some of his written answers to the questions on the Information and Comprehension subtests. Notice first that there is a definite shift to the right side of the page and that his writing skills were marked by perseveration at the letter, syllable and word level. His responses were relatively sophisticated despite grammatical errors, and his performance on the Information and Comprehension subtests of the Wechsler were above average.

However, visuospatial skills, according to the Performance section of the Wechsler, were severely impaired. Figure 2 demonstrates his performance on the Digit Symbol subtest. This was the first Performance test administered and H.D. had considerable difficulty understanding the instructions, as though the visual symbols on the page distracted him. His responses were characterized by a tendency to copy numbers rather than symbols, to make constructional apraxic errors such as vertical and left - right mirror reversals, and by some visual confusion (copying the symbol which is supposed to go below the 9 below the 6). His overall performance on the test was 3 standard deviations below average.

Figure 3 demonstrates H.D.'s performance on the Block Design subtest over the period of recovery. As you will notice, there is very little change from performance at 2 weeks post onset to 12 months post onset. What is most interesting about his performance on the Block Design subtest is that he demonstrated visuoperceptual as well as visuoconstructive deficits. When he was asked if the designs that he constructed were correct, he would say, "Certainly, there's the red part of the design, there's the part of the design that's both red and white, there's the part that's all red, and there's the part that's red and white". He was correctly analyzing the parts of the design, but he was not able to integrate those parts to produce the entire design. Visual perceptual deficits were also demonstrated by impairment on the match to sample Facial Recognition and Line Orientation tasks.

At 2 weeks post onset, H.D. demonstrated visuospatial deficits which are typically seen in pateints with right hemisphere involvement (Critchley, 1969) and language deficits which were not as severe as one might expect if his right hemisphere was dominant for language. Therefore, these data are most consistent with the interpretation of a left-handed man with mixed language dominance (Brown and Hecaen, 1976). The pattern of his deficits, with relatively intact comprehension skills but impaired speaking and writing skills, has been described by Hecaen and Sanguet (1971) in familial left handers with right hemisphere damage.

H.D. was discharged just before three months post-onset and was retested

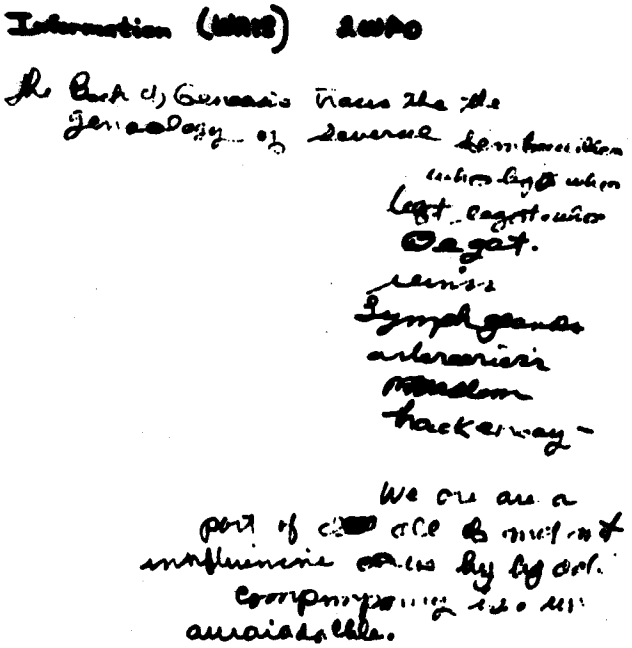

Figure 1. HD's written supplement to questions on the Information subtest of the Wechsler Adult Intelligence Scale (WAIS) 2 weeks after stroke.

