

## **2. Biological Bases for Behavior**

**Now we will discuss the field of behavioral neuroscience. This section will cover how the body and communication among its parts influences behavior as well as how information is moved throughout the body.**

**2.1. Endocrine system**

**2.2. Etiology**

**2.3. Functional organization of  
the nervous system**

**2.4. Genetics**

**2.5. Neuroanatomy**

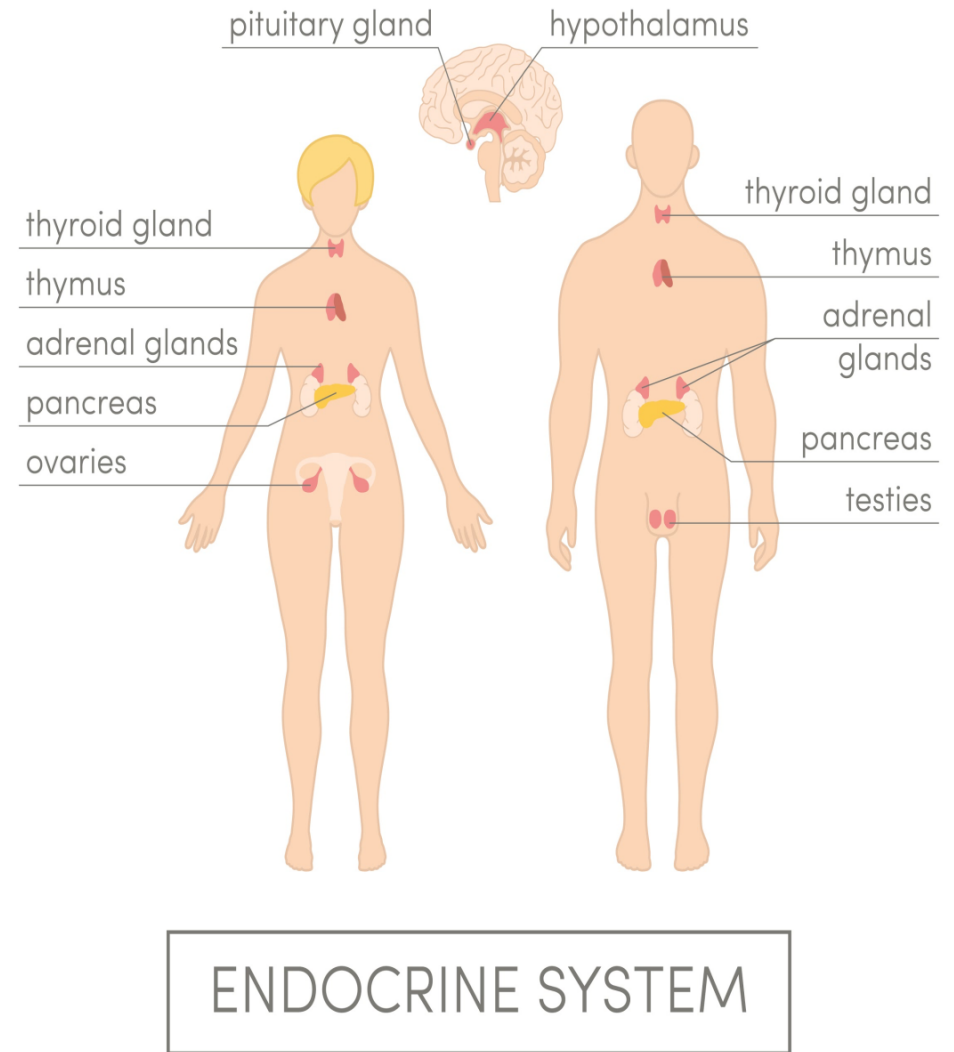
**2.6. Physiological techniques**

## **2.1 Endocrine System**

- **Made up of glands located throughout the body that secrete hormones into the bloodstream**
- **Hormones are chemical messengers secreted into the bloodstream to regulate bodily functions**
- **Processes regulated include metabolism, growth rate, digestion, blood pressure, sexual development and reproduction**

