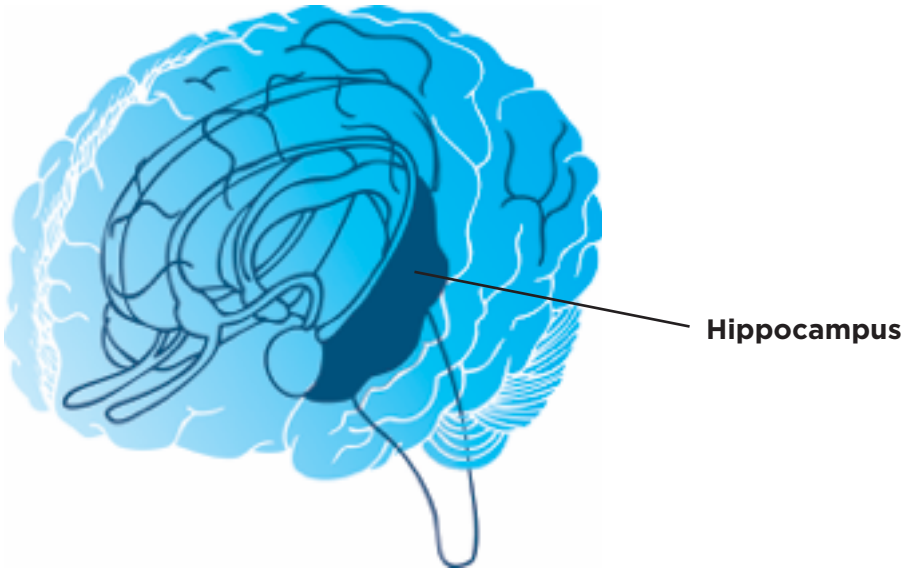
CASE STUDY ACTIVITY: PATIENT H.M.

In 1953, a man known as Patient H.M. had brain surgery to help control epileptic seizures. Large parts of his **temporal lobes** were removed, including most of a structure called the **hippocampus** (hip-uh-cam-pus).



After the surgery, H.M.'s epilepsy improved, but something strange happened. H.M. remembered details of his life from before the surgery, but he couldn't remember anything that had happened to him since. He could not tell you today's date or even what happened to him an hour earlier. Every time he saw his doctors, it was as if he was meeting them for the first time. H.M. still had normal intelligence and could carry on short conversations, but forgot everything he had been saying and doing as soon as he was distracted.

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CASE STUDY ACTIVITY: PHINEAS GAGE

Phineas (FINN-ee-us) Gage was a polite and responsible railroad construction worker. In 1848, Gage was setting up a gunpowder charge in a bed of rock when the gunpowder exploded, sending a steel rod straight through Gage's skull. The rod removed a large part of Gage's **frontal lobes**.

Gage made a surprising recovery, going on to live another twelve years after the accident. But his personality had changed noticeably: he became rude, impatient, and unable to carry out plans. People who knew him said that he was "no longer Gage."

Image credits:
Phineas Gage: Originally from the collection of Jack and Beverly Wilgus; now in the Warren Anatomical Museum, Harvard Medical School.
Injury reconstruction: Raitu et el. (2004) J. Neurotrauma 21:637

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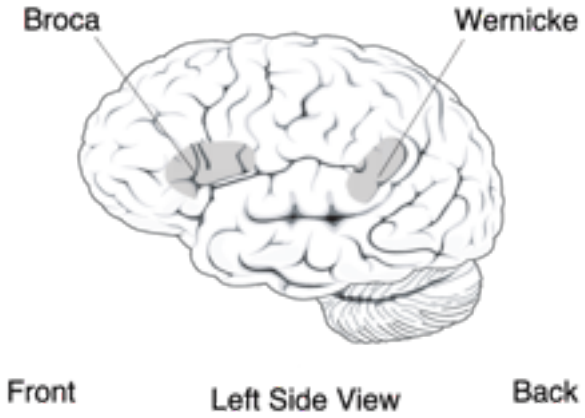
CASE STUDY ACTIVITY: BROCA'S APHASIA

In the 1800s, a French doctor named Paul Broca studied several patients who had difficulty producing speech. One of these patients was nicknamed "Tan" because 'tan' was the only sound he could make; another could only say the words 'yes,' 'no,' 'three,' 'always,' and 'lelo' (a mispronunciation of his own name).