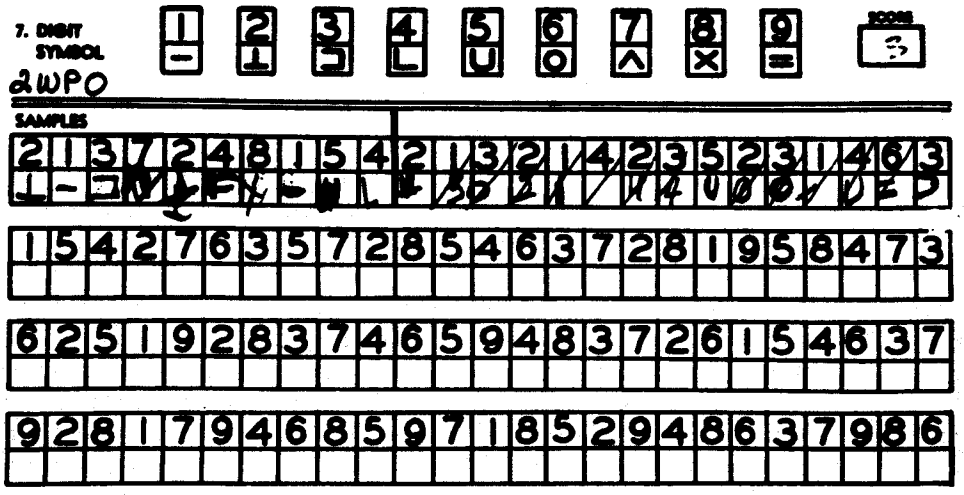

Figure 2. HD's performance on the Digit Symbol Subtest of the WAIS 2 weeks after stroke.

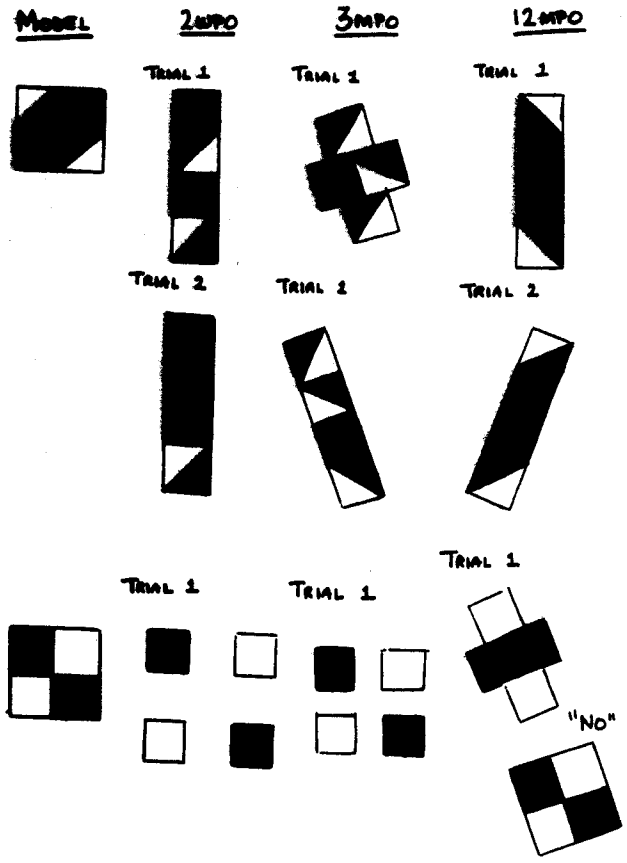

Figure 3. Examples of designs constructed by HD on the Block Design subtest of the WAIS at 2 weeks, 3 months, and 12 months after stroke.

