

MODULE 12 THE CEREBRAL CORTEX**CEREBRAL CORTEX**

- The CEREBRAL CORTEX is the layer holding the structures of the brain together. Brain's "thinking crown." The fissures (folds) known to the eye when looking at the brain is long wrinkles that when let out of the skull can be expanded over three times the area of the skull capacity. The cerebral cortex is compiled of over 300 trillion synaptic connections. Being human takes a lot of nerve, precisely 20 to 23 billion nerve cells.
- The GLIAL CELLS are the worker bees and provide nutrients and insulating myelin, guide neural connections, and mop up ions and neurotransmitter.
- Each hemisphere's cortex is subdivided into four lobes: FRONTAL LOBES (behind your forehead), PARIETAL LOBES (at the top and to the rear), OCCIPITAL LOBES (at the back of your head), and TEMPORAL LOBES (just above your ears).

FRONTAL LOBES/PARIETAL LOBES**MOTOR FUNCTIONS**

- An arch-shaped region at the back of the frontal lobe is known for the body's movement on the opposite side from which was stimulated, known as the MOTOR CORTEX. When stimulation was manipulated on top of the left parietal lobe, movement would occur on the right side of the body.
- Mind over matter: when the motor cortex is damaged through having a stroke, electrical implantation has now been able to help these individuals have some type of movement with robotic assistance.

SENSORY FUNCTIONS

- Parallel to the motor cortex in the parietal lobes is the SOMATOSENSORY CORTEX. The SC allows sensations to be messaged to the brain. The more sensitive the body part, the larger the SC area devoted to is. This, in animals, would be devoted to whisker sensations, tail sensations, and hearing sensations.

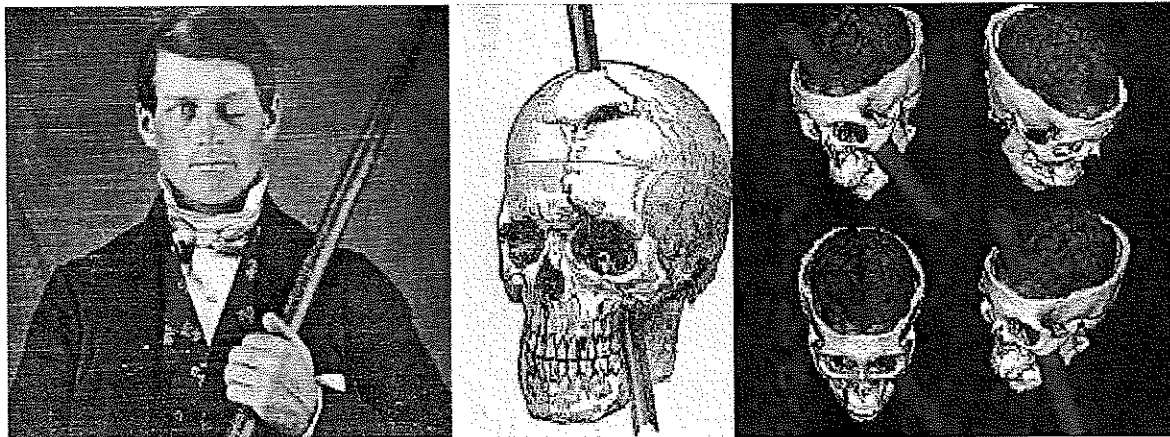
ASSOCIATION AREAS

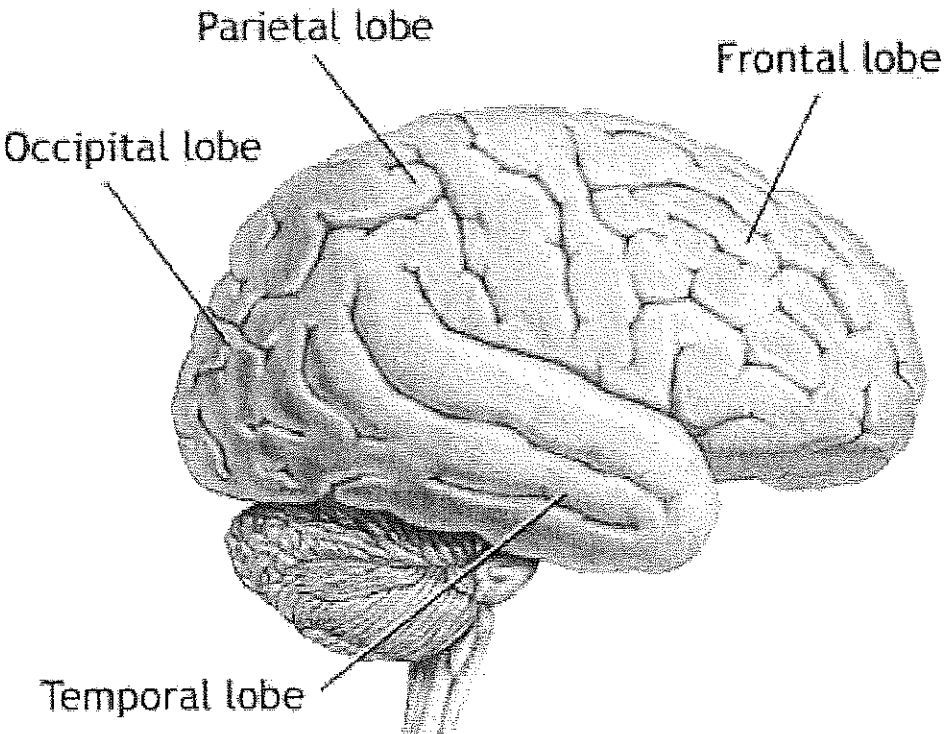
- The ASSOCIATION AREAS are areas within the brain that help with higher mental functions. These areas can be deemed as dormant when in reality AA's interpret, integrate, and act on sensory information and link it with stored memories. When damaged, you are unable to recognize people.
- The PREFRONTAL CORTEX is the forward part of the frontal lobes that enable judgement calls, planning, and processing new memories.

