# Explainer: This is your brain

By The Conversation, adapted by Newsela staff on 03.24.17
Word Count **758**
Level **1040L**

TOP: There are many different parts of the brain with their own specific function. There are times when these parts work together. MIDDLE: The main parts of the brain featuring the four different lobes and the lower levels of the brainstem. BOTTOM: The Broca's and Wernicke's areas of the brain, which help process language. Photos: Wikimedia Commons

If someone would have been asked 15 years ago to write a short piece about what the different parts of the brain did, it would have been a fairly simple task. Not anymore.

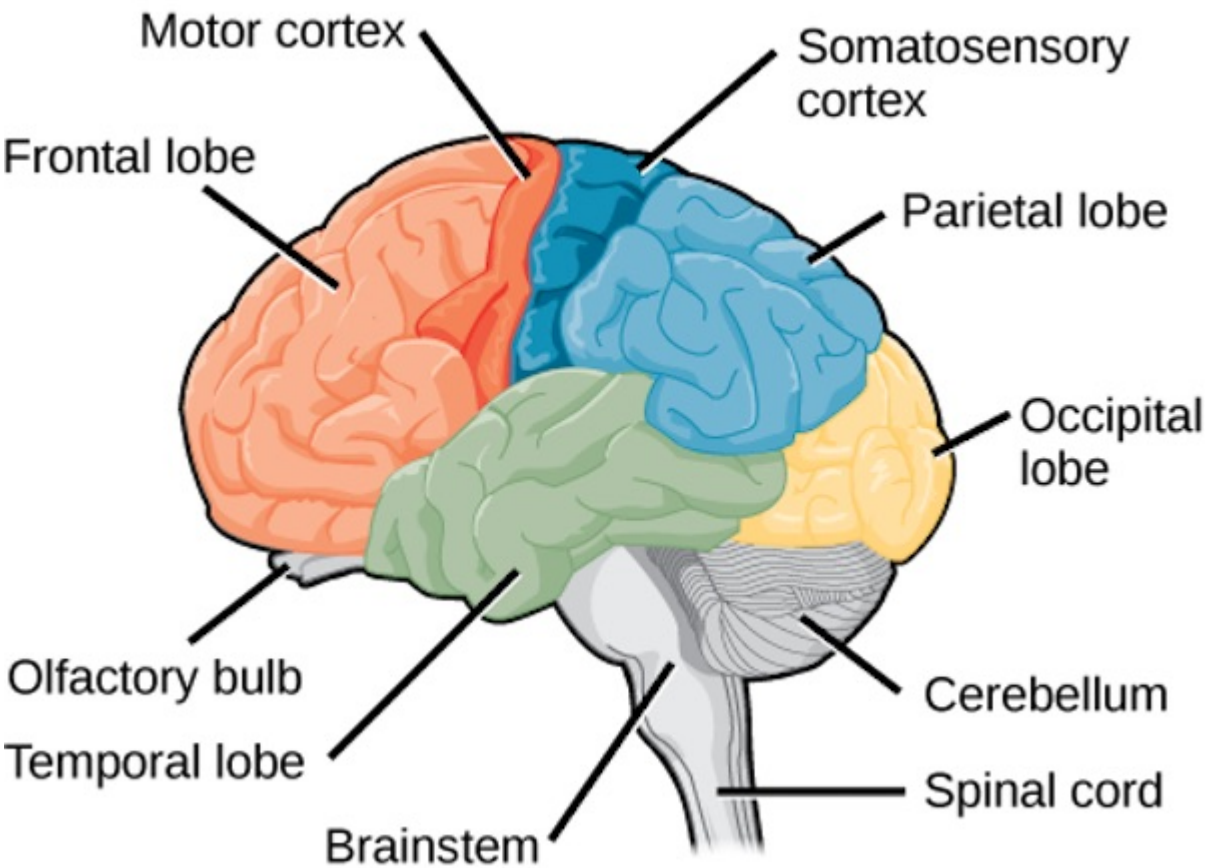
Over the last 15 years, the methods used to study the brain have advanced significantly, and with them so has scientists' understanding of the brain. This makes the task of explaining the most complicated organ in the body, well, complicated.

The structure of the brain is certainly well-defined and the more basic of its functions have been generally well-mapped. The "lower levels," such as the brainstem, regulate functions such as heart rate and breathing.

The cerebellum is critical for the control and regulation of movement. More recently, it has also been shown to have a role in "higher functions" such as cognition and emotion.

In the "higher levels" of the brain, such as the cerebral cortex, more complicated functions come into play. Here the relationship between function and structure becomes much less clear-cut.

