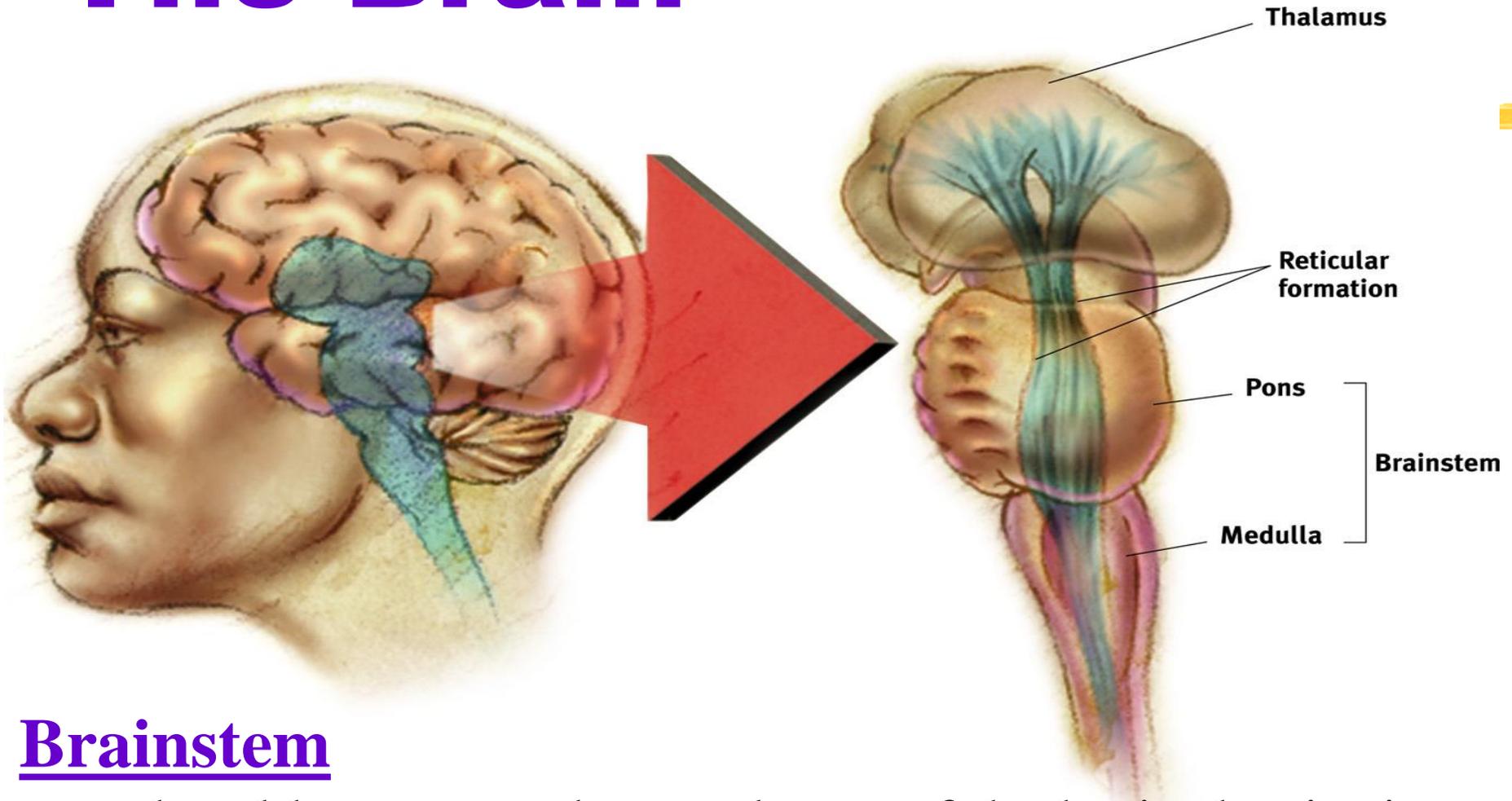


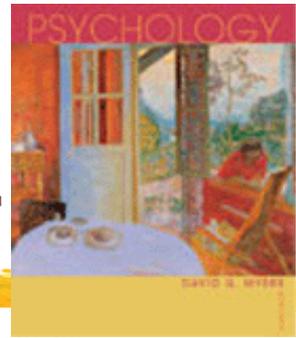
# The Brain



## Brainstem

- the oldest part and central core of the brain, beginning where the spinal cord swells as it enters the skull
- responsible for automatic survival functions

# The Brainstem



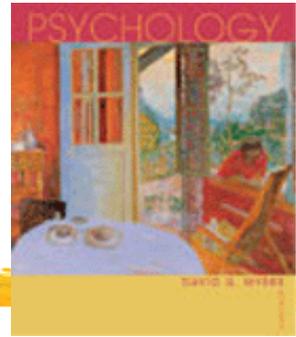
- Medulla [muh-DUL-uh]
  - base of the brainstem
  - controls heartbeat and breathing



