

had established some memory for the layout of the Formboard, it was rotated. It took him until after putting four of the shapes into the board that it clicked and he was able to see the board from another direction.

Given that his training and occupation very much involved spatial shapes, directions, and rotation, he does appear to have taken a hit in this area. Still, his performance should be adequate to learn skills of blindness.

It is notable that his highest Haptic subtests were Object Assembly and Block Design, which is reasonable, considering his history of designing and making tool and die. It might be speculated that he could have scored even higher premorbidly, but this is only speculation, and it is true that his scores are certainly adequate for his ability to function, and do well navigating the world and things in it, without vision. His memory for location of the Pattern Board might be considered a bit better than it was on the Tactual Formboard, but then this may have been easier for him to conceptualize as a design.

Directional orientation testing was done to assess the subject's understanding of his position in the spatial world. He was able to get a perfect score on Benton's Right Left Orientation Test, thus showing that he understood right and left from his perspective, as well as from someone else's perspective. He also did quite well with compass directions, including calculating with compass directions, such as *if you are going north and you turn right, then right again, what direction are you going?*<sup>2</sup>

A strength was shown on the Comprehension Test, where he scored above average, suggesting that social understanding and reasoning are a strong attribute for this gentleman. He also did well on interpreting Proverbs, showing an understanding of their abstract social nature. Supplemental judgment questions also suggested a strength in this area.

Sensory motor testing revealed adequate upper body strength and finger-tapping speed. Assessing rapid alternating movements was a bit different, as he showed difficulty at first, but with practice was able to overcome the problem, and demonstrate adequate performance. Double simultaneous tactile stimulation revealed no suppression. Auditory acuity appeared to be adequate, and there was no suppression with double stimulation.

This gentleman had reported some depression after losing his vision. The Zung Depression Scale, taken at this time, was in the normal range and not suggestive of depression. He did, however, indicate that he does not feel particularly useful or needed. Beyond this, he appears to have a positive attitude, and even a positive outlook for the future.

The neuropsychological report on this gentleman did recommend that he attend the Training Center, and gave some suggestions regarding approaches to training. Follow-up information showed that he did reasonably well

at the Training Center, despite learning at a slower pace than many of the other students.

Case II illustrates that neuropsychological evaluation can inform the rehabilitation process. The report recommended that, due to this man's problems with attention, he was to be given instructions with the least possible distraction, and with teachers being alert to inattention in order to help him refocus. It was also recommended that an error-free format for learning be used to avoid the false memories that were evident in the evaluation. Likewise, repetition was extremely important, and some booster sessions to mitigate against the forgetting rate were recommended. It was also recommended that information of a similar nature not be taught in close chronological proximity to other information to be learned, as possible interference was shown during the testing.

It had been discovered, during the testing, that this gentleman had retained fairly good executive skills. Therefore, it was recommended that the teaching staff make him a full partner in developing strategies for learning, remembering, and performing tasks. Learning could be enhanced by making the information more meaningful, and by breaking the information into groups or chunks, and by not overwhelming the student with too much information at one time. Spatial learning could be enhanced by using his relatively intact abilities in understanding design, so that travel route learning, building layouts, and so forth could be understood in terms of some geometric design.

Some minor word-finding problems could be expected, so staff were cautioned to be patient with this, as the problems were minor and the student would likely resolve them himself. Staff were also forewarned that, even though he is likely good at exploration or at planning an exploration of space, he will be a bit slow in adjusting to new spatial situations, but he is able to do it. Staff were encouraged to recognize that this was a motivated individual who would likely persevere, and do well, if given enough time.

### Case III

This case concerns a 33-year-old man referred for neuropsychological evaluation by a Michigan Bureau of Services for Blind Persons counselor. An evaluation of his functioning was requested to ascertain his rehabilitation potential. Six years prior to this, his diminished vision began when papilledema was detected. This turned out to be due to a large oligodendroglioma, involving the frontal lobes. Craniotomy followed; excision of the tumor and radiation treatment ensued. This individual has remained with no vision, since that time, with no change expected. Chemotherapy and gamma knife radiation treatment have occurred in the intervening years, due to recurrence of the tumor.

Prior to his illness, this gentleman had achieved a bachelor's degree, and had worked in a supervisory capacity. He had very little previous rehabilitation training. His activities for the past six years had been very limited, although he does enjoy television and recorded books.

No other significant medical history was uncovered, and he had no mental health history. He denied that depression was the cause of his inactivity.