- **Pituitary gland**

- **master gland of the endocrine system**
- **when activated by hypothalamus activates other glands throughout the body**



## **2.2 Etiology**

- **Biological explanation for mental disorders within psychology**
- **Genetic predisposition and hereditary links**
  - **schizophrenia, alcoholism, bipolar disorder**
- **Malfunctioning brain chemistry, neuroanatomic pathology**

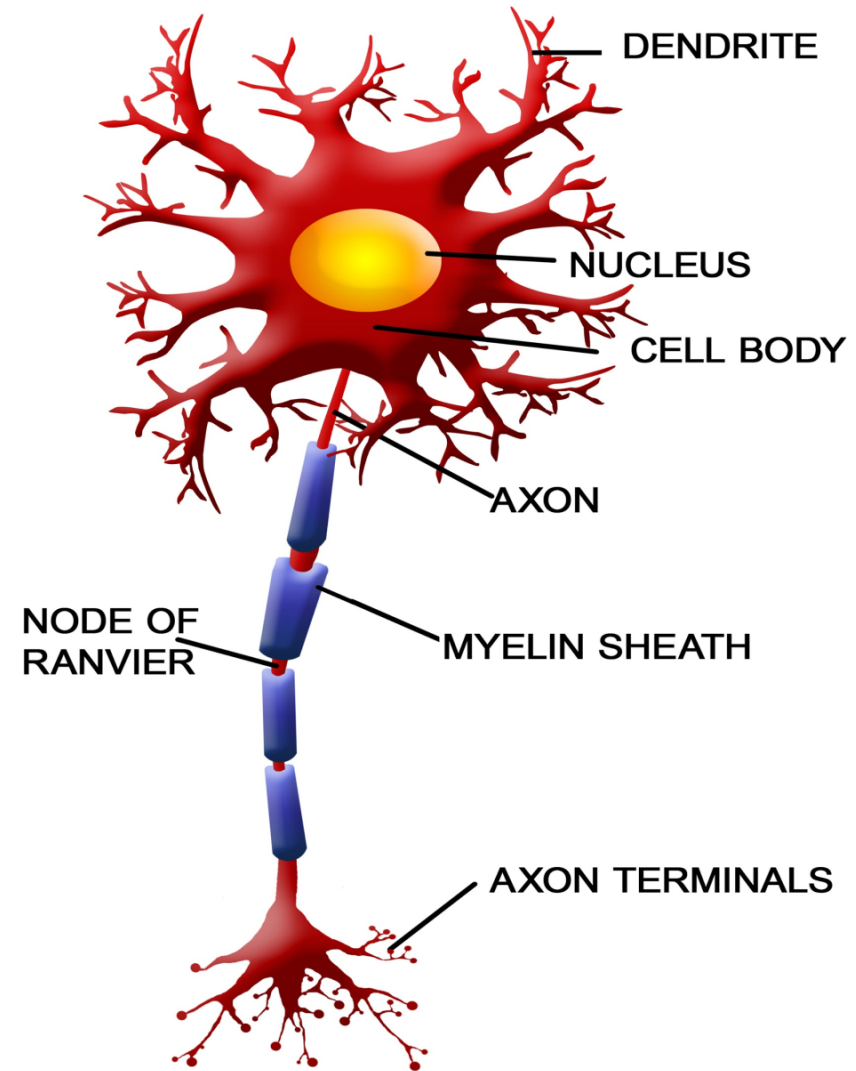


## **2.3 Functional Organization of the Nervous System**

- **Communication throughout the nervous system takes place via neurons, cells that are highly specialized to receive and transmit information across the body**

- **Structure of Neurons**
  - **Cell body- helps keep the cell alive and functioning**
  - **Dendrites- take information in from outside of the cell**
  - **Axons- pass information along to other nerve cells, muscles or glands**