- Pons
  - Connects different brain regions together
  - Involved in facial expressions

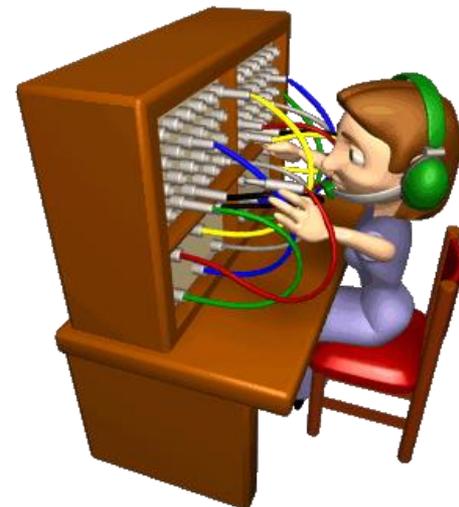


# The Brainstem

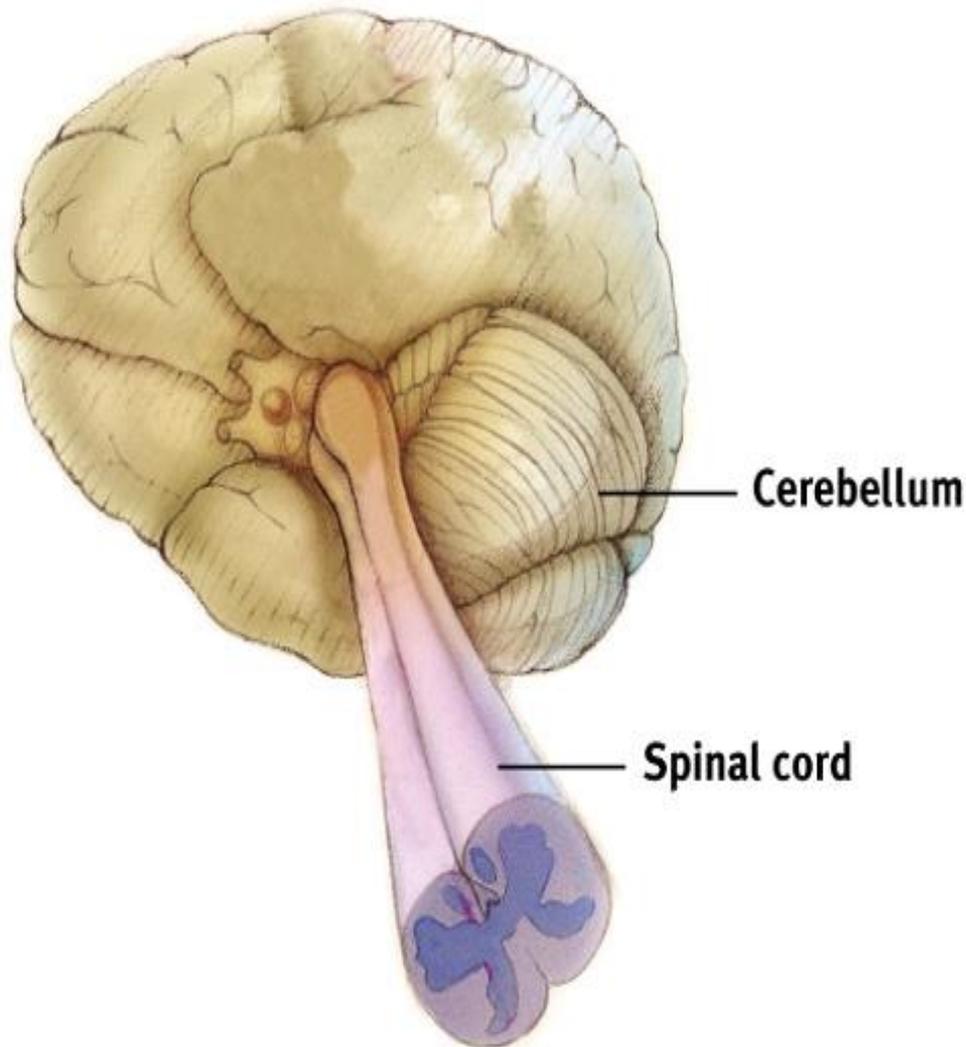
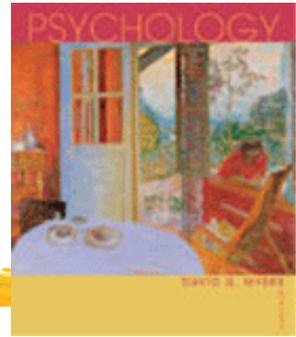


- Reticular Formation
  - a nerve network in the brainstem that plays an important role in controlling arousal
- Thalamus [THAL-uh-muss]
  - the brain's sensory switchboard, located on top of the brainstem
  - it directs messages to the sensory receiving areas in the cortex and transmits replies to the cerebellum and medulla

Did you know? Severing the reticular formation's pathways will cause a coma.



