Speak Up!
Mini Cases in Language

by

Antoinette R. Miller
Psychology Department
Clayton State University, Morrow, GA

Introduction

Your group will be assigned one of the patient cases from the following pages, which are based in part on actual medical cases reported in the literature. Each case depicts a language deficit (aphasia) that may be traced to damage in an area or areas of the brain related to language processing. After reading your case, your task is to work in your groups to answer the questions that follow the case write-up. As you answer the questions, remember to document your sources.

Case 1 – William

William is a right-handed man in his late 60s who has been noticing a progressive difficulty in recognizing spoken words (this actually began nearly 10 years ago). He has a decade-long history of hypertension, although his doctors had thought this was well-controlled with medication.

As his difficulties progressed, he also began experiencing problems with speaking (mild, but still noticeable). When his daughter spoke to him, William often showed difficulty in understanding what she said, although when she wrote him notes, William understood those perfectly well.

Interestingly enough he has had no problem with recognizing environmental (non-speech) sounds, and has been able to carry on his work as a farmer with no problems.

When William finally saw his doctor, a neurological exam revealed few abnormalities. He had no paresis, and the muscle tone in his extremities was normal. However, when he spoke William always seemed to be shouting, and yet there was no evidence of a hearing deficit.

William was referred for a full neuropsychological evaluation. The team evaluating him noted that his voice was abnormally loud, explosive, and quite dysprosodic. William continued to show difficulty in understanding words that were said to him, and was unable to complete any repetition tasks. He still read quite well, though when he read aloud his voice was quite loud and his tone was odd.

While William was being evaluated, he often mixed up his words or substituted nonsense syllables without being aware of it. This happened more often when he was asked to name objects rather than in spontaneous conversation. However, his doctors noted that evaluation was difficult: often William was unable to repeat instructions because of his inability to understand what was being said to him. When instructions were written down for him, however, William did not exhibit as many of these problems. Also, his writing was quite fluent and contained few of these substitution or other errors.

Questions

1. What condition or conditions (there may be more than one possibility) are being described in this case?
2. What brain area or area(s) may be involved (be sure to consider which language functions are compromised too, and be specific as to which hemisphere)? How should they function normally? What could be causing this dysfunction?
3. What do the patient's symptoms tell you about his language abilities and how they may be impaired?

Case 2 – Louis

Louis is a right-handed man in his mid-50s who has recently suffered from a cerebrovascular accident (CVA). This has left him with a right-sided hemiparesis (weakness) and significant language issues. In particular, Louis's right arm and hand were too weak to grasp anything.

During the first week after his CVA, Louis was unable to utter more than single words. This was incredibly frustrating for him, but he was able to communicate using Scrabble tiles (he could spell out nongrammatical and misspelled sentences of three or four words). He appeared to understand what was being said to him, and his communications did answer inquiries, although they were very sparse and lacking in "smoothness" (he often sounded like Tarzan when he spoke).

Over the next few weeks, his speech improved slightly although it was still clearly very difficult for him. He was able to articulate short sentences with few function words, but his prosody was lacking. When Louis spoke, he sounded like a robot (lacking in emotional tone) no matter what he said. He could, however, repeat simple sentences spoken to him.

Questions

1. What condition or conditions (there may be more than one possibility) are being described in this case?
2. What brain area or area(s) may be involved (be sure to consider which language functions are compromised too, and be specific as to which hemisphere)? How should they function normally? What could be causing this dysfunction?
3. What do the patient's symptoms tell you about his language abilities and how they may be impaired?

Case 3 – Sherman

Sherman is a right-handed man in his mid-50s. He suffered a head injury 30 years ago that had caused a variety of problems including post-traumatic amnesia and residual right-sided hemiparesis (weakness) for about two weeks. However, he eventually recovered his mobility.

More recently, Sherman began experiencing somewhat severe seizures that were fairly well-controlled by phenobarbitol. However, in the past few years Sherman has been neglectful in taking his medication and his seizures have worsened significantly. He has continued experiencing right-sided hemiparesis that has progressively increased, and his face has begun to droop.

Along with these seizures, Sherman has been experiencing difficulties with reading. Prior to his seizures Sherman was an avid reader, but his recent difficulties have removed much of the pleasure for him. Sherman finds that he has no problem with high-frequency words like "and," "it" and "boy" (he can still read them with relatively little difficulty). However, when he encounters irregular words, especially low-frquency words like "colonel" and "thyme," he can't read them well at all (he sounds them out letter-by-letter, "culoneel" and "thymee").

Questions

1. What condition or conditions (there may be more than one possibility) are being described in this case?
2. What brain area or area(s) may be involved (be sure to consider which language functions are compromised too, and be specific as to which hemisphere)? How should they function normally? What could be causing this dysfunction?
3. What do the patient's symptoms tell you about his language abilities and how they may be impaired?

