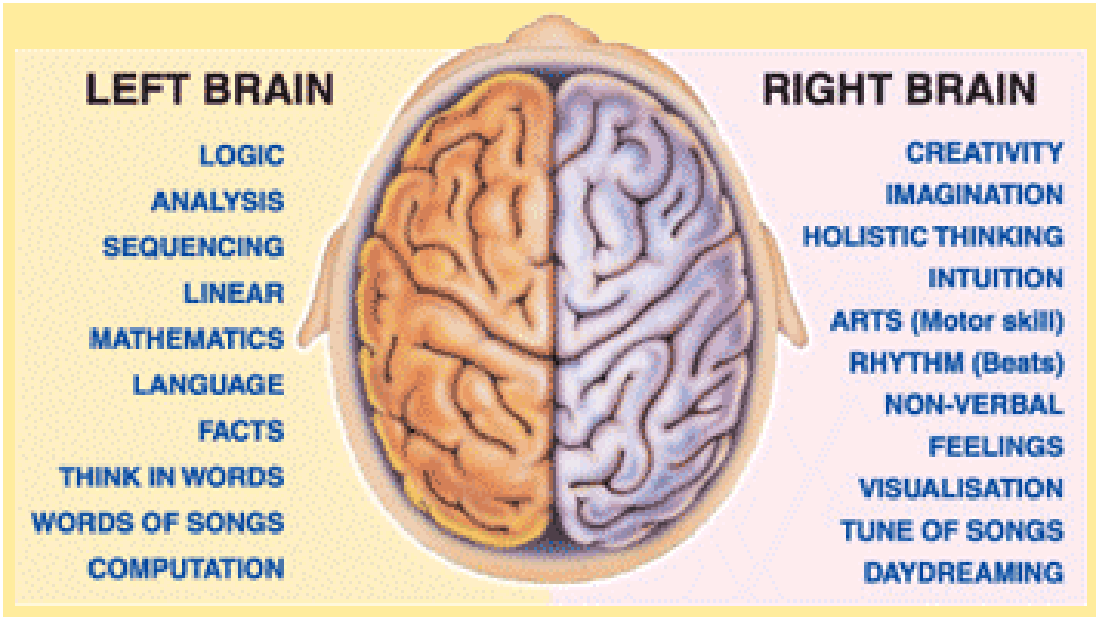
THE RIGHT AND LEFT HEMISPHERES OF THE BRAIN

The human brain is made up of two halves. These halves are commonly called the right brain and left brain, but should more correctly be termed 'hemispheres'. For some reason, our right and left hemispheres control the 'opposite' side of our bodies, so the right hemisphere controls our left side and processes what we see in our left eye while the left hemisphere controls the right side and processes what our right eye sees.

In general, the left and right hemispheres of our brain process information in different ways. While we have a natural tendency towards one way of thinking, the two sides of our brain work together in our everyday lives. The right brain of the brain focuses on the visual, and processes information in an intuitive and simultaneous way, looking first at the whole picture then the details. The focus of the left brain is verbal, processing information in an analytical and sequential way, looking first at the pieces then putting them together to get the whole.

Left brain thinking is verbal and analytical. Right brain is non-verbal and intuitive, using pictures rather than words. The best illustration of this is to listen to people give directions. The left brain person will say something like "From here, go west three blocks and turn north on Vine Street. Go three or four miles and then turn east onto Broad Street." The right brain person will sound something like this: "Turn right (pointing right), by the church over there (pointing again). Then you will pass a McDonalds and a Walmart. At the next light, turn right toward the Esso station."

Though right-brain or non-verbal thinking is often regarded as more 'creative', there is no right or wrong here; it is merely two different ways of thinking. One is not better than the other, just as being right-handed is not 'superior' to being left-handed. What is important is to be aware that there are different ways of thinking, and by knowing what your natural preference is, you can pay attention to your less dominant side to improve the same.



Activity 1: ***WHICH PART OF YOUR BRAIN IS MOST DOMINANT?***

Go to the computer and start the activity on the following website.

http://braintest.sommer-sommer.com/en/index.html

This activity will help you identify which part of your brain is more dominant.

Activity 2: Testing the corpus Callosum

I've just discovered a wonderfully simple finger touch procedure that can test the function of your corpus callosum, a key brain structure that connects the two cortical hemispheres.

It is called the 'cross lateralization of fingertips test' and was used in a 1991 study by Kazuo Satomi and colleagues.

It relies on the fact that different hemispheres are responsible for the movements and sensations from each hand.

In other words, each hand is connected to a different side of the brain, and, to allow you to co-ordinate both hands, the brain passes information between the two sides by using the corpus callosum.

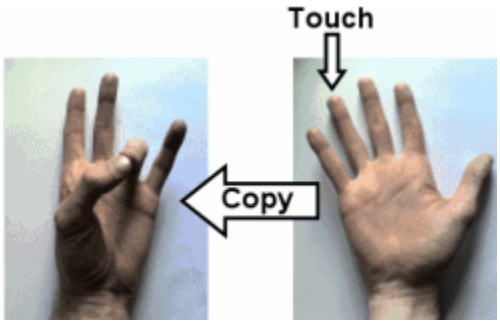
The corpus callosum is the largest structure in the brain and works like a huge bundle of white matter 'cables', connecting different areas.

