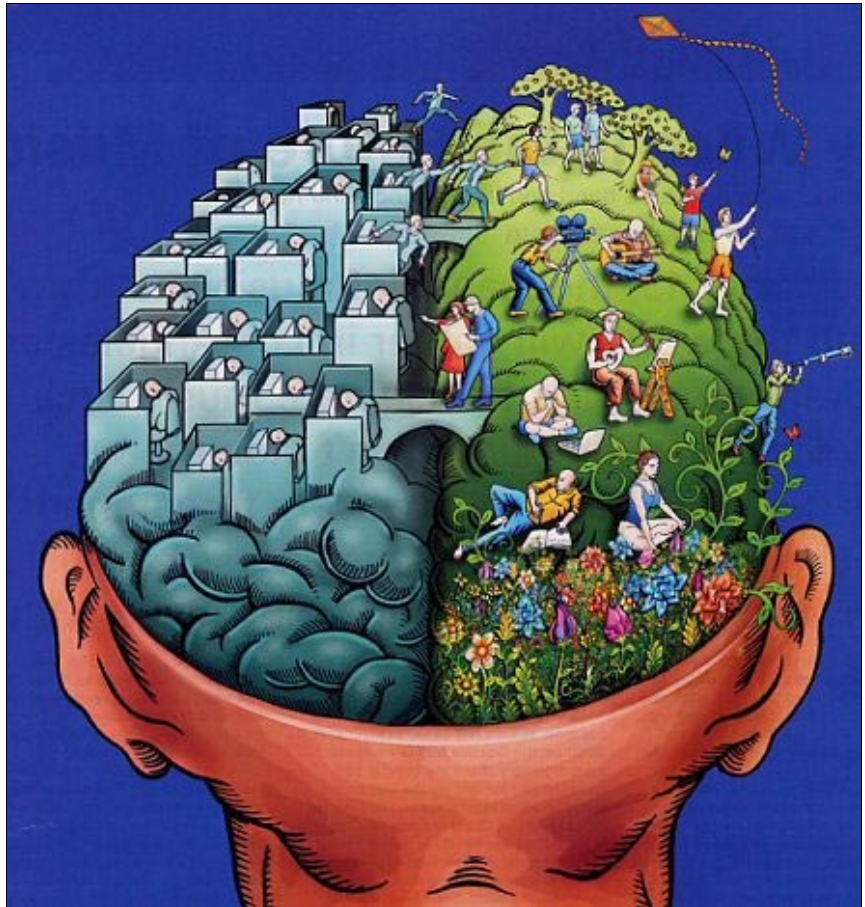


How We Think and Learn

About the Brain

Learning about the brain is key to understanding how learning occurs, and how to become a better learner.



The brain is a complex system that controls the functions of our entire body and is the control center for the nervous system. Every part of the brain is interconnected to other parts of the brain, and everything from hunger, to laughter, to deciding which movie to rent, to remembering your kindergarten teacher, is all tied up in the connections.

Knowing how the brain works can make you smarter. It can help you remember more and be able to better use your information. But, before examining how the brain learns and remembers new things, some understanding of its **physical structure** is necessary.

The Structure of the Brain

The physical structure of the brain can be looked at from different perspectives: There are two hemispheres, four lobes, and three levels.

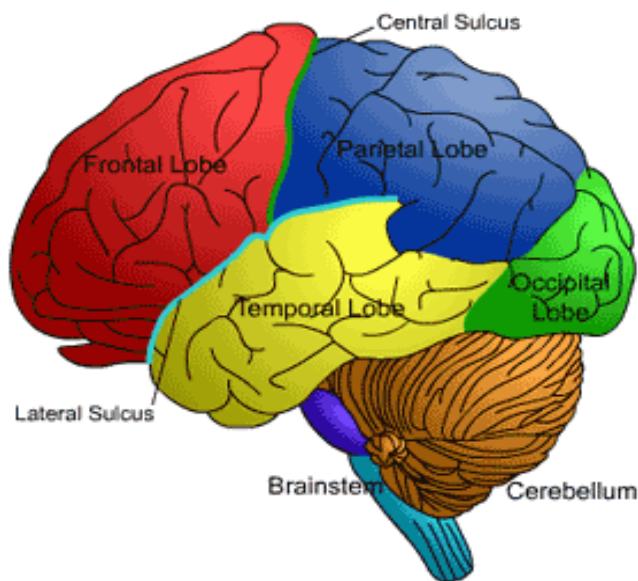
Two Hemispheres



The brain can be examined from the outside, where it looks like it could be divided in half. Each half, or hemisphere is responsible for different brain activities and different kinds of learning. Not every person's hemispheres do exactly the same thing, but the **left hemisphere** generally controls language and logical thoughts, and moves the right side of the body.