Case 4 – Gerald

Gerald is a 60-year-old right-handed man who has suffered a medial cerebral artery infarction that initially resulted in a severe expressive aphasia and right-sided hemiparesis (weakness). After one year of speech therapy, his articulation improved, although it was still somewhat labored. In addition to this, he was severely impaired in his ability to name objects. When confronted with pictures, he was only able to name 47 out of 114 pictures. However, he was significantly better at reading words and sentences aloud. He showed no signs of paraphasia (inappropriate word substitutions), and his writing was only mildly impaired.

Here is an example of a conversation between Gerald and his doctor:

Doctor [holding up a coffee cup]: Can you tell me what this is?

Gerald: Oh boy, you know … isn't that funny, oh I know, it's one of those things, … geez … it's something that you hold, right? … Uhmm … it holds stuff …

Doctor [now showing a pencil]: How about this?

Gerald: Um … ok … I know what that is … isn't it something you use to … you know … oh darn it … you use it to write, I think … It's one of those things that … Ugh! … I must be getting old.

Questions

1. What condition or conditions (there may be more than one possibility) are being described in this case?
2. What brain area or area(s) may be involved (be sure to consider which language functions are compromised too, and be specific as to which hemisphere)? How should they function normally? What could be causing this dysfunction?
3. What do the patient's symptoms tell you about his language abilities and how they may be impaired?

Case 5 – Bob

Bob is a 33-year-old right-handed man who was recently found sprawled on the floor by his wife. When he woke, he was dragging his right leg, had a right facial droop, and didn't appear to understand anything said to him. After being rushed to the ER, the doctors diagnosed a dense right hemiparesis (weakness). Doctors also noticed that while his speech was rapid and fluent, he was quite unintelligible. He showed no slurring or stilting of his speech, and his overall articulation was fine. Bob had absolutely no trouble getting words out—the problem was that once they were out they made no sense!

During his neuropsychological assessment, his doctor asked him to repeat sentences such as "will you answer the telephone?" More often than not, he would answer the questions ("yes I will" or "no, it's on the ground") rather than repeat the sentence. His spontaneous speech was filled with neologisms (made-up words) and jargon. In fact, one of his doctors commented that Bob's speech was reminiscent of the "Jabberwocky" poem by Lewis Carroll (i.e., "Twas brillig, and the slithy toves … Did gyre and gimble in the wabe"). Bob was unable to comprehend written text or write coherently (his written work read much like his spoken words sounded; fluent but empty). And, to all intents and purposes, Bob seemed completely unaware of his condition.

Questions

1. What condition or conditions (there may be more than one possibility) are being described in this case?
2. What brain area or area(s) may be involved (be sure to consider which language functions are compromised too, and be specific as to which hemisphere)? How should they function normally? What could be causing this dysfunction?
3. What do the patient's symptoms tell you about his language abilities and how they may be impaired?

Case 6 – Paddy

Paddy is a right-handed man in his 50s who has recently suffered a stroke in his left hemisphere, in the area of his posterior middle cerebral artery. Damage was restricted to the posterior part of his left hemisphere.

After his initial recovery, his language was assessed and found to have a variety of issues. When speaking spontaneously, his speech contained a fair number of paraphasias. In addition, although he was unable to repeat anything said to him, he was able to signify his comprehension by other means (pointing, gestures). Paddy clearly could tell something was wrong with his speech; when asked a question he would keep "talking around the answer," in some cases finally hitting upon the correct word or phrase almost by accident.

Questions

1. What condition or conditions (there may be more than one possibility) are being described in this case?
2. What brain area or area(s) may be involved (be sure to consider which language functions are compromised too, and be specific as to which hemisphere)? How should they function normally? What could be causing this dysfunction?
3. What do the patient's symptoms tell you about his language abilities and how they may be impaired?

Background Information

There are a variety of cortical brain areas that are involved in the production and comprehension of language. Damage to these areas, or disruption of their functioning, can lead to language dysfunctions. The primary areas include:

- Broca's area, located in the posterior frontal lobe (left hemisphere): responsible for the production of language, and also some basic grammatical processing.
- Wernicke's area, located in the temporo-parietal junction (left hemisphere): responsible for the comprehension of language.
- Angular gyrus, located in the parietal lobe: a convergence zone, involved in reading.
- Arcuate fasciculus: a band of fibers that connects the Broca's and Wernicke's areas.

The classic Wernicke-Geschwind model of language postulates that these areas interact as shown in Figure 1 (below) to comprehend and produce spoken language, and to read and pronounce written language. It should be noted that the language "loop" is found on the left hemisphere in the great majority of the population.

