

Forebrain and Its Cerebrum

by Sophia



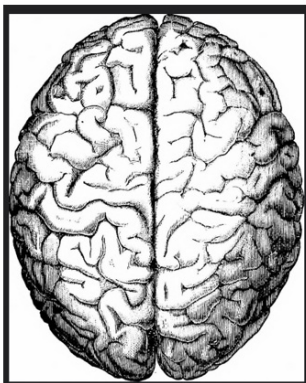
WHAT'S COVERED

In this lesson, you will learn about the structure and function of the cerebrum and the roles that it plays in emotion, consciousness, and memory. Specifically, this lesson will cover:

1. Cerebrum Structure

The brain is composed of three sections: the midbrain, forebrain, and hindbrain. The **cerebrum** is found in our forebrain and is composed of two cerebral hemispheres.

Take a look at this diagram below to see our two hemispheres of the cerebrum. The image shows the brain if you are looking down at someone while standing over them. In this view, you can see the two cerebral hemispheres.



The two hemispheres are connected by a band of nerves, called the **corpus callosum**. In the illustration above, it is the line on the top of the brain running from the forehead to the back of the head. The corpus callosum not only connects the two hemispheres of the brain together but is also how each hemisphere communicates with one another.



DID YOU KNOW

Any sensory information detected by the left side of your body will be interpreted by the right side of your cerebrum and vice versa. If you were to touch a hot stove with your right hand, the left side of your cerebrum would be the side you would process that information on.



TERMS TO KNOW

Cerebrum

A part of the brain located in the forebrain that processes incoming sensory input.

Corpus Callosum

A band of nerve tracts that connects the hemispheres of the cerebrum.

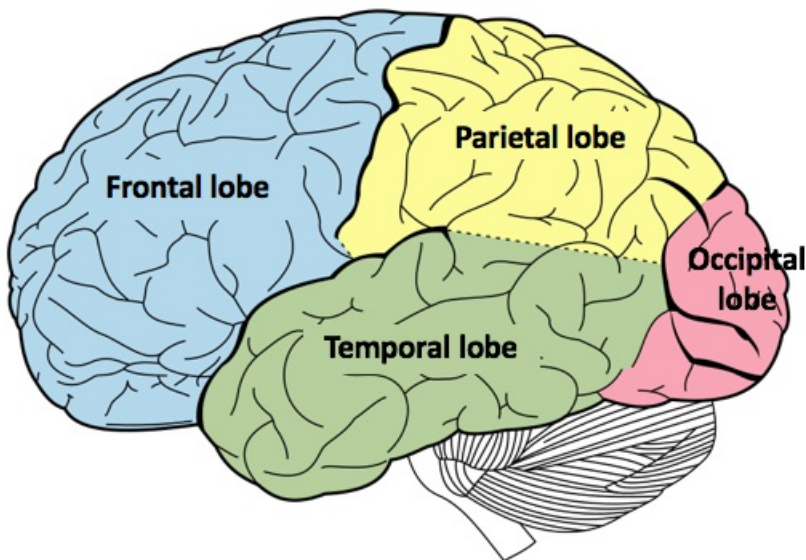
2. Cerebrum Function

The cerebrum is responsible largely for processing information. The outer layer of gray matter—referred to as the **cerebral cortex**—is divided into three areas: motor areas, sensory areas, and association areas.

Motor areas of the cerebral cortex control our voluntary movements while **sensory areas** of our cerebral cortex interpret the meaning of different sensations that we experience. **Association areas** of the cerebral cortex process information to produce some sort of action; think of these as a mix of sensory and motor areas.

The image below identifies the different divisions of the cerebrum, otherwise known as the different lobes.

- The frontal lobe is responsible for movements, memory, and behaviors.
- The parietal lobe is responsible for receiving and processing sensations from our internal organs.
- The occipital lobe is responsible for vision.
- The temporal lobe plays a large role in hearing and visual processing.



TERMS TO KNOW

Cerebral Cortex

The outer layer of the cerebrum that deals with conscious behaviors.

Motor Areas

Areas of the cerebral cortex that control voluntary movements.

Sensory Areas

Areas of the cerebral cortex that interpret the meaning of sensations.

Association Areas

3. Structures of the Forebrain

In addition to the cerebrum, there are other structures within the forebrain. These structures bring information from the rest of the body to our attention and help us execute the decisions we make.

3a. Stages of Consciousness

The **reticular formation** is a structure that connects the cerebrum to the hindbrain and midbrain. It's probably no surprise then that it's involved in balance and posture (which require the help of the cerebellum and brainstem).