After these patients died, Broca examined their brains and found that they all had lesions (damage) in a specific part of the left inferior frontal lobe, later called **Broca's area**.



Damage to this area of the brain results in **Broca's aphasia (uh-FAY-zha)**, in which a person has difficulty producing speech. People with Broca's aphasia can understand simple language, but their words are not properly formed, and their speech is slow, slurred, and ungrammatical. For example, this is how a Broca's aphasic patient tried to describe the picture below:

OK. Uh... water, uh ... leaking, uh, from sink, uh. Window... seems... to... be... o-pen, uh. Outside view... of ... the next house, uh. See... bushes... uh, trees and walk... uh ... way and ... grass ...and, uh ... kids... uh. Going ... to ... fall ... off ... the ... stool, and, uh ... he's, uh ... taking cookies ... and, uh ... and a housewife, uh ... standing ... uh, in a ... puddle ... of water, and, uh ... boy, uh ... handing ... cookie ... to ... girl, and, uh, ... she ... seems ... to ... be finding ... the ... her mouth, uh... sss, uh. Two cups, uh ... plates, uh. Housewife, uh... drying dishes, uh. Curtains, uh. That's, uh... uh. Full cookie jar... and, uh... and a lid, uh... leaning on... cans... cookie jar. Pretty much. OK? (Henderson, 1985)

Image credits:
Brain diagram: NIH
Kitchen image: Goodglass & Kaplan/Boston Diagnostic Examination for Aphasia

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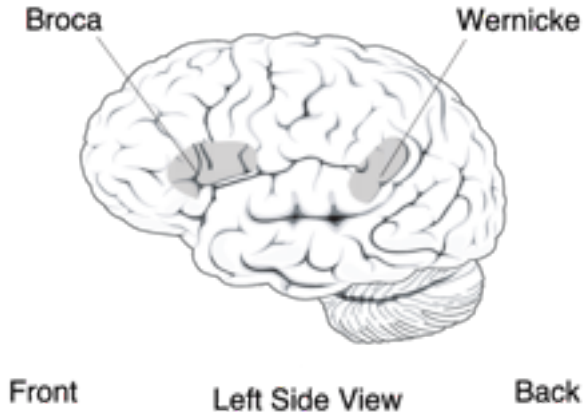
CASE STUDY ACTIVITY: WERNICKE'S APHASIA

In the 1800s, a German neurologist named Carl Wernicke (VAIR-nick-ee) found that damage to a specific part of the **left temporal** (TEM-per-al) **lobe**, later named Wernicke's area, resulted in language problems.

Wernicke's aphasia (VAIR-nick-ees uh-FAY-zha) is a loss of the ability to understand language. A person with Wernicke's aphasia can speak clearly, but the words that are put together make no sense. This way of speaking has been called "word salad" because it appears that the words are all mixed up like the vegetables in a salad. Here is an example of a patient trying to describe the picture below:



"Well this is mother is away here working her work out of here to get her better, but when she's looking, the two boys looking in the other part. One their small tile into her time here. She's working another time because she's getting to. So two boys work together and one is sneaking around here making his work and his further funnas his time he had." (Goodglass & Kaplan, 1972)

Image credits:
Brain diagram: NIH
Kitchen image: Goodglass & Kaplan/Boston Diagnostic Examination for Aphasia