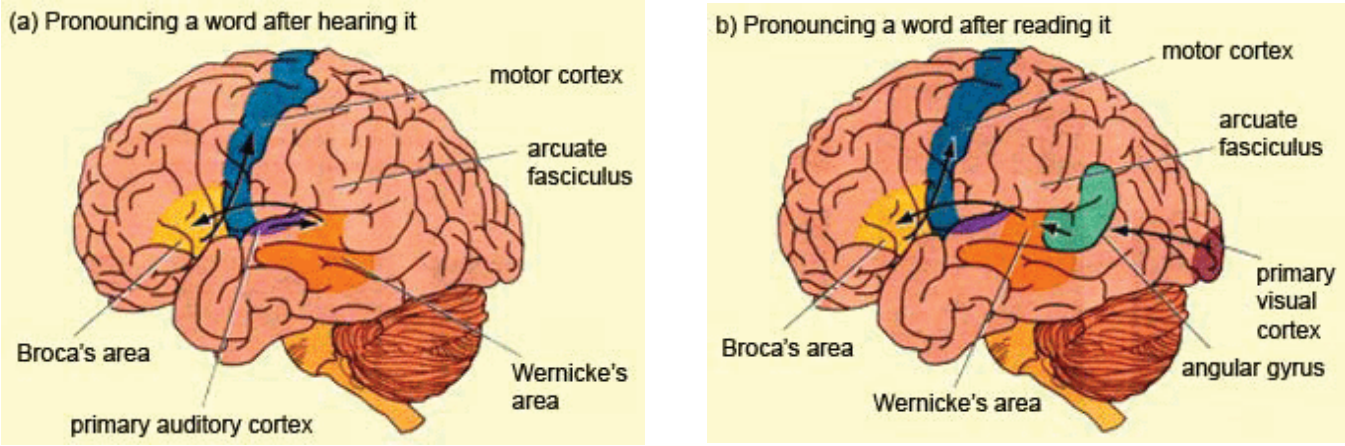

Figure 1: Brain areas associated with language comprehension and production.
(Obtained from "The Brain from Top to Bottom" (**http://thebrain.mcgill.ca/**), which operates according to terms of copyleft.)

Many language dysfunctions involve either the production or comprehension of language, and can involve either spoken or written language. Some of the conditions covered by these cases include:

- **Broca's aphasia:** So named because it may result from damage to Broca's area, in the posterior left frontal lobe. It is a nonfluent aphasia, in which language production is harmed while language comprehension may be spared.
- **Wernicke's aphasia:** Also named because of the brain area (Wernicke's area) damaged; this is a left posterior temporal lobe area (near its junction with the parietal lobe). It is a fluent aphasia, in which language production is not affected, but the patient suffers from a lack of comprehension of what is said to him or her, and the language produced by the patient is empty and meaningless. The Wernicke's aphasiac may speak in a "word salad," insert many paraphasias (production of unintended syllables, words, or phrases that are unrelated to what is being said), and neologisms (created, nonsensical words). Moreover, the Wernicke's aphasiac is often unaware of his or her difficulties.

- **Dyslexia:** There are several subtypes of dyslexia, and all have in common the disruption of reading. It may be developmental or acquired through brain damage, and may result from damage to the angular gyrus located in the parietal lobe. Surface dyslexia is a condition in which a person may not be able to recognize words by sounding out the letter-by-letter combinations, but may still be able to recognize and read words that are common and follow regular spelling rules. Surface dyslexics often have difficulty with homophones ("deer" and "dear") and irregular and infrequent words (such as "afghan"). Deep dyslexia is a condition in which the dyslexic makes many semantic (meaning-based) errors, and may substitute semantically similar words (for example, may say "candy" when seeing "chocolate").
- **Word deafness:** Also known as pure word deafness and verbal auditory agnosia. There is a disconnect between the perception and understanding of non-speech sounds (such as dogs barking) and speech-specific sounds (words, etc.). Pure word deafness may also include speech output problems such as increased volume and dysprosodic speech. This may be the ultimate result of Wernicke's aphasia, which results from damage to the left temporoparietal junction (also known as Wernicke's area). What may distinguish Wernicke's aphasia from pure word deafness is that those with Wernicke's aphasia also lose the ability to write and comprehend written text. Pure word deafness may result from bilateral temporal lobe damage.
- **Anomia:** Also known as amnesic aphasia, a fluent aphasia in which comprehension and production are both relatively intact, however the patient may experience difficulty in finding the names of objects. Many aphasiacs also experience anomia, and it may result from damage to a variety of brain areas (including the left hemisphere). As such, it may be seen in many of the other language disorders described above.
- **Conduction aphasia:** This is a fluent aphasia in which a patient can speak easily (unlike in Broca's aphasia), can understand what is said to him or her (unlike in Wernicke's aphasia), and can name objects. However, the conduction aphasiac's speech may be filled with paraphasias as in the Wernicke's aphasia, and repetition is impaired. Also unlike Wernicke's aphasia, those with conduction aphasia may be aware of the errors in their speech output. This can result from damage to the arcuate fasciculus that connects Wernicke's to Broca's areas.

References

Kolb, B., and I.Q. Whishaw. 2008. Fundamentals of Human Neuropsychology, 6th edition. New York: Worth Publishers.

The Brain from Top to Bottom: From Thought to Language. Broca's Area, Wernicke's Area, and Other Language-Processing Areas in the Brain
http://thebrain.mcgill.ca/flash/i/i_10/i_10_cr/i_10_cr_lan/i_10_cr_lan.html