# The Brainstem



- Cerebellum [sehr-uh-BELL-um]
  - the “little brain” attached to the rear of the brainstem
  - it helps coordinate voluntary movement and balance
  - Formulates implicit memories

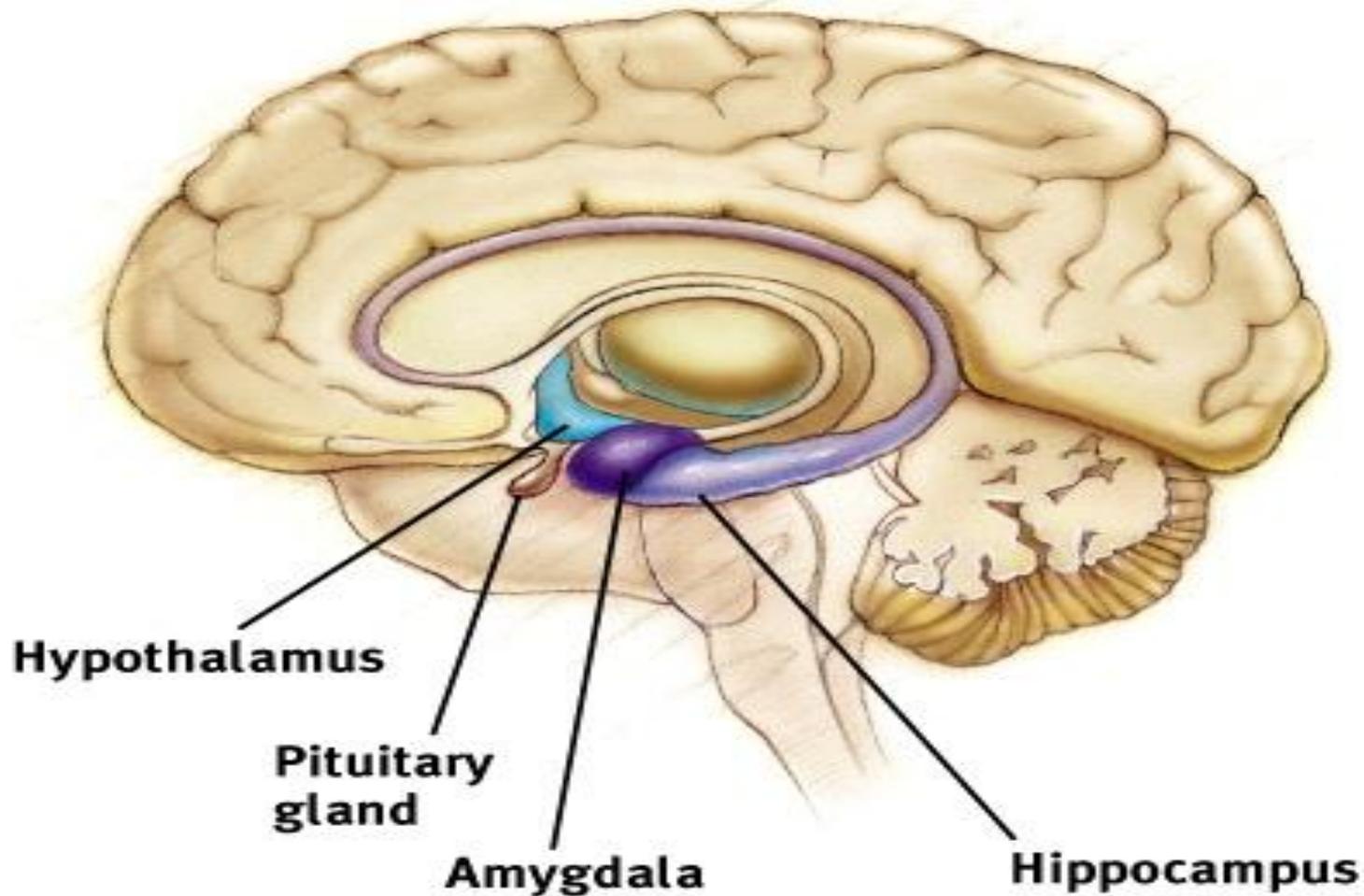
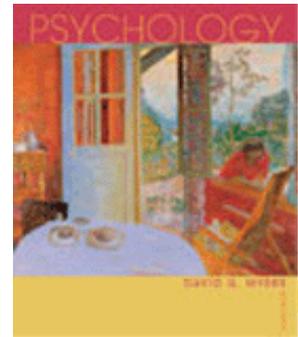
# The Limbic System

## Limbic System

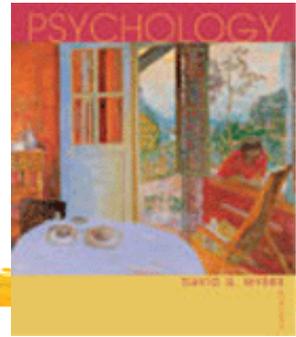
- a doughnut-shaped system of neural structures at the border of the brainstem and cerebral hemispheres
- associated with emotions such as fear and aggression and drives such as those for food and sex
- includes the hippocampus, amygdala, pituitary gland, and hypothalamus.