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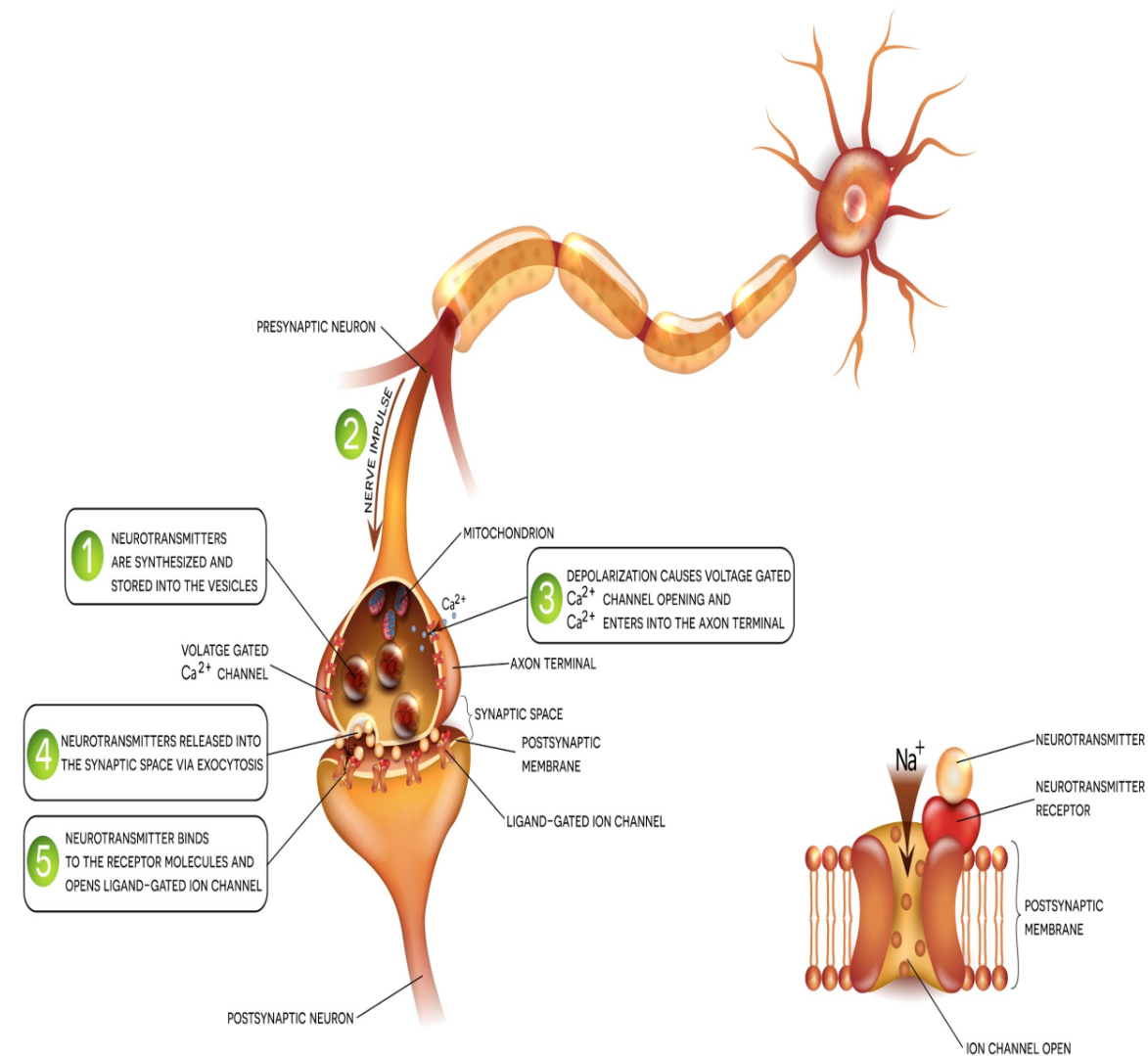
- **Myelin sheath covers the axon on some neurons (but not all)**
  - **accelerates the transmission of information**

- **Sensory/Afferent Neurons**
  - take in information from body tissues and sense organs
  - transmit to spinal cord and brain
- **Motor/Efferent Neurons**
  - send information from spinal cord and brain to body tissue, muscles, and sense organs
- **Inter/Association Neurons**
  - neurons that communicate with other neurons
  - Most common