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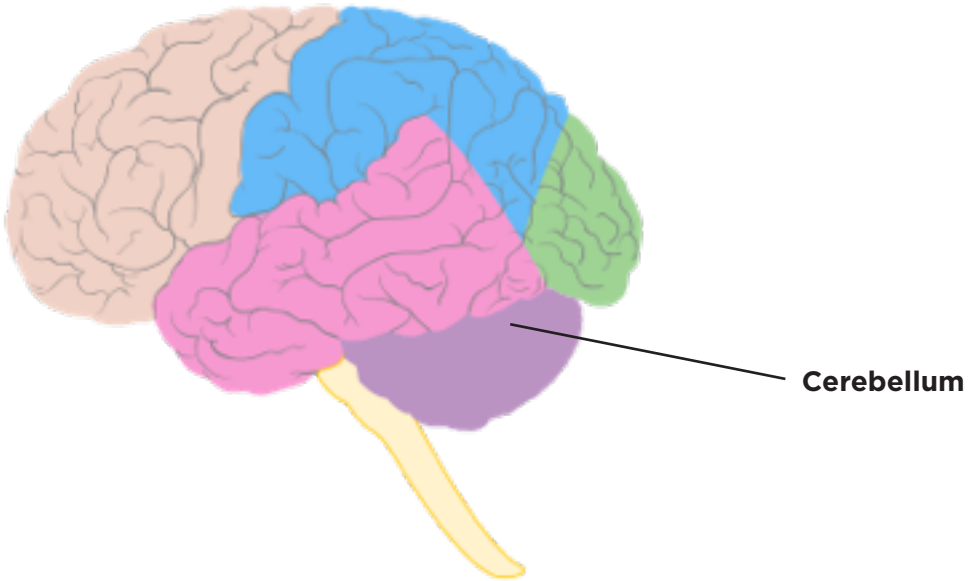
CASE STUDY ACTIVITY: ATAXIA

In 1978, Mr. R was involved in a motorcycle accident while not wearing a helmet. The force of the collision threw him off his bike and his head hit the curb, resulting in damage to the **right half of the cerebellum** (sair–uh–BELL-um). After this injury, Mr. R had difficulty controlling movements on the left half of his body. Although he was able to move both sides of his body, when he tried to make fine movements such as touching his nose or writing with his left hand, his movements were jerky and uncooordinated. He was able to use his right hand normally. Difficulty coordinating movements is called **ataxia** (uh-TAK-see-uh) .

This case demonstrates how each half of the body is "wired" to the opposite half of the brain. This is the case for vision (the left hemisphere processes information from the right visual field, and vice versa), other bodily sensations (the right hemisphere processes input from the left half of the body, and vice versa), and movement (the right hemisphere controls the left half of the body, and vice versa).



Case study: https://web.archive.org/web/20120618114054/http://www.ravall.com/2011/06/18/exploring-cerebellar-ataxia-brain-disorder/
Image credit: CFCF/own work

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CASE STUDY ACTIVITY: URBACH-WIETHE DISEASE

S.M. suffers from a rare genetic condition called Urbach-Wiethe disease that has caused a part of her brain called the **amygdala** to harden and waste away. Because of this damage, she is unable to recognize fear. If she sees a person making a fearful facial expression, she is unable to interpret it, and if asked to draw a scared face, she is unable to do so. She is also unable to experience fear herself. In scary situations that would make the average person scared, she feels nothing. Interestingly, her ability to experience other emotions seems to be intact.