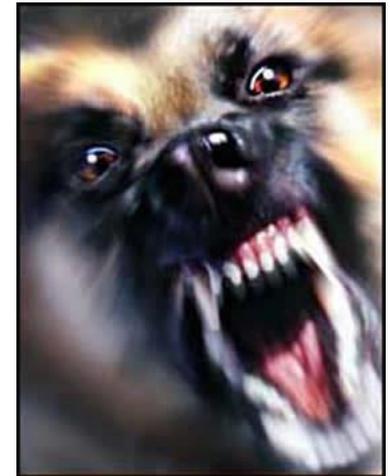
# The Limbic System



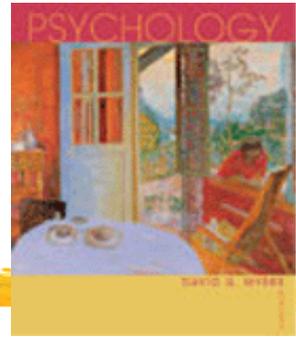
# The Limbic System



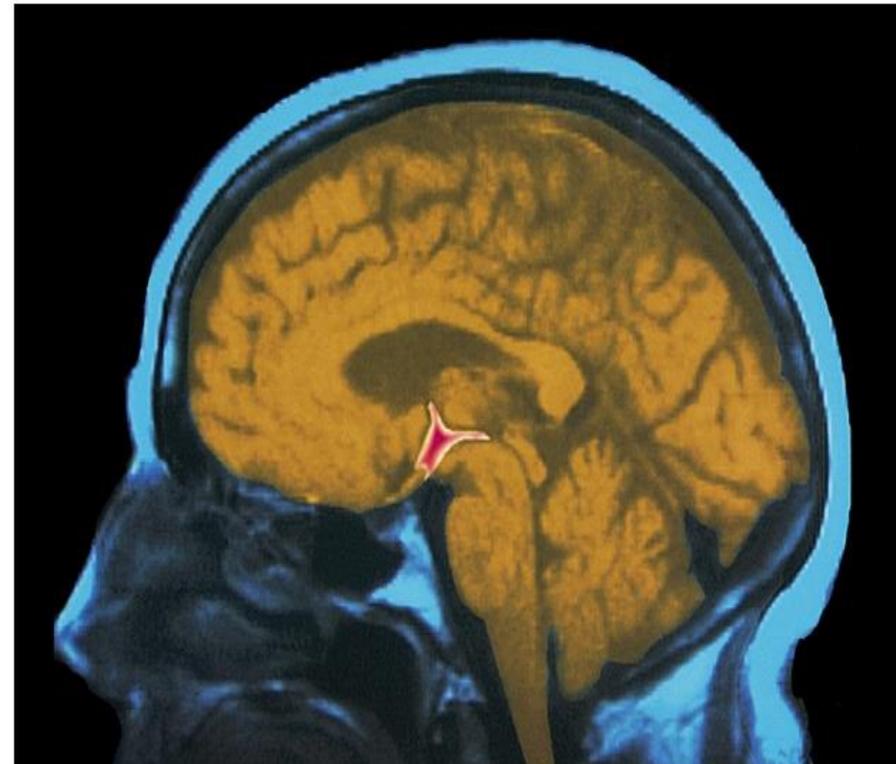
- Amygdala [ah-MIG-dah-la]
  - two almond-shaped neural clusters that are components of the limbic system and are linked to emotion (specifically aggression and fear)