The **right hemisphere** is most closely associated to visual processes and open-ended ideas. It also controls the left side of the body. At one time, the two hemispheres were thought to operate completely independently of one another. It is now understood that a thick band of nerves lets the two sides communicate information freely.

Figure AB-11: Lobes of the Brain



Four Lobes

Another way to understand the brain is to see it as divided into four parts or lobes. From a side view, four different sections can be seen.

The **frontal lobe** is the front portion of the brain, behind the forehead. Creativity, problem solving, and planning are controlled by this part of the brain. On either side of the brain, behind your ears, are the **temporal lobes** which control language, hearing and memory. The **parietal lobe** is

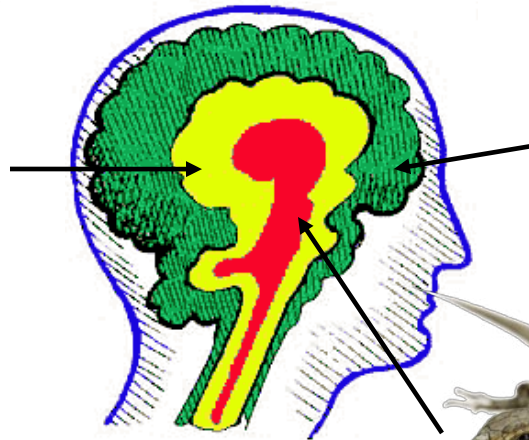
at the top and back of the head. Sensory and language functions are performed here. The back of the brain, above the nape of the neck, is called the **occipital lobe**, where vision is controlled. If you feel along the back of your head, up from the neck, you will feel an indentation, then a bony ridge above it. This is the occipital ridge, and the occipital lobe is directly behind that part of your skull.

Three Levels - The Triune Brain

The brain has been studied for centuries. Current discussions of brain research refer to the **triune brain**, meaning that it is made up of three (tri) distinct parts or levels. Looking at the brain from the inside out, these parts are the lower brain, the midbrain, and the outer brain. These three parts of the brain have also been referred to as the **reptilian brain**, the **primitive mammalian brain**, and the **modern mammalian brain**. These different levels show how the brain has evolved, and how the brain works in different species.



EMOTIONS
Intermediate Brain



INTELLECTUAL TASKS
Outer Brain



SELF-PRESERVATION
Lower Brain



The Lower Brain

This part of the brain controls all the basic life functions like heartbeat, blood circulation, breathing, and levels of alertness. There are 5 distinct parts to the lower brain, and each serves to ensure that the physical body is functioning. The reticular formation is one part of the lower brain, and this part is referred to as the **reptilian brain**, because it is found in all animals – reptiles, birds and mammals. This is where the ‘fight or flight’ instinct comes from.



The Midbrain

This section of the brain is also made up of 5 interconnected sections. This is where hormone secretions are controlled, and emotions are processed. New learning gets transferred into long term memory in this area of the brain, and sensory information is processed here. There continues to be new scientific research discovering functions of parts of the midbrain. This section is referred to as the limbic system, or **primitive mammalian brain**, because this is the part that birds and mammals have (but not reptiles).