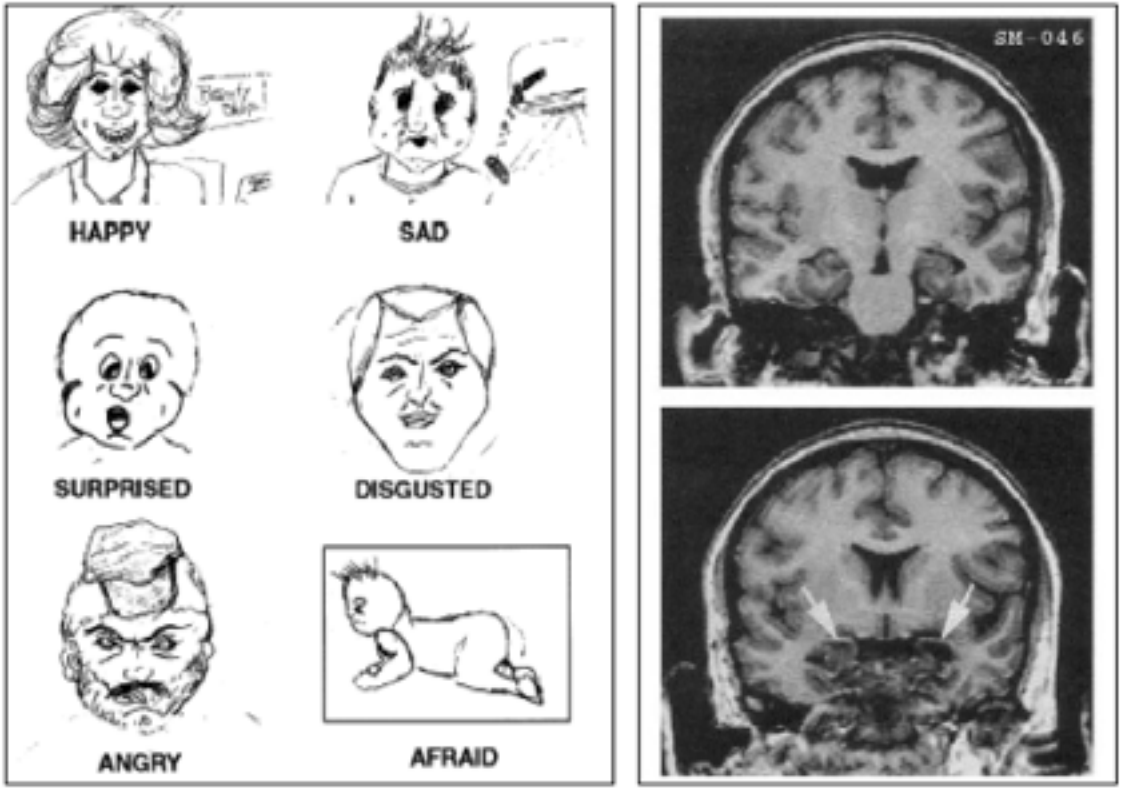

Image credit: Adolphs et al. (1994) Nature 372: 669.

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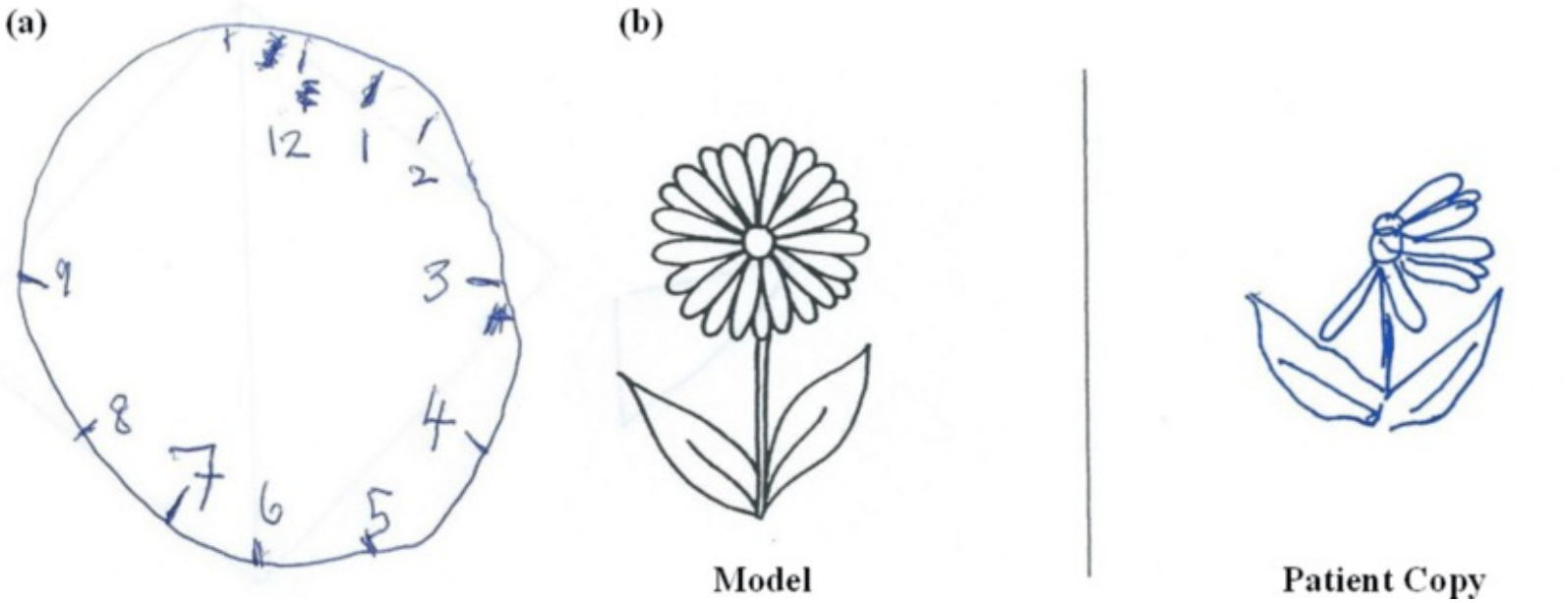
CASE STUDY ACTIVITY: ALAN BURGESS