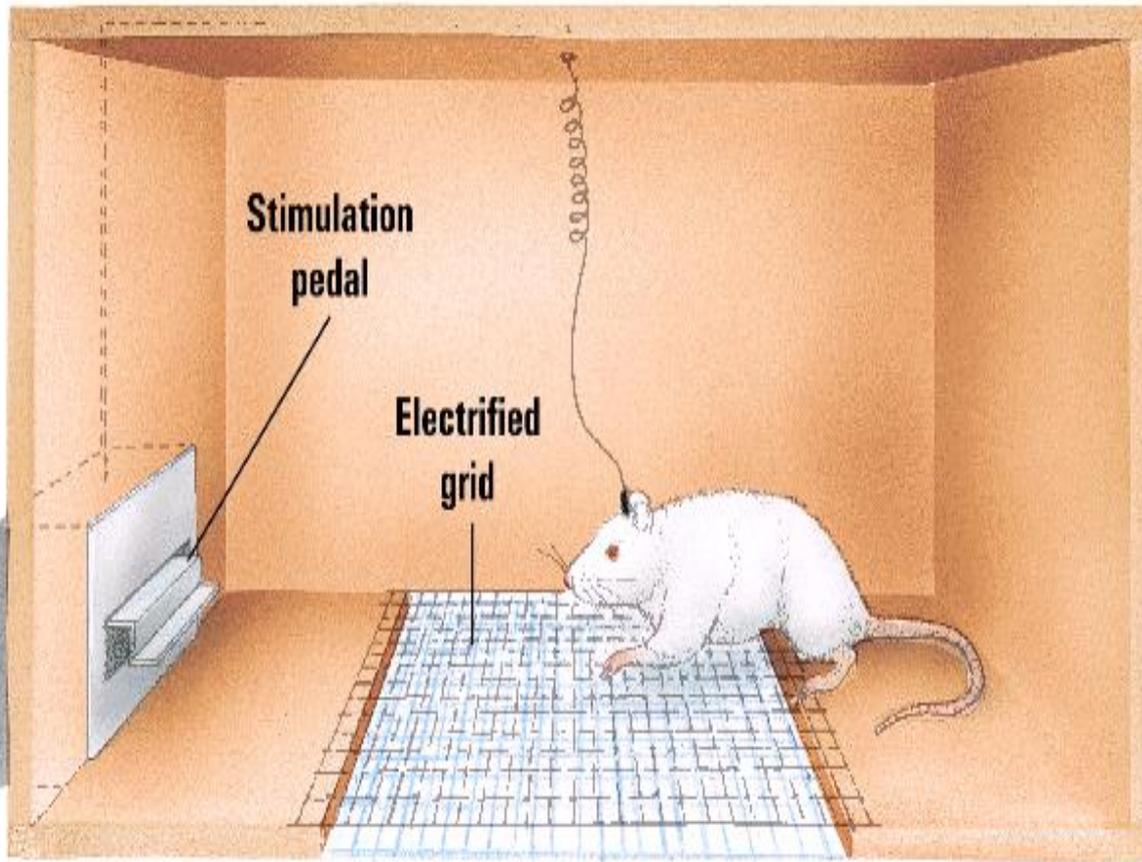
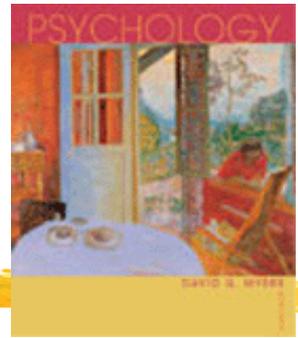
# The Limbic System



- Hypothalamus
  - neural structure lying below (*hypo*) the thalamus; directs several maintenance activities
    - Eating and drinking
    - Sex drive
    - body temperature
  - helps govern the endocrine system via the pituitary gland



# Hypothalamus Stimulation



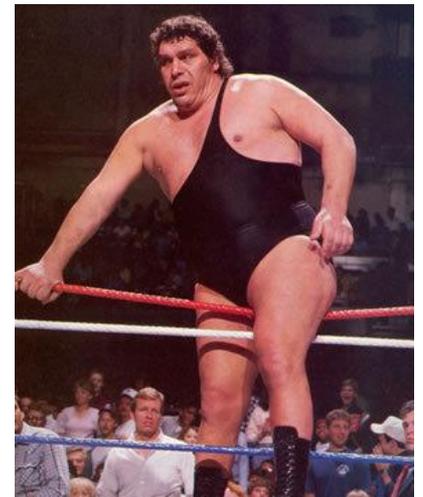
- Electrode implanted in reward center of hypothalamus
- Rat readily crosses to get stimulation

# The Limbic System

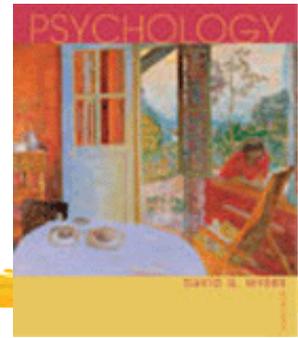
⌘ **Hippocampus:** a structure in the limbic system linked to explicit memory (Clive Wearing example)