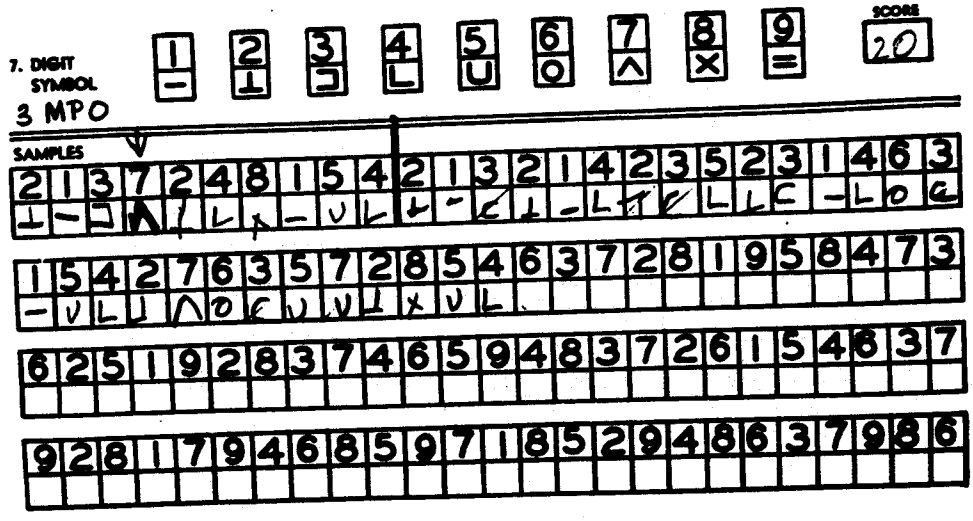

Figure 4. HD's performance on the Digit Symbol subtest of the WAIS 3 months after stroke.

at that time. The entire Wechsler Adult Intelligence Scale was administered. His verbal skills could be evaluated without the aid of writing and were in the "Bright Normal" range. Visuospatial deficits were still apparent and were greater than 1 standard deviation below average. More importantly, his visuospatial skills were 39 points below his Verbal skills. Figure 4 demonstrates his performance on the Digit Symbol subtest. As you will remember, at 2 weeks post-onset he was able to copy 3 symbols whereas at 3 months post-onset, he was able to copy 20. Constructional apraxic errors were still apparent and characterized by mirror reversals, but these reversals were decreased significantly. H.D.'s score at this point was improved by 2 standard deviations but was still more than 1 standard deviation below average.

At 12 months post-onset, his Verbal skills were similar to testing at 3 months post-onset with some improvement in verbal categorization. Although Performance IQ had been 75 at 3 months post-onset, it had improved to 88 at 12 months post-onset. This improvement is not overwhelming, but it was greater than the improvement expected from practice alone. Looking at the different subtests, we note that there was no change in Block Design performance. However, the Object Assembly score improved significantly from 3 standard deviations below average to 1 standard deviation below average. Figure 5 demonstrates Digit Symbol performance which at this time was within normal limits and improved from 20 to 40 symbols correct.

Speech and Language Testing

As you saw on the tape at 2 weeks post-onset, H.D.'s speech was characterized by non-fluencies, minimal output, omission and distortion of initial phonemes, and substantial delays. At 12 months post-onset, as you will see on the video tape, his verbal output was characterized by generally complete sentences, some improvement in prosody but still some unevenness, and the retention of initial phoneme distortion. Generally, H.D.'s verbal performance, was more fluent than on previous testing (videotape at 12 months post-stroke).

Figure 6 summarizes H.D.'s language performance on the Porch Index of Communicative Ability (PICA). Although performance at 2 weeks post-onset is not graphed, the most important changes were that his verbal skills improved from the 39th percentile at 2 weeks post-onset to the 78th percentile at 1 month post-onset. While his performance on the 4 verbal subtests and on graphic test F were below the 50th percentile at 2 weeks post-onset, no subtest scores were below the 50th percentile at 1 month post-onset. Between 1 month and 3 months post-onset graphic skills improved to the greatest extent, associated with better use of the page, and decreased perseverative and spelling errors. Verbal skills did not change significantly between 2 testing periods. However, improvement in verbal skills was noted between 3 and 12 months post-onset and was characterized by increased fluency, fewer delays and more complete sentences. Associated with these changes on the PICA were changes in auditory comprehension on part 5 of the Token Test, which was at the 65th percentile at 2 weeks post-onset (when compared to a group of aphasic patients) and improved to the 100th percentile at 12 months post-onset. Motor speech evaluations did not vary significantly between 9 and 12 months post-onset, but at both times revealed a mild apraxia characterized by slow responses with a slight monotone.