Alan Burgess was a tool design draftsman and driver when, in 2007, he suffered a stroke that damaged his right **parietal lobe**. His eyesight was unaffected, but after the stroke, he no longer noticed people, sounds, or objects on his left. For example, when he sketched an animal, the left side of its head would be missing. When he walked down the street, he would stay close to the right side of the sidewalk where he knew it was safe. Asked to mark the midpoint of a 25 cm line, he would mark it just 2 cm from the right edge—because he didn't notice the rest of the line. "It's in the middle of my line, not the middle of your line," he told his doctor.



Drawings of a patient with parietal lobe damage similar to Alan Burgess.
Image credit: Gallagher, Maria et al. (2013). British Journal of Neuroscience Nursing. 9: 273-277.

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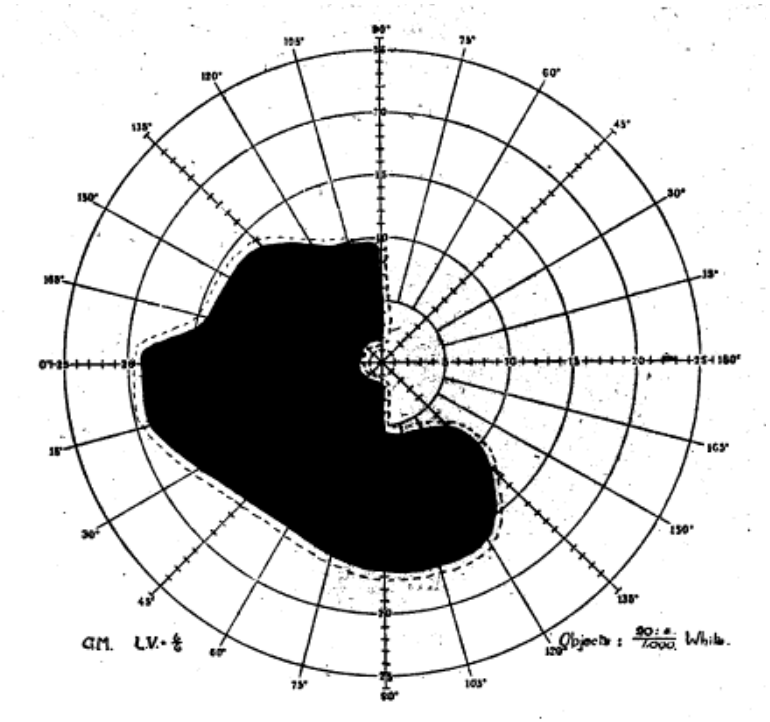
CASE STUDY ACTIVITY: CORPORAL G.M.

Corporal G.M. was a 22-year-old soldier who was injured in the Battle of Kohima in 1944 during World War II. Having already been shot in the thigh, he was being transported when a shell exploded near his field ambulance, injuring the right side of the back of his head. Afterwards, he reported an area in his left field of vision where he could not see. Reading the newspaper, he complained that he could see one word but the word next to it had disappeared. When he looked at his hand, he could only see the fingers on the right.

When he later underwent an operation to remove bone fragments lodged in his brain, doctors observed that the wound had damaged his right **occipital lobe**.



The black region indicates the area of vision loss in Cpl. G.M.'s visual field.
Image credit: Macaskill, J. (1945) Br J Ophthalmol. 29: 626–628.

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