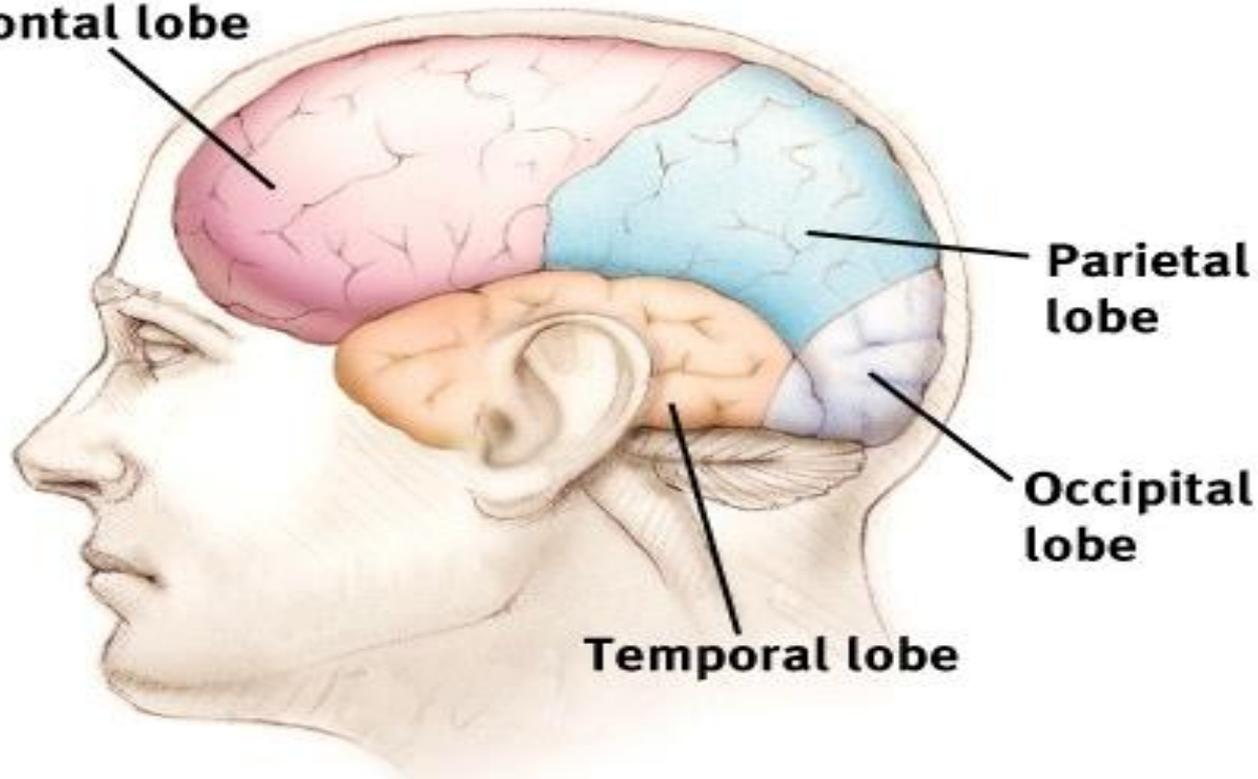
⌘ **Pituitary Gland:** master endocrine gland, linked to growth (Andre the Giant example) (2)



# The Cerebral Cortex



Frontal lobe

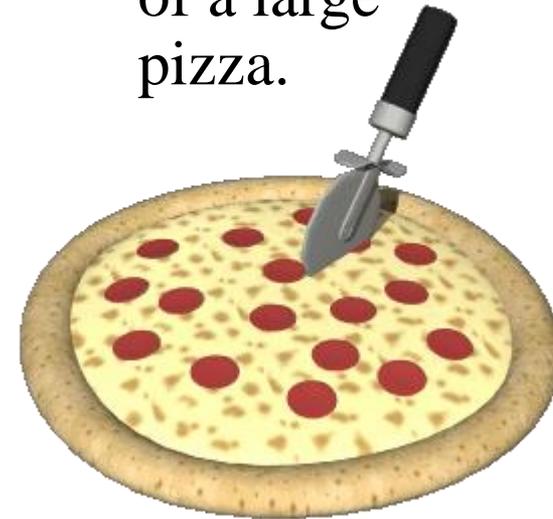


Parietal lobe

Occipital lobe

Temporal lobe

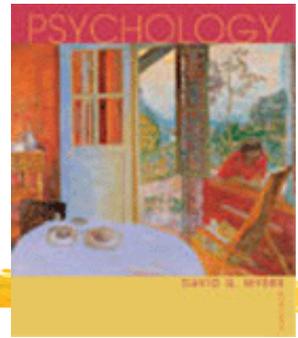
Laid out it would be about the size of a large pizza.



## Cerebral Cortex

the intricate fabric of interconnected neural cells that covers the cerebral hemispheres

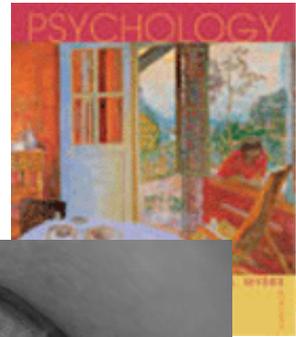
# The Cerebral Cortex



- Frontal Lobes
  - involved in speaking and muscle movements and in making plans and judgments (Phineas Gage Clip)
- Parietal Lobes
  - Involved in sensations (touch), pressure, and pain