- **Neurons work through use of electrical impulses and neurotransmitters**
- **Neurotransmitters are chemical molecules contained in vesicles within the axon terminal**
  - **communicate across the synapse gap- the space between two neurons**

# THE SYNAPSE

- Neurons work through use of electrical impulses and neurotransmitters
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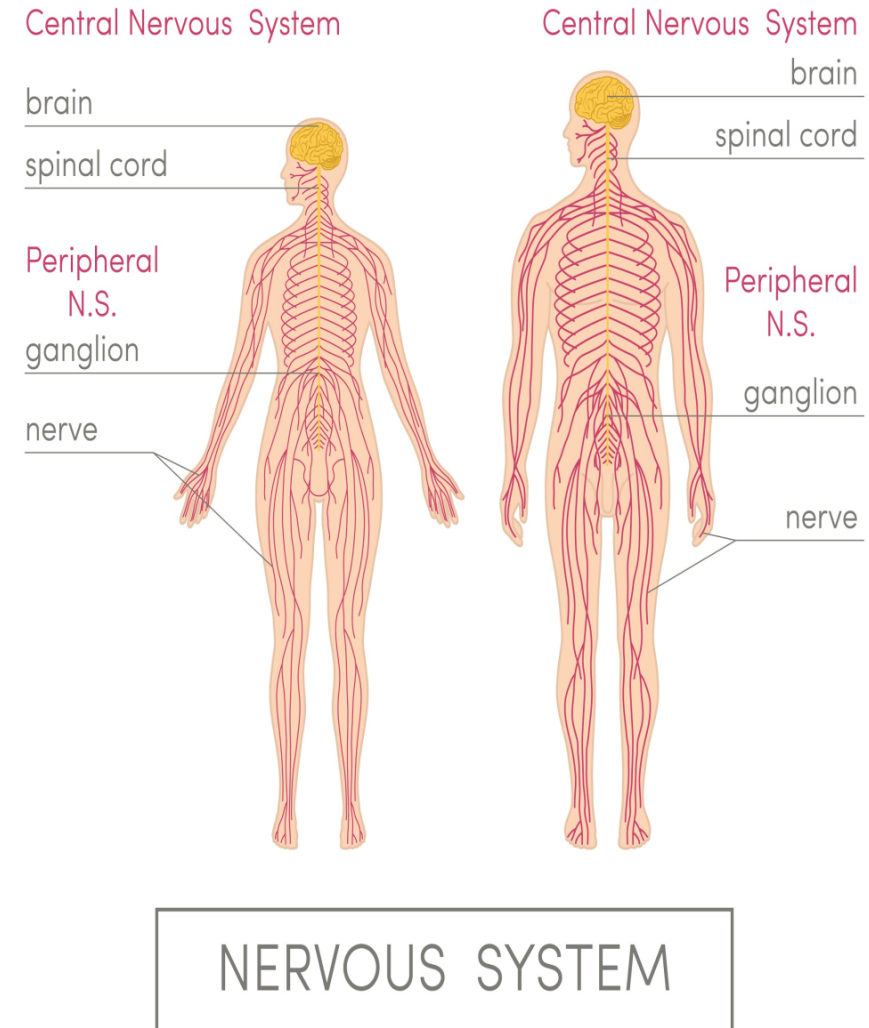


- **Any neurotransmitter left in synaptic gap is broken down or absorbed back into the neuron which is called reuptake**

- **Each neurotransmitter affects behavior differently**
  - Serotonin – mood, emotional states, sleep
  - Dopamine – attention, movement, pleasure sensations
- **Drugs mimic behavior of neurotransmitter**
  - Agonist- increase neural activity flow and effect
  - Antagonist- decrease neural activity and effect

- **The nervous system is made up of different divisions that have unique functions**
- **Central nervous system (CNS) includes the brain and spinal cord**
  - **Suspended in cerebrospinal fluid**
  - **reflexive behavior**
  - **Relies on sensory, motor, and interneuron communication**