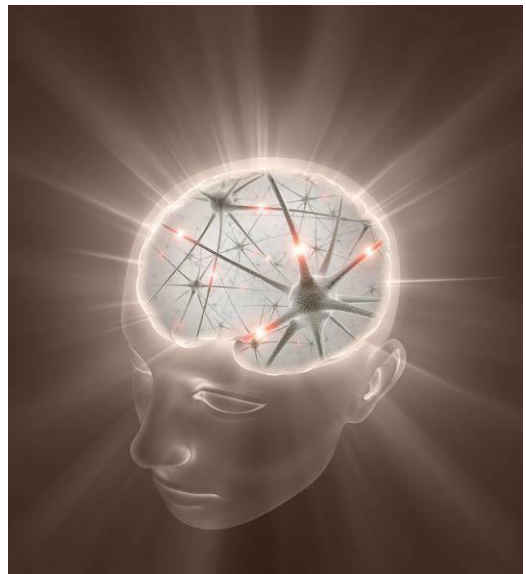


The Outer Brain

This is also referred to as the **modern mammalian brain** because it is only found in highly evolved **primates** (including humans). This section is the grayish wrinkled outer layer of the brain, just inside the skull. The two hemispheres are connected here, and this is where our conscious decisions are made. This helps humans to control their instincts, which is part of the difference between human beings and other mammals.

Putting it All Together

Each perspective of the physical make-up of the brain offers different information about how the brain functions, and how learning is affected. The physical parts of the brain are the actual sections that can be seen. This overview has made some connections to the parts of the brain and some of their functions or jobs. As the brain controls everything



that happens within the body and processes all the sensory information about what goes on outside the body, the levels of detail that could be studied are extensive. Diagrams and images are useful tools to remember the different parts, so that functions can be remembered later on.

About the Brain

Vocabulary

Physical structure	The actual structure of the brain that you can see and touch.
Left hemisphere	A section of the brain that controls language and logical thoughts.
Right hemisphere	A section of the brain that is closely associated with visual information and creative processes.
Frontal lobe	One of four lobes: the frontal lobe is just behind the forehead and is closely involved with creativity, problem solving, and planning.
Temporal lobes	There are temporal lobes on each side of the brain behind the ears. The temporal lobes are involved with hearing, language, and memory.
Parietal lobe	The parietal lobe is at the top and back of the brain. It helps to perform sensory and language functions.
Occipital lobe	The occipital lobe is in the back of the brain and is where vision is controlled.
Triune brain	Triune brain refers to the brain as having three (tri) levels related to how the brain developed over time. The most primitive part of the brain is in the center and the more modern part is on the outside.
Reptilian brain	The reptilian brain is the oldest part of the human brain. It has much in common with other reptiles, birds and mammals. It controls the physical functioning of the body, quick responses, and the "fight or flight" instinct.
Primitive mammalian brain	The primitive mammalian brain has much in common with birds and other mammals, but not reptiles. It is where emotions and hormones are processed and where long-term memory resides.
Modern mammalian brain	The modern mammalian brain is found only in highly functioning mammals like humans and apes. It is where conscious decisions are made.
Primate	A biological designation for a group of animals that includes humans, monkeys, apes and similar animals that have forward-facing eyes, binocular vision, and opposing thumbs.

About the Brain

Vocabulary Match

Write each of the following words next to its matching definition.

• Physical structure	• Temporal lobes	• Reptilian brain
• Left hemisphere	• Parietal lobe	• Primitive mammalian brain
• Right hemisphere	• Occipital lobe	• Modern mammalian brain
• Frontal lobe	• Triune brain	• Primate

A section of the brain that controls language and logical thoughts.

One of four lobes: the frontal lobe is just behind the forehead and is closely involved with creativity, problem solving, and planning.

The parietal lobe is at the top and back of the brain. It helps to perform sensory and language functions.

The reptilian brain is the oldest part of the human brain. It has much in common with other reptiles, birds and mammals. It controls the physical functioning of the body, quick responses, and the "fight or flight" instinct.

A biological designation for a group of animals that includes humans, monkeys, apes and similar animals that have forward-facing eyes, binocular vision, and opposing thumbs.

The modern mammalian brain is found only in highly functioning mammals like humans and apes. It is where conscious decisions are made.

The primitive mammalian brain has much in common with birds and other mammals, but not reptiles. It is where emotions and hormones are processed and where long-term memory resides.

Triune brain refers to the brain as having three (tri) levels related to how the brain developed over time. The most primitive part of the brain is in the center and the more modern part is on the outside.

The occipital lobe is in the back of the brain and is where vision is controlled.

The parietal lobe is at the top and back of the brain. It helps to perform sensory and language functions.

A section of the brain that is closely associated with visual information and creative processes.

The actual structure of the brain that you can see and touch.