# The Cerebral Cortex



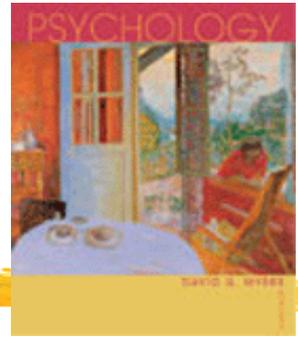
- Occipital Lobes
  - include the visual areas, which receive visual information from the opposite visual field



- Temporal Lobes
  - include the auditory areas

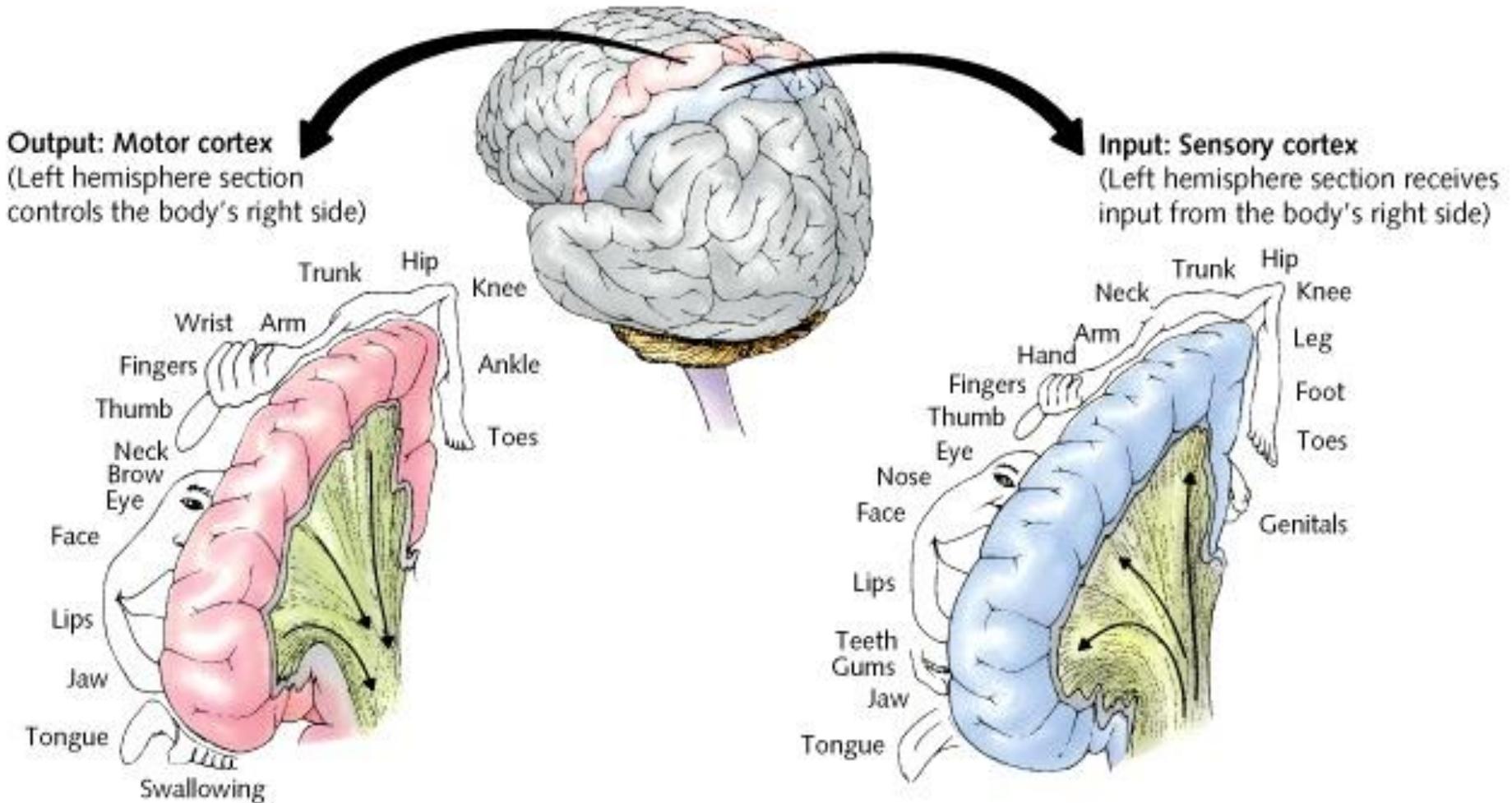
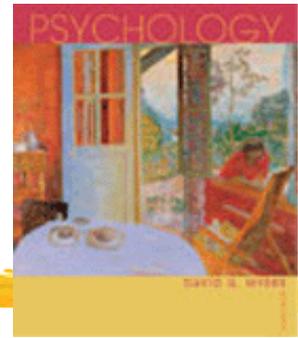