- Frontal lobe, when damaged, can alter personality and remove a person's inhibition. Phineas Gage, for instance, was in a dangerous railroad labor accident where a rod burst up into frontal lobe causing permanent damage. Gage's personality was impacted but he survived. Impulse control was also impacted, as Gage left his family and traveled with a circus for some time after the accident. People's moral compass seems to disconnect from their behavior when the frontal lobe is damaged.
- The frontal lobe is also encompassing mathematical logic and special reasoning. ALWAYS REMEMBER: the brain works as a whole and different structures work together not so much one spot is in charge of one aspect but there are more prominent areas that result on average to the same consecutive results.
- For instance, BROCA'S AREA controls the ability to speak while WERNICKE'S AREA control the ability to understand speech. Other structures are still seen with helping aid language.

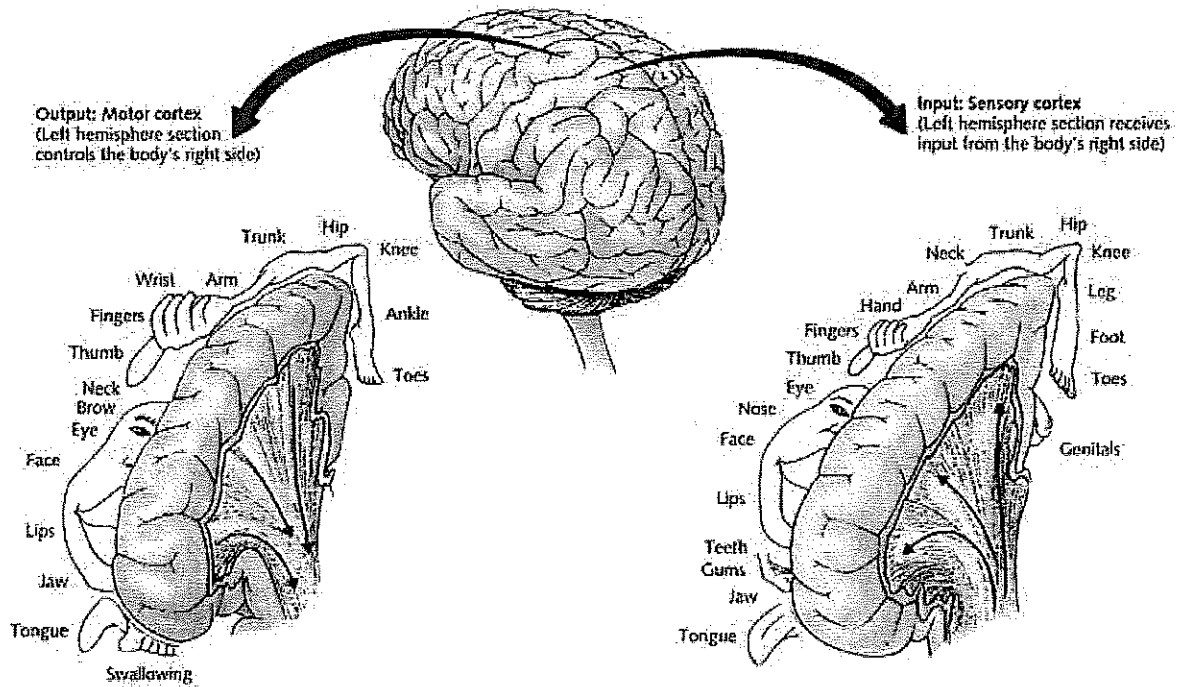
THE BRAIN'S PLASTICITY

- When the brain is damaged, the brain (remember coordinates brain activity for all tasks, memories, and movements) will have the ability to reorganize/modify certain areas to take over the tasks of the damaged area. This is known as PLASTICITY. The earlier in age the brain becomes damaged, the better chance the other areas of the brain will reorganize for those tasks.
- Constant-induce therapy aims to rewire brains and improve the dexterity of a brain-damaged child or even an adult.
- This is all due to NEUROGENESIS, or the formation of new neurons.





*ADAM.



BE ABLE TO ANSWER: Try moving your right hand in a circular motion, as if polishing a table. Then start your right foot doing the same motion, synchronized with your hand. Now reverse the right foot's motion, but not the hand's. Finally, try moving the left foot opposite to the right hand.

1. Why is reversing the right foot's motion so hard?
2. Why is it easier to move the left foot opposite to the right hand?

PRACTICE FRQ: Doctors sometimes have to remove a portion of the brain to control life-threatening seizures. Describe what the results of the removal of a portion of the motor cortex would be and explain how this procedure might be affected by brain plasticity.