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- **Peripheral nervous system connects the brain and spinal cord to the rest of the body**
  - **Two subdivisions**
- **Somatic nervous system**
  - **carries information from muscles, sense organs and skin to the CNS**
  - **carries messages from CNS to skeletal muscle**

- **Autonomic nervous system**
  - **controls internal environment of the body**
  - **glands, organs and some muscles**
  - **sympathetic nervous system prepares you for action**
  - **parasympathetic nervous system is in operation during states of relaxation**

## **2.4 Genetics**

- **Genetics play a large role in how and when learning, growing and development occur**
- **Human behavior is a product of genetics and environment**
  - **nature vs nurture**
- **Genes do not determine behavior but can have a significant impact on what we do and why we do it**



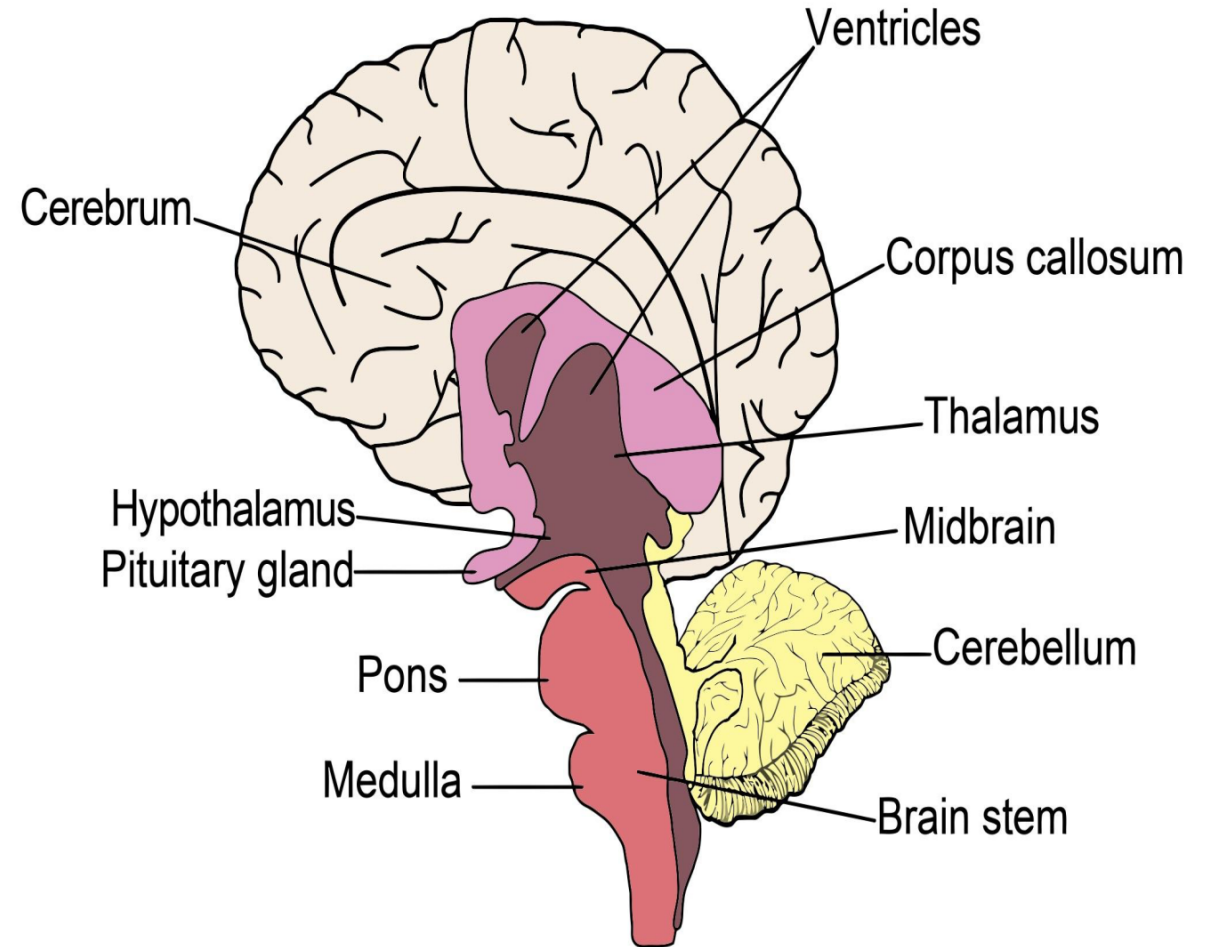
## **2.5 Neuroanatomy**

- **Neurons in the brain work together as neural networks**
- **Different parts of the brain utilize different functions that influence thoughts, feelings and behaviors**
- **Malfunctioning or damage in different areas of the brain impact their designated functions**

- **Brainstem is where the spinal cord enters the skull and is the oldest part of the brain**
  - **cerebellum- coordination of voluntary movement**
- **Thalamus is on top of the brainstem**
  - **receives information about taste, touch, sight and hearing**

# HUMAN BRAIN

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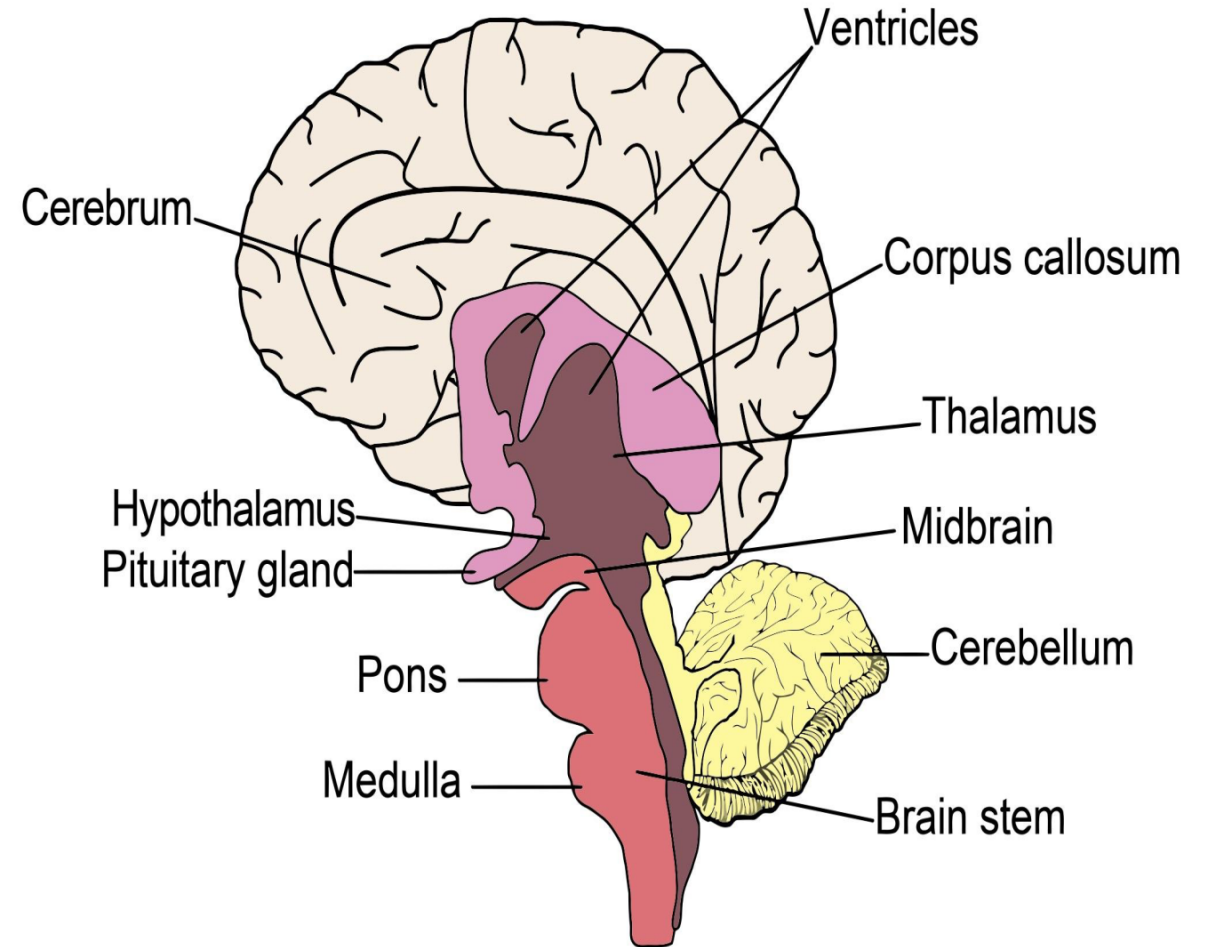