# The Cerebral Cortex

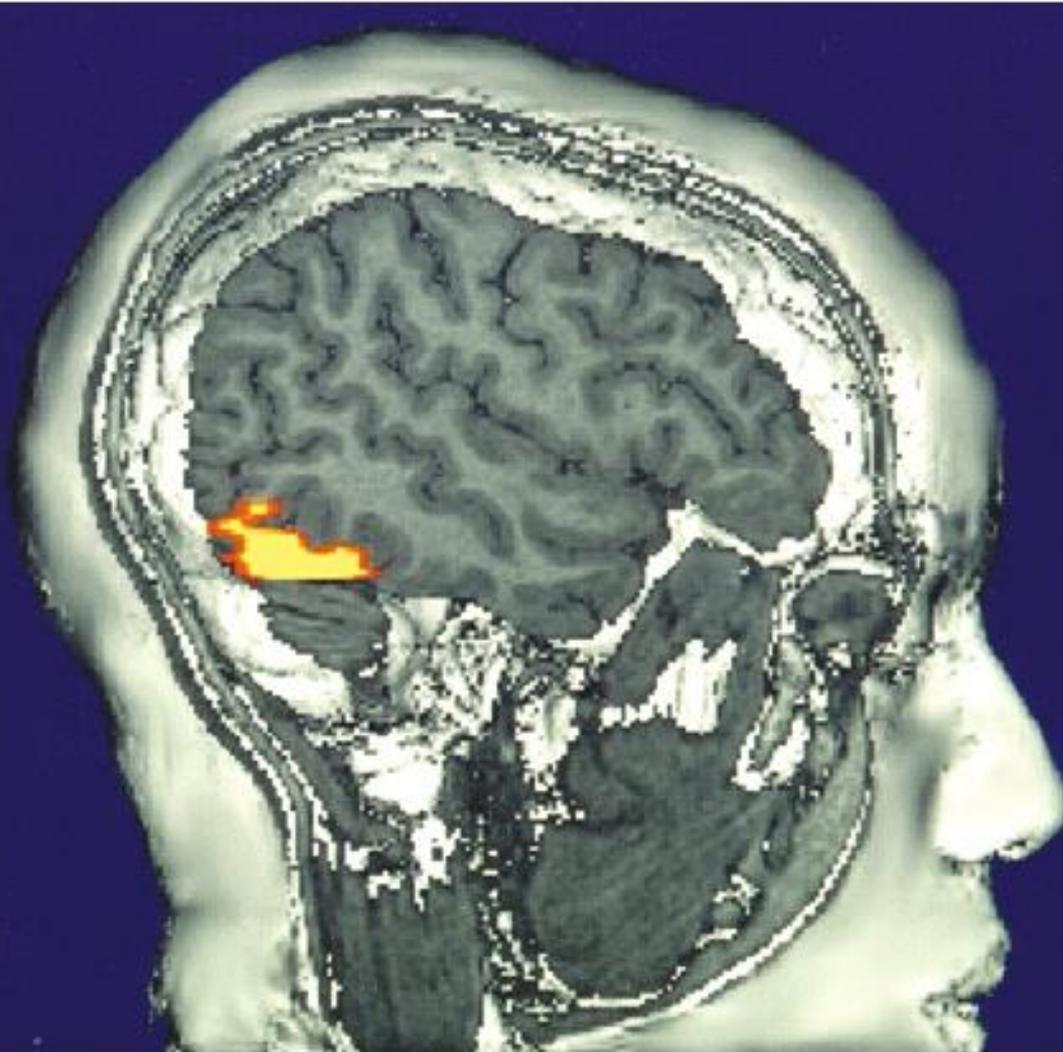
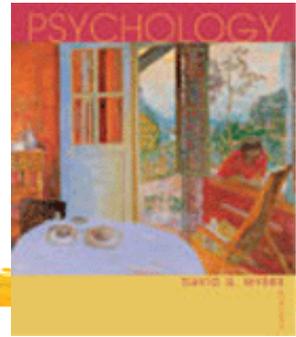


- **Motor Cortex**
  - area at the rear of the frontal lobes that controls voluntary movements
- **Sensory Cortex**
  - area at the front of the parietal lobes that registers and processes body sensations

# The Cerebral Cortex

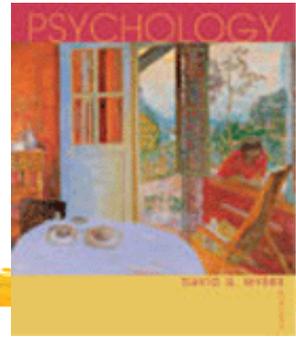


# The Cerebral Cortex



- Functional MRI scan shows the visual cortex activated as the subject looks at faces

# Association Areas



- “Uncommitted” areas that are not involved in primary functions but play a role in learning, remembering, and thinking
- More intelligent animals have increased “uncommitted” or association areas of the cortex

- Motor areas
- Sensory areas
- Association areas