At this point I would like to very quickly summarize some of the other

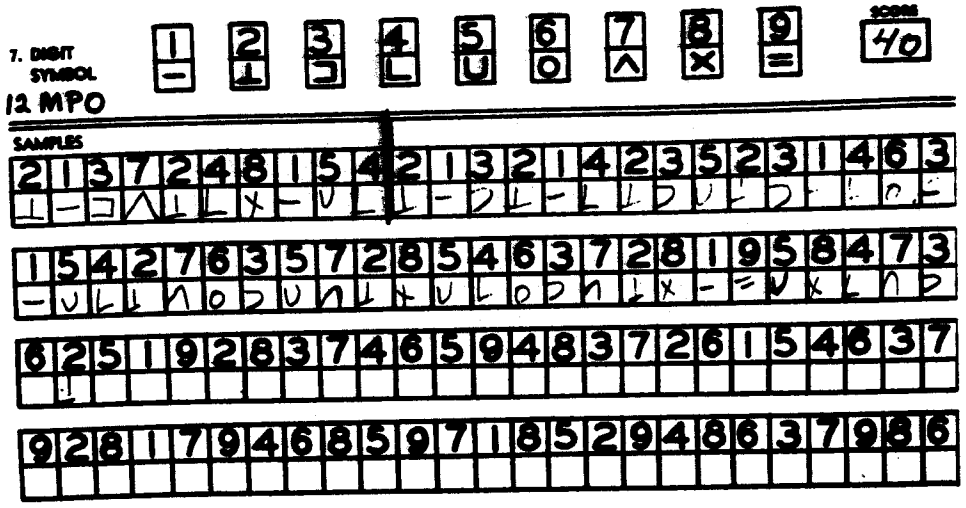

Figure 5. HD's performance on the Digit Symbol subtest of the WAIS 12 months after stroke.

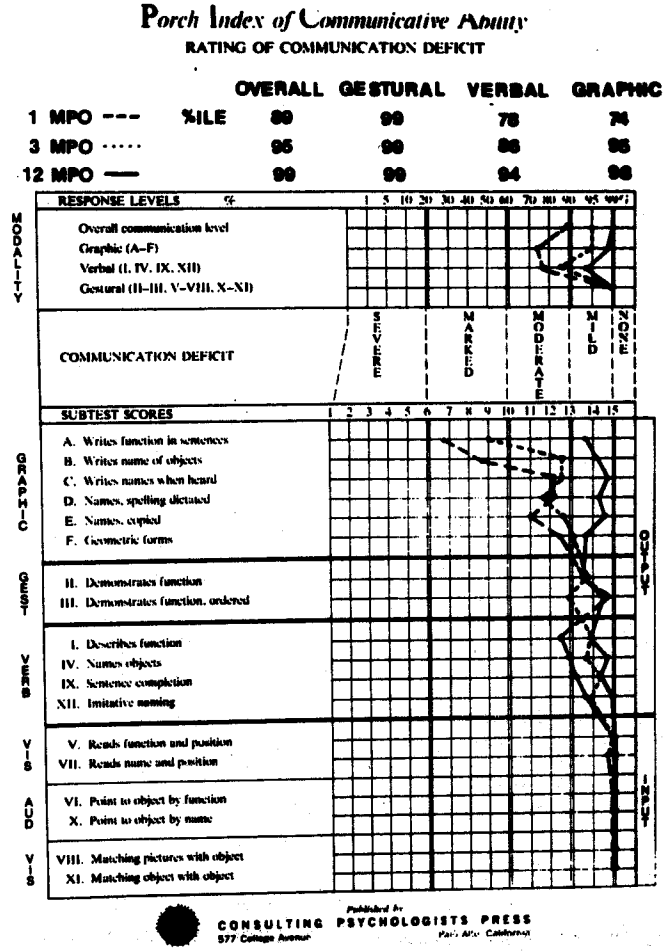

Figure 6. Summary of Communication Deficit on the Porch Index of Communicative Ability at 1, 3, and 12 months after stroke.