Behavioral observations found that he was friendly and cooperative, and appeared to put forth his best effort on all the procedures. However, he moved slowly, and performed slowly on all of the tests. His speech was slow, although it was clear and easily understood. He appeared to be a poor historian, and he tended to use repetitive phrases. He held his hands in unusual ways, when not using them. No coordination problems were obvious.

It was expected, given his educational history, that verbal IQ should have been very strong. However, it was at 91, or the 27th percentile. This verbal score was dragged down by an Arithmetic score at the ninth percentile, a Digit Span score at the 16th percentile, and a Comprehension score at the 25th percentile. Not figuring into the verbal IQ, but an even lower score was obtained on Letter Number Sequencing at the second percentile. The remaining subtests were Vocabulary at the 37th percentile, Information at the 63rd percentile, and Similarities at the 63rd percentile. It might be noted that his Vocabulary Test results included a high number of definitions that only received one point, as he appeared to know the word but struggled to explain it. Interpretation of Proverbs involved one abstract social explanation for "You can't tell a book by its cover," but the remaining five proverbs were all answered in a very concrete way.

Verbal slowness became very apparent on the Delis-Kaplan Verbal Fluency Tests. Fluency to initial letter was at the second percentile, while fluency to categories was at the first percentile. Verbal language ability did help his immediate recall on Sentence Imitation, as he could repeat at the 37th percentile of his age group but working memory for verbal material on the Digit Span and Letter Number Sequencing Tests were below expectations.

The man's performance on the Rey Auditory Verbal Learning Test demonstrated difficulty with verbal learning and memory, but it was not drastically impaired. He was able to repeat four words, after the first trial, and eight words after the fifth. He could still retain five of these words after a half hour. For the second list, the unrepeated list, he initially repeated three words, and could recall three words after the half-hour delay. Recognition memory showed that he had encoded no more than the three words for the non-repeated list. For the initial list, he was able to correctly recognize all 15 of these words, with no false positives. He did however, put three of the 15 as coming from the second list, so there was a minor source memory problem.

For the meaningful narrative memory on the Logical Memory Test, he showed some ability to retain information for non-repeated information, but did show here, as well, that he did better when the information was repeated. Still, his immediate recall was at the ninth percentile, while his delayed recall was at only the first percentile. It was fairly clear that verbal memory problems existed. It would appear that repetition helps, the meaningful nature of the information may help, and chunking appears to help. It also appears that for some of the information, especially repeated information, he may have more information in mind than he is able to produce by free recall.

When this gentleman was given the 20 Questions Test, he was unable to solve the problems, even though he understood that he needed to ask some abstract questions. He simply was unable to use the feedback to narrow down his choices, and often asked questions that were unrelated, or that were clearly already contraindicated. For example, he asked if the animal in question was a mammal, and after getting a "Yes" response, he asked if it had feathers. This would suggest executive function loss in an individual who previous had functioned on a higher level.

Executive functioning was also assessed with the Pattern of Search Test (see Figure 25.3). Here, again, was an indication that there may have been some executive function skills in the past that he is reaching for, but can't quite get. He would attempt a systematic way of searching the page for a while, but then lose this, seem to function randomly for a while, and then attempt another systematic way of searching, followed by the same pattern. There were numerous, different apparently systematic ways of searching, alternating with random scribbling. His conception of space was clearly defective on this test, as all this search or almost all of it, took place in about a third of the page. The area away from him was almost totally unsearched, and the areas close to him, on his right and to his left, were substantially ignored as well.