If this structure gets damaged, a patient might have trouble with coordinating their hands, preventing them from matching sensations on one hand with movement on the other, because the information doesn't get to where it's needed.

Testing the Corpus Callosum:

Ask someone to close their eyes and put their hands face up.

You then touch one of their fingertips with a pencil, and with the opposite hand the participant needs to touch the corresponding finger with thumb of the same hand.



For example, if you touched their right ring finger, they would need to touch their left ring finger with their left thumb, as shown in the diagram above.

You need to do this on both hands, with them always touching the corresponding finger on the opposite hand.

It's important that the person keeps their eyes closed, because as soon as they look, they get information from the eyes, which goes to both hemispheres.

Patients who have damage to the corpus callosum (either because of acquired damage or because it just hasn't developed) usually can't do this test, because of the disruption in communication between the two hemispheres of the brain.

Of course, just to be sure its not a problem with movement or sensation in one hand only, the patient is also asked to do another quick test where they're asked touch the exact finger you just touched.

For this part, the sensation and movement happen in the same hand, so information doesn't need to cross the corpus callosum.

https://mindhacks.com/2008/01/21/test-your-corpus-callosum/

THE FRONTAL LOBE

By: Dr. Pascale Michelon

The frontal lobes of the brain (in gray here) have been compared to an orchestra conductor, influencing, directing, and moderating many other brain functions. Indeed, the frontal lobes support the so-called executive functions: decision-making, problem-solving, planning, inhibiting, as well as other high-level functions (social behavior, emotional control, working memory, etc.). Ready for an executive workout?

The functions of the frontal lobes are crucial for work and life in general. How can we preserve and enhance these functions? Research tells us that cognitive or brain reserve (i.e., the brain's resilience to pathology) can be increased by mental exercise. Mental exercise has to be challenging (to trigger the formation of new synapses and neurons) and repeated (a single teaser will not affect your cognitive reserve but it is a good start!).

Here is an example of a challenging exercise stimulating the functions of the frontal lobes. This teaser will require you to: a) solve the mystery of the code by understanding the provided clue (problem-solving and inhibition), b) decide on which strategy you will use to get back to the original message (decision-making), and c) mentally travel the alphabet (working memory). Enjoy!

Activity 3: ***CAN YOU DECIPHER THIS MESSAGE? YOU CAN LEAVE YOUR ANSWER AS A COMMENT BELOW.***

Clue: Each letter in the original message (underlined Y) has been replaced by another according to this rule: "Take each letter and replace it by the letter in the alphabet that is 3 positions after it."

J R R G M R E: Y R X G R K D Y H

D E U D L Q!

Answer: *Good Job: You do have a brain*

THE TEMPORAL LOBE

By: Dr. Pascale Michelon

Language in the brain is processed in the temporal lobes. These are on the sides of your brain, next to your temples.

Different areas in the temporal lobe (mostly on the left side of your brain) deal with different aspects of language. For instance, the Wernicke area is the one that allows you to understand words. The Broca area, on the other hand, is the one that allows you to produce language or articulate words.

Damage to Wernicke's area causes Wernicke's aphasia, a condition in which people can hear language being spoken, but cannot understand it. Damage to Broca's area causes Broca's aphasia, a condition in which people have trouble producing language.

Activity 4: Word Game – Stimulate your temporal lobe

Below you will find a brain exercise that targets the neurons in your language areas. When to try to solve the problems, words (i.e., neurons and groups of neurons) in your left temporal lobe will be activated, electrical and chemical signals will travel from neuron to neuron. This stimulation is crucial for good brain health!

Ready to stimulate neurons in your temporal lobe? Read each definition and try to find the corresponding words. (Answers appear below).

_____ = A plant having a permanently woody main stem, usually growing to a high height, and developing branches at some distance from the ground.

_____ = A large, usually tawny-yellow cat, native to Africa and southern Asia, having a tufted tail.

_____ = The nutritious, orange to yellow root of a plant of the parsley family.

_____ = An article of furniture consisting of a flat top supported on one or more legs.

_____ = An institution where instruction is given.

_____ = A moving cage for carrying passengers from one level to another.

_____ = A device for transmission of sound or speech to a distant point

_____ = a body of water of considerable size, surrounded by land.

Answers: *Tree, Lion, Carrot, Table, School, Elevator, Telephone, Lake*

THE PARIETAL LOBE

The parietal lobe is vital for sensory perception and integration, including the management of taste, hearing, sight, touch, and smell. It is home to the brain's primary sensory area, a region where the brain interprets input from other areas of the body. Research suggests that, the more sensory input a region of the body provides, the more surface area of the parietal lobe is dedicated to that area. For example, the fingers and hands are a primary site for sensory data, so much of the parietal lobe is dedicated to receiving and processing their input.