## Dividing Up Brain Functions




The cortex is divided into two hemispheres (left and right). Each hemisphere has four lobes – occipital, parietal, temporal and frontal.

Brain functions have been traditionally assigned to one such lobe and/or hemisphere of the brain. These include functions such as vision, language, memory and problem-solving.

This division of functions has led to some confusion. The most popular misunderstanding is the belief that there is a distinction between the left “logical” brain and the right “creative” brain. In fact, such complicated behaviors are not determined by a specific brain region or even a specific hemisphere.

The idea of an almost one-to-one relationship between structure and function was largely a result of lesion studies. These were tests where a certain part of the brain was lesioned, or damaged, causing impairments in a particular function. The results led scientists to believe that there was a direct relationship between the structure and the function. But as methods for studying the brain improved, this approach was shown to be somewhat simplistic.

## Networking Within The Brain

Scientists now understand that complicated, higher-level brain functions are a result of a number of brain areas working together. These brain areas work together in what are called "networks."

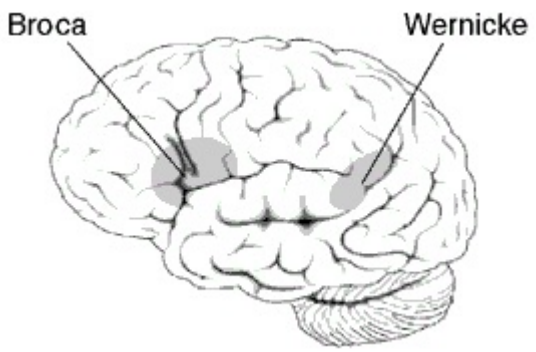
Scientists know this because of methods such as Magnetic Resonance Imaging (MRI). It allows them to scan the brain and look at all the regions involved in certain functions. Newer methods also allow scientists to picture the connections between these regions.

This is not to say that there is no separation of function throughout the brain. There are brain regions that carry out specialized functions, but they are now thought to do so in combination with other brain regions through network connections.

To understand this, it helps to think of the brain as an exceptionally efficient rail network. Certain train stations perform specialized duties, but they do so in conjunction with other stations. They are connected and "communicate" through the rail network.

## Language And Speech Functions

Language can provide a good example of how this occurs in the brain. Language is often thought of as a solely “left brain” function and, while this is somewhat true, it is certainly not the whole story.




There are specific regions in one hemisphere of the brain – usually the left – that are essential for producing and understanding speech. These parts of the brain are known as Broca's area and Wernicke's area.

But the other – usually the right – hemisphere of the brain is also involved in language. It is thought to play an important role in recognizing and producing the emotional features of speech.

Additionally, the "language network" involves a number of other "left" hemisphere regions. These include the prefrontal cortex, premotor cortex and supplementary motor area.

Together, these brain regions perform higher-level functions such as mapping words to their meaning.

## The Ever-Adaptable Brain

While there are certain highly specialized brain regions for language, they are still part of an extensive network. These brain regions all work together to produce this complicated function.

In addition, the brain is not fixed in its functioning. It is adaptable, which means that it can change over time to meet different needs. After an illness or injury, for example, the brain can train new regions or networks to take over the functions of damaged areas.

So the different parts of the brain are not as simple as they first seem. Scientists believe it is a complicated relationship between structure and function that best describes what the different regions of the brain do – at least for now.

## Quiz

1 Select the paragraph in the section "Networking Within The Brain" that BEST explains HOW scientists know that the brain uses networks to complete functions.

2 Read the fourth paragraph of the article.

> *The cerebellum is critical for the control and regulation of movement. More recently, it has also been shown to have a role in "higher functions" such as cognition and emotion.*

Which sentence in the section "Dividing Up Brain Functions" helps explain what the word "cognition" is referring to?

(A) Each hemisphere has four lobes – occipital, parietal, temporal and frontal.

(B) Brain functions have been traditionally assigned to one such lobe and/or hemisphere of the brain.

(C) These include functions such as vision, language, memory and problem-solving.

(D) In fact, such complicated behaviors are not determined by a specific brain region or even a specific hemisphere.

3 Read the sentence from the section "Dividing Up Brain Functions."

> *These were tests where a certain part of the brain was lesioned, or damaged, causing impairments in a particular function.*

Which option is the BEST definition of the word "impairments" as used in the sentence?

(A) weakness

(B) differences

(C) strengths

(D) changes

4 Which section of the article highlights the idea that healthy parts of the brain are able to take over the functions of damaged parts of the brain?

(A) "Dividing Up Brain Functions"

(B) "Networking Within The Brain"

(C) "Language And Speech Functions"

(D) "The Ever-Adaptable Brain"