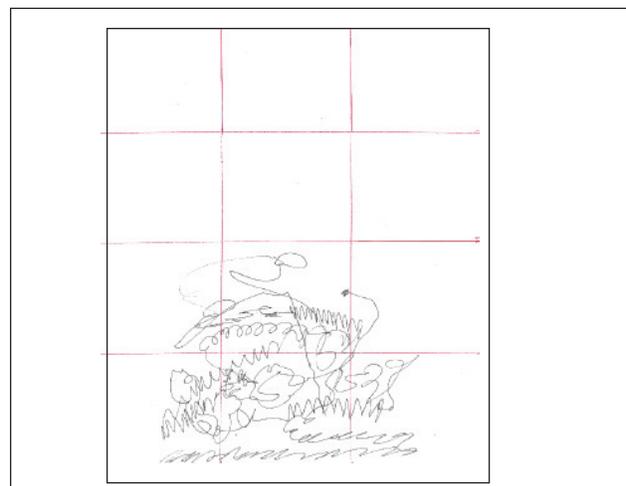


Figure 25.3 Pattern of Search Results, for 33-year-old man

His performance on the Tactual Formboard Test also initially showed, perhaps, some attempt to have a strategy, as he searched the board as far as the last row, within the first 29 seconds. However, after this, his performance was quite impaired, being unable to put all of the shapes into the receptacles within the time limit on any of the trials. He did, however, appear to learn something of the shapes and their locations, as after the fourth trial he was able to recall seven shapes, and place three of them in the correct location. Once again, on placing the shapes on the board for the memory trial, he did tend to put the shapes close to him, suggesting that the shrinking of space noticed on the Pattern of Search Test might be a persistent characteristic. The Tactual Formboard uses rather large shapes, which he was able to identify reasonably well. Smaller pieces, on other tests, were more difficult for him. It was also noticed, on the Tactual Formboard, that he appeared to be at a loss as how to use his hands together, on the bimanual trials.

The performance IQ of 70, at the second percentile, as estimated on the four Haptic Subtests, was substantially lower than the verbal IQ. His lowest subtest was Block Design, where he received no credit, despite understanding the nature of the task. He simply could not reproduce the designs beyond the sample training design. His ability to reproduce the pegboard designs on the Pattern Board, from memory, was on the impaired level at less than the first percentile, as he could only reproduce two of the simpler patterns from immediate memory. His best score was on Object Assembly, which was a scaled score of eight, at the 25th percentile of the visually impaired normative group. He moved slowly and carefully on this test, and did achieve some points on each of the four objects to be assembled. He did verbalize understanding of what two of the four objects were. He was slow to understand the shapes on Digit Symbol, and continued to make shape detection mistakes, but did do well enough to score on the borderline level at the fifth percentile.

Spatial problems continued on the level of stimulus to the finger tips. His Reitan Finger Tip Writing received only random correct responses, for any fingertip, of either hand. Therefore, despite his ability to detect one or two-point stimulation, learning Braille appeared to be an unlikely scenario.

Sustained attention on the Cancellation Test showed significant impairment for sustained auditory attention. Seventeen errors out of the 60 targets was quite high. The Oral Trail Making Test and Category Switching involve attention, as well as, working memory. Surprisingly, he scored in the normal range on Trail-Making, but well below normal on Category Switching, an easier task for

most. This may be related to the problem he had with Category Fluency.

Grip Strength at 25 kg with his right hand, and 24 kg with his left, tended to be weak for a man of his age and size. Likewise, his Finger Tapping speed, at an average of 36 in 10 seconds for his right, and 36 for his left, was on the slow side. This is not surprising, given the slowness of movements that he had shown throughout the evaluation. Rapid Alternating Movements were not rapid, but he was able to catch on the alternating part. There was no tactile suppression to simultaneous stimulation, nor was there auditory suppression.

It was recommended that learning Braille not be attempted, but that other independent living training proceed. It was recommended that considerable repetition would be needed for any training. It was also noted that he would probably never be a fully-independent traveler, given his spatial difficulties.

It is interesting to note, in this case, not surprisingly, given his frontal lobe involvement, that he had difficulty with the executive functions of planning, response monitoring, fluency, alternating attention, and so forth. Still, he was making efforts to use abstraction, and problem solving. It may well be that his lack of activity over the previous six years was due to poor executive function, with difficulty of initiation, rather than depression.

It is often seen in individuals who lose their vision that they can become depressed and do very little until motivated by others. This may have been partially the case here, but it is also quite possible that executive function problems contributed to his lack of activity and disorganization.

It is also worthy of note that this tumor, described as “very large”, affected more areas of the brain than the frontal lobe. Spatial functioning was particularly affected, compounding his difficulty resulting from lack of vision. Verbal abilities may have taken some hit, but this appeared to be a strength, and he would need to use what verbal memory he had in order to compensate for his poor spatial understanding and memory. The fact that his Oral Trail Making was unimpaired even though his Category Switching was impaired, a less difficult switching task usually, should serve as a reminder that each person is an individual and that we cannot always predict the results of one test, on the basis of another. This individual appeared to have some pockets of functioning that were better than others. Working closely with such individuals in rehabilitation, keeping strengths and weaknesses in mind, might point to some unexpected ways of helping their learning and adjustment.