neuropsychological test data. If you have questions regarding the specific tests involved, I can go into greater detail during the discussion period. Figure 7 demonstrates H.D.'s overall performance on some of the neuropsychological tests given. Between one and three months post-onset, the greatest changes were noted on the numeric and alphanumeric sequencing tasks. Although H.D.'s performance was still severely impaired at 3 months post-onset he was able to complete the tasks, whereas before he had difficulty following the instructions for both. In addition, his performance on the fine finger dexterity and moving steadiness tasks was also improved from more than 8 standard deviations below average (at 1 month post-onset) to the mildly impaired or average region at 3 months post-onset. Between 3 and 12 months post-onset, greatest changes were noted in numeric sequencing with no improvement in alphanumeric sequencing, suggesting H.D. was having greater difficulty on a task requiring switching of categories as opposed to a more overlearned task requiring numeric sequencing only. Up until 12 months post-onset he was not able to perform the tactual problem solving task but at that time he was able to complete the task, although performance was still severely impaired. Greatest difficulty was noted on problem solving tasks which required sequencing of problem solving steps.

Since we have very little time I will not focus upon the speech therapy strategy. H.D. was seen for a period of about a year with emphasis placed upon speech, reading and writing skills. He was a cooperative persevering patient and continued to improve throughout his course of therapy.

Interaction between neuropsychology and speech pathology was greatest during counseling sessions. Given H.D.'s severe depression and difficulty adapting to his deficits, after each evaluation test results were discussed in detail with both Mr. and Ms. H.D. Speech and language data were important because he was highly dependent upon communicative skills and intent upon re-entering graduate school, and neuropsychological data were important because they measured a wide variety of non-language skills which were impaired. In addition, the neuropsychological data afforded comparison with a control group without brain damage, which was particularly useful for this patient, since he was interested in competing with individuals without brain damage.

H.D.'s course with respect to emotional status was particularly rocky. Initially he was quite depressed but with improvement of skills his depression decreased until 3 months post-onset, when he was relatively optimistic. It was at this time that his wife, who had been attending the Women's Counseling Group run by Speech Pathology, became concerned that his expectations for recovery were overly optimistic; she felt that he was anticipating complete recovery. We again discussed H.D.'s skills and deficits and the likelihood of recovery with Mr. and Ms. H.D. According to his wife, he was quite depressed throughout the next few days, but the depression subsided and H.D.'s optimism returned to the point that, despite our reservations, he enrolled for 2 graduate level Political Science courses. Primarily due to his slow reading speed, poor note taking skills, and quick fatiguability, he was forced to drop out of the first class after 1 month and out of the second after 1-1/2 months. He was still in speech therapy, so he had that support when this failure and associated depression occurred. At this time we are encouraging him to become involved in a somewhat less difficult academic program.

