

Cerebral Cortex: Parietal Lobes, Temporal Lobes and Occipital lobes

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WHAT'S COVERED

Welcome to today's lesson on the cerebral cortex. Each side of the brain, as you may recall, is divided into four distinct lobes. These areas control specific aspects of the brain and mental processes. This tutorial will focus specifically on:

1. Parietal Lobe
2. Temporal Lobe
3. Wernicke's Area
4. Occipital Lobe

1. Parietal Lobe

The **parietal lobe** is a lobe that borders the frontal lobe. This is the lobe that is directly related to the somatic senses, meaning touch, pressure, temperature--essentially all the information that we're receiving from our skin. As you can see, this is a very large area of function, and therefore it corresponds to an important area of the brain as well.

A noteworthy area of the parietal lobe is the **primary somatosensory cortex**, which is the area right next to the frontal lobe, across from the primary motor cortex. There are some similarities between those two areas of both lobes. The primary somatosensory cortex is the area that is directly related to processing all of the somatic sensory information received from the skin throughout the body.

There are larger areas of the somatosensory cortex devoted to more sensitive or intricate areas of the body, so the area in the brain devoted to feet is much smaller than the area devoted to hands, because function of hands is much more complex and intricate, and ultimately the things that we need to sense with them are more important.



DID YOU KNOW

We can use a homunculus, or figurative representation, to model the relative sizes of the sensory areas of the brain which correspond to parts of the body. The form of this model is a distorted human figure, so we can see the relative sizes of the parts of the brain that correspond to parts of the body. For example, the hands of the

homunculus would be distortedly large, since the relative sensory space that the function of hands occupy within the cerebral cortex is large.



TERMS TO KNOW

Parietal Lobe

The part of the cerebral cortex related to somatic senses (touch, pressure, temperature)

Primary Somatosensory Cortex

Area next to frontal lobe across from primary motor cortex related to senses across the body

2. Temporal Lobe

The **temporal lobe** is located directly on the side of the brain. It is related specifically to hearing and information received by our ears.

The **primary auditory area** is the area directly at the top of the temporal lobe, located underneath the somatosensory cortex. This is the area that processes all information related to hearing.

In addition, there is an area in the temporal lobe that is related to the understanding of language, which makes sense because this concerns hearing. How do we understand language? Through hearing.



TERMS TO KNOW

Temporal Lobe

The part of the cerebral cortex located on the side of the brain related to the processing of hearing

Primary Auditory Area

The area at top of the temporal lobe near the primary motor/somatosensory cortices, related to hearing and language understanding

3. Wernicke's Area

Wernicke's area is located near the occipital lobe and is related to creating meaning and understanding out of language. It is named for the German neurologist Carl Wernicke, who studied patients that had damage to this specific area of the brain.

Wernicke noticed a certain kind of aphasia, meaning that when the patients heard language being spoken, they would take it in the sounds, but they couldn't create any understanding or meaning out of those sounds.

This area is used in conjunction with Broca's area in the frontal lobe to create a type of language pathway in the brain, which extends from the temporal lobe all the way to active language production in the frontal lobe (Broca's area).



TERM TO KNOW

Wernicke's Area

4. Occipital Lobe

The **occipital lobe** is located at the back of the brain and is related to seeing and understanding visual information. It is connected to the eyes via the optic nerve, so there is a type of visual pathway going from our eyes directly to this area of the brain. The important area to note is the primary visual area, which is located at the very back of the occipital lobe. This area is related to processing all of that visual information.

People with damage to this area of the brain, the primary visual area, can have all different sorts of **agnosia**. Agnosia means that a person is able to see an object, but they can't recognize it. Essentially, they take in the information, but they can't process it and make meaning out of it.

IN CONTEXT

Suppose Samantha has damage to her left occipital lobe and has visual agnosia. She can describe what she sees and can create some visual information, but she cannot create meaning out of it.

When Samantha sees a chair, she describes long, straight legs and a flat surface on the top, but she is unable to put those pieces together to say that it's a chair.

People can also have facial agnosia or prosopagnosia, which means they cannot recognize others by sight. They are unable to identify a person even if it is a close family member. However, if there is some auditory recognition when the person speaks, they can automatically recognize them. Why is that? Because the area of the brain involving auditory recognition has not been damaged.



TERMS TO KNOW

Occipital Lobe

The part of the cerebral cortex related to the processing of visual information and seeing

Agnosia (visual and facial)

When a person has damage to the left occipital lobe and can describe what they see but cannot not say what it is, or create meaning out of the visual information



SUMMARY

Today we learned about different parts of the cerebral cortex. We discussed the **parietal lobe**, which is responsible for touch and pressure, and the **temporal lobe**, which is associated with hearing. In addition, **Wernicke's area** is responsible for creating meaning and understanding out of language. Finally, the **occipital lobe** relates to seeing and the processing of visual information.

Good luck!



TERMS TO KNOW

Agnosia (visual and facial)

When a person has damage to the left occipital lobe and can describe what they see but not say what it is, or cannot create meaning out of the visual information.

Occipital Lobe

The part of the cerebral cortex related to the processing of visual information and seeing.

Primary Auditory Area

The area at top of the temporal lobe near primary motor/somatosensory cortices related to hearing and language understanding.

Temporal Lobe

The part of the cerebral cortex located on side of brain, related to the processing of hearing.

Wernicke's Area

The area near occipital lobe related to creating meaning and understanding language.