- **Reticular formation runs through thalamus and brainstem**
  - **controls arousal and sleep**
  - **filters incoming stimuli and sends to other parts of brain**
- **Limbic system sits between brainstem and cerebral cortex- more recently evolved part of the brain**

- **Limbic system components**
  - **hippocampus- processes memory**
  - **amygdala- fear and anger**
  - **hypothalamus- hunger, thirst, sexual behavior**
    - **controls pituitary gland**
- **Cerebral cortex is the outer covering of the brain**
  - **motor, cognitive and sensory processes**
  - **divided into two hemispheres**

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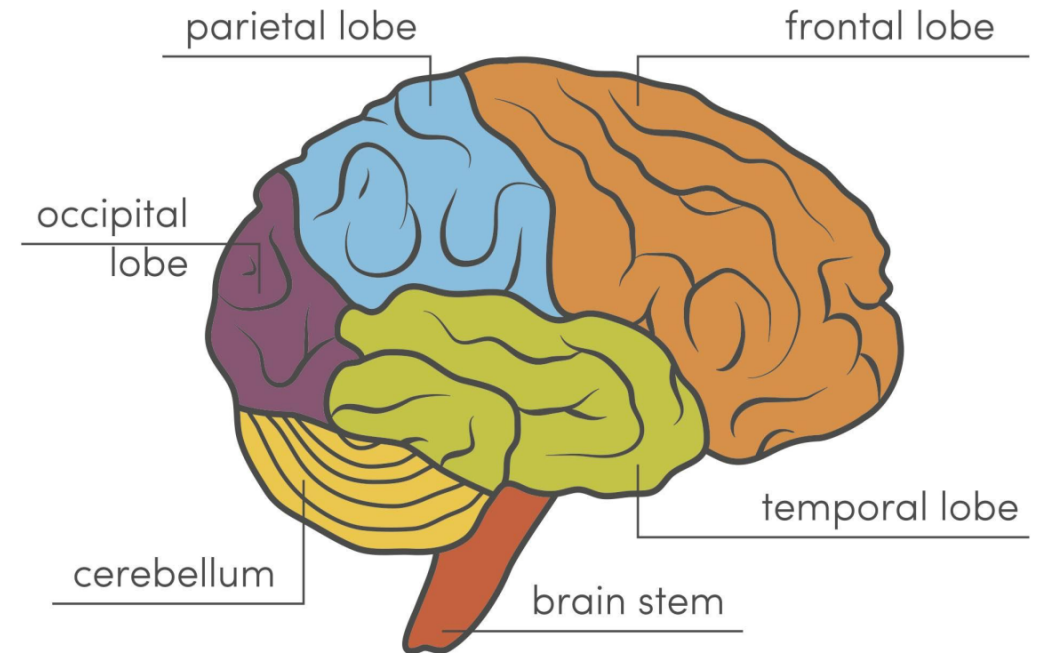
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- **Cerebral cortex hemispheres are divided into 4 regions**
  - **frontal lobes- coordinating movement, higher level functioning and speech**
    - **Broca's area**
    - **Wernicke's area**
  - **parietal lobes- sense of touch- hands and feet**
  - **temporal lobes- hearing**
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human brain

## **2.6 Physiological Techniques**

- **Physiological techniques are used examine the interrelationship between a person's brain and their behavior**
- **Examples:**
  - **EEG**
  - **MRI**
  - **CAT scan**
  - **PET scan**