Some of the other functions of the parietal lobe include:

- Distinguishing between two points, even without visual input.
- Localizing touch: When you touch any object with any part of your body, your parietal lobe enables you to feel the sensation at the site of the touch and not, say, in your brain or all over your body.
- Integrating sensory information from most regions of the body.
- Visuospatial navigation and reasoning: When you read a map, follow directions, or prevent yourself from tripping over an unexpected obstacle, your parietal lobe is involved. The parietal lobe is also vital for proprioception—the ability to determine where your body is in space, including in relationship to itself. For instance, touching your finger to your nose without the assistance of a mirror is a function of the parietal lobe.
- Some visual functions, in conjunction with the occipital lobe.
- Assessing numerical relationships, including the number of objects you see.
- Assessing size, shape, and orientation in space of both visible stimuli and objects you remember encountering.
- Mapping the visual world: a number of recent studies suggest that specific regions in the parietal lobe serve as maps to the visual world.
- Coordinating hand, arm, and eye motions.
- Processing language.
- Coordinating attention.

Like all other regions of the brain, the parietal lobe is not fully understood. Researchers are consistently making new findings about how this brain region works, and it is unlikely that we have identified all of its functions.

http://www.spinalcord.com/parietal-lobe

<u>Activity 5:</u> Mental exercise to stimulate your mental rotation skills.

- The top shape is your model.
- Among the 3 shapes below the model, only one matches the model. To figure out which one does, you will probably have to move the shapes around in your mind.
- Move the shapes from left to right or right to left but DO NOT FLIP them around.

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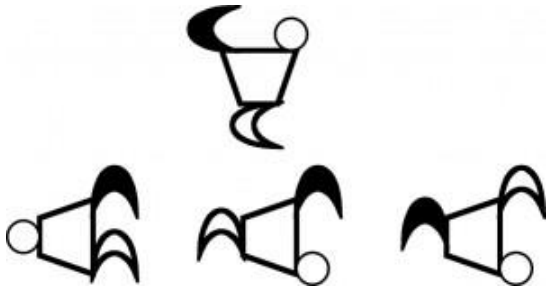
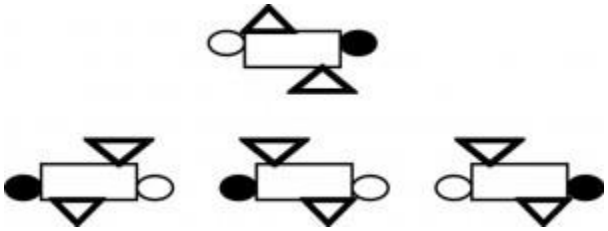
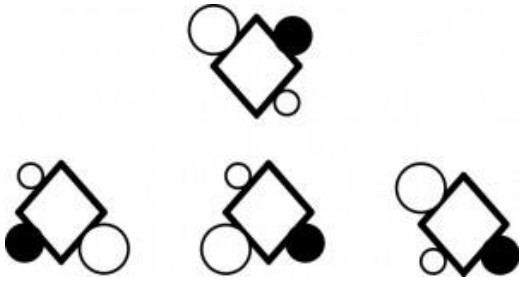


First set



Second set



Third Set

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Answers:*First set: The second shape matches the model. Second set: The second shape matches the model. Third set: The first shape matches the model.*

THE OCCIPITAL LOBE

Studying the brain is a difficult task, particularly since some areas compensate for others when the brain suffers damage. The brain's sensitive, dense, and complex nature means that researchers are constantly uncovering new structures within the brain, and new functions for each brain lobe. The occipital lobe is no exception to this rule.

Researchers once thought that the occipital lobe only controlled visual functions. But in recent years, they discovered that some portions of this lobe receive inputs from other brain regions. Specifically, a brain region called the dorsomedial stream receives input both from regions of the brain related to vision, and to areas that are not linked to visual processing. This suggests either that the occipital lobe may perform additional functions, or that researchers have not identified all regions of the brain associated with visual processing.

Although we know that the occipital lobe is dedicated to vision, this process is highly complex, and includes a number of separate functions. Those include:

- Mapping the visual world, which helps with both spatial reasoning and visual memory. Most vision involves some type of memory, since scanning the visual field requires you to recall that which you saw just a second ago.
- Determining color properties of the items in the visual field.
- Assessing distance, size, and depth.
- Identifying visual stimuli, particularly familiar faces and objects.
- Transmitting visual information to other brain regions so that those brain lobes can encode memories, assign meaning, craft appropriate motor and linguistic responses, and continually respond to information from the surrounding world.
- Receiving raw visual data from perceptual sensors in the eyes' retina.

http://www.spinalcord.com/occipital-lobe

Activity 6: Visual Illusions

Click on the following website to test different visual illusions. This activity will target your occipital lobe directly.

http://sharpbrains.com/blog/2010/10/27/test-your-brain-with-these-top-10-visual-illusions/