Additionally, the reticular formation includes a structure called the **reticular activating system (RAS)**. Reticular formations receive and process sensory information and then send these signals to the thalamus of your brain, which then arouses the cerebral cortex. The combination of the reticular formations, the thalamus, and the cerebral cortex is called the reticular activating system. It will arouse the cerebral cortex and the amount of the cerebral cortex that it arouses, or that it stimulates, determines our level of **consciousness**; the more of it that it arouses, the more conscious we are.

Stages of consciousness depend on the activity of our reticular formations; your reticular formations are basically a network of neurons that runs through our brain. Stages of consciousness can range from being fully alert to wide awake to being on the extreme other end: in a coma.

Part of the reticular activating system's job determining our level of consciousness includes determining what we're conscious of. In other words, the RAS also helps filter out unimportant stimuli and focus on what's important.

➞ **EXAMPLE** Some people prefer to study for exams in noisy, crowded coffee shops. Their reticular activating system allows them to filter out all the conversations and the aroma of coffee so they can focus on the class material they're trying to master.



TERMS TO KNOW

Reticular Formation

A network of neurons that connects the brainstem to the spinal cord, cerebrum, and cerebellum; it also is involved in our level of consciousness.

Reticular Activating System (RAS)

A part of the reticular formation that plays a role in determining our level of consciousness.

Consciousness

What a human being is aware of, whether an external object or something within oneself, at any given time.

3b. Emotions

The **limbic system** is another area within the forebrain. It is the seat of your emotions. The limbic system is located in your upper brainstem and lower cerebrum. It includes parts of the thalamus, the amygdala, the hypothalamus, and the hippocampus.



TERM TO KNOW

Limbic System

An area of the brain that controls emotions.

3c. Memory

Memory also plays a role with the forebrain and is a way in which your brain stores and retrieves information. There are two types of memory: **short term memory** and **long term memory**. As the name suggests, long term memory is a more permanent type of memory. When memories are stored, generally, only relevant information is stored. Information that is irrelevant is then forgotten. It's not necessary to be stored.

The two types of memory that can be stored are:

- Declarative memory: Basically facts that are stored. You're able to store facts such as dates, names, faces, odors, words—anything along those lines.
- Skill memory: Type of memory that's gained by practice. It's something that involves a motor skill.

➞ **EXAMPLE** If you're an ice skater, the tricks that you can do while you're ice skating—if you practice them over and over and over again—create a form of memory in your brain. It's a type of memory that's gained by practice and that involves a motor skill.

There are links between memory storage and the different parts of your brain like the cerebral cortex, the limbic system, the thalamus, and the hypothalamus. A connection between memory in the limbic system would be if there's a certain smell that reminds you of a certain memory. Every time you smell the specific smell, it makes you think of something else.

➞ **EXAMPLE** Every time you smell blueberry muffins, it reminds you of being at your grandma's house when you were little. This is associating memory with some sort of emotional connection with the limbic system.



TERMS TO KNOW

Memory

The way in which the brain is able to store and retrieve information.

Short Term Memory

Information that is stored for a short period of time.

Long Term Memory

Information that is stored more permanently.



SUMMARY

This lesson has been an overview of the **structure and function of the cerebrum** and more broadly, **the forebrain**, as well as an overview of **consciousness**, stability, **emotions**, and **memory**.

Keep up the learning and have a great day!

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TERMS TO KNOW

Association Areas

Areas of the cerebral cortex that processes information and works to produce an action.

Cerebral Cortex

The outer layer of the cerebrum that deals with conscious behaviors.

Cerebrum

A part of the brain located in the forebrain that processes incoming sensory input.

Consciousness

What a human being is aware of - whether an external object or something within oneself - at any given time.

Corpus Callosum

A band of nerve tracts that connects the hemispheres of the cerebrum.

Limbic System

An area of the brain that controls emotions.

Long Term Memory

Information that is stored more permanently.

Memory

The way in which the brain is able to store and retrieve information.

Motor Areas

Areas of the cerebral cortex that control voluntary movements.

Reticular Activating System (RAS)

A part of the reticular formation that plays a role in determining our level of consciousness.

Reticular Formation

A network of neurons that connects the brainstem to the spinal cord, cerebrum and cerebellum. It also is involved in our level of consciousness.

Sensory Areas

Areas of the cerebral cortex that interpret the meaning of sensations.

Short Term Memory

Information that is stored for a short period of time.