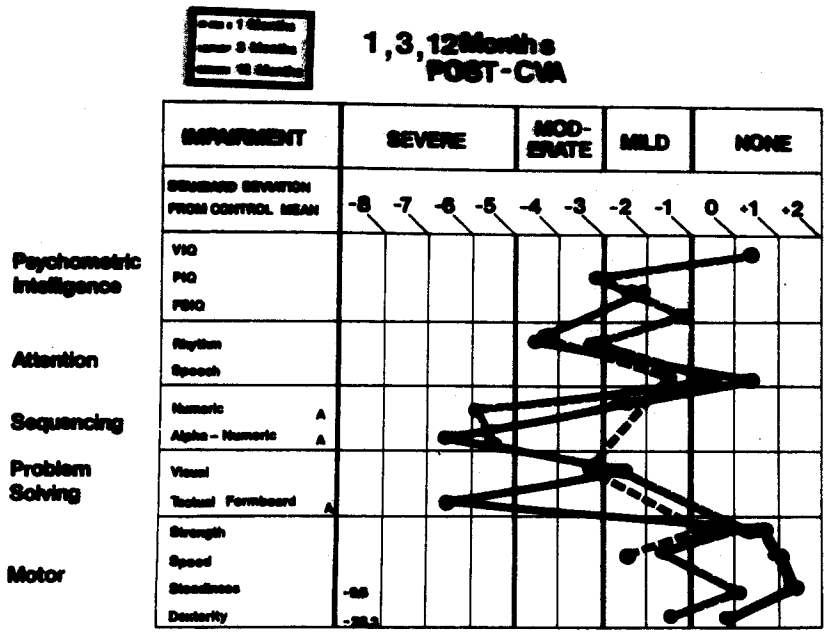

Figure 7. Summary of HD's performance on neuropsychological tests at 1, 3, and 12 months after stroke.

Conclusion

Here you have a single example of how the speech pathologist and neuropsychologist may interact. I am sure many of you also have successfully collaborated with the neuropsychologist in your hospital. From my point of view the best reason for interaction is to get some information about the patient which can be used for development of therapy strategy, counseling, and if appropriate, vocational rehabilitation.

References

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Discussion

Q. Do you think that it is important that the neuropsychologist and the speech pathologist or aphasiologist have somewhat a common base? Once again we get back to the jargon problem. Different neuropsychologists have said that they sometimes have difficulty communicating with the clinical aphasiologist, since they may not have quite the same background in psychometrics; on the other hand, the clinical aphasiologist is frustrated by the neuropsychologist's emphasis upon diagnostics and lack of interest in rehabilitation. I have seen both of those situations in

the past, but I have been happily involved in good interactions which have typically been based upon shared interest and expertise in language and psychometrics.

A. Of course it is easier if you have a common communication background, but the neuropsychologist and aphasiologist can teach each other a lot if they are interested and aware of the potential benefits. With respect to the lack of interest in rehabilitation, I think, just as Dr. Rubens said, that if the CT scan could replace the neurologist, it can also replace the neuropsychologist, particularly those who focus solely on localization. As that becomes clearer, more neuropsychologists will become more open to working with other professionals who have been involved in long-term rehabilitation. In our hospital we do a lot of followup testing and counselling which can be very useful to the patient and family. This is a perfect opportunity for both professionals to interact with the family and each other to improve communication.

Q. On the Performance part of the Wechsler did you have the opportunity to double score without time limits?

A. The Block Design subtest was double scored with and without time limits, and it made no significant difference.

Q. Did the Picture Arrangement subtest vary relative to the other subtests?

A. Picture Arrangement age-scale scores were similar to Object Assembly at twelve months post-stroke (one standard deviation below average) and, like Picture Completion and Block Design, did not change significantly between three and twelve months post-stroke.

Q. Was the site of lesions specified?

A. It was specified on the basis of EEG and brain scan as right fronto-central/fronto-temporal in the distribution of the right middle cerebral artery.

Q. The writing sample that you showed was typical of patients with diffuse or multiple right hemisphere lesions with regard to the number of perseverations per syllable and words. What else did you see in the writing besides perseveration and omission?

A. Those were the primary characteristics: Perseveration at the letter, syllable and word level with some syntactical errors.

Q. You mentioned you used the Trails. Did you use both Trails A and B, and did you see a difference in performance?

A. Yes, there was a difference in performance with recovery. At one month post-onset HD was not able to do either task. At three months post-onset performance was severely impaired on both tasks, but he was able to complete both. Finally, at twelve months post-onset performance was still severely impaired on the alternate alpha-numeric sequencing task (Trails B) but only moderately impaired on the numeric sequencing task (Trails A).

Q. Do you diagnose apraxia?

A. No.