

Chapter 6 Body and Behavior

Sec 1: Nervous System Basic Structure

Nervous System (NS) – controls your emotions, movements, thinking, and behavior

- Two Parts:
 1. Central Nervous System (CNS) – brain & spinal cord
 2. Peripheral Nervous System (PNS) – nerves branching out from the spinal cord

Neurons – long, thin nerve cells which carry messages to and from the brain

- All or None Principle – when a neuron fires it does so at full strength, if not stimulated past the threshold (minimum) level it does not fire at all
- Basic Parts
 1. Cell Body – contains nucleus, produces energy needed to fuel neuron activity
 2. Dendrites – short, thin fibers that stick out from the cell body, receive impulses from other neurons and send them to the cell body
 3. Axon – long fiber that carries impulses away from the cell body toward the dendrites of the next neuron

4. Myelin Sheath – insulates and protects the axon for some neurons
 - Multiple Sclerosis – myelin sheath is destroyed, behavior is erratic & uncoordinated
5. Axon Terminals – small fibers, branch out at the end of the axon
6. Synapse – gap between nerve cells, serves as a connection between neurons

Neurotransmitters – chemicals released by neurons, determine the rate at which other neurons fire, only flow in one direction

- Types:
 1. Norepinephrine - memory & learning
 - Undersupply – depression
 2. Endorphin – inhibits pain
 3. Acetylcholine – movement & memory
 - Undersupply – paralysis & Alzheimer's disease
 4. Dopamine – learning, emotional arousal, & movement
 - Undersupply – Parkinson's disease
 - Oversupply – Schizophrenia

Afferent Neurons – sensory neurons, relay messages from sense organs to the brain

Efferent Neurons – motor neurons, send signals from brain to glands and muscles

Interneurons – carry impulses between neurons in the body

Somatic NS (SNS) – part of PNS that controls voluntary activities

Autonomic NS (ANS) – part of PNS that controls involuntary activities (those that occur automatically)

- Two Parts:
 1. Sympathetic NS – prepares the body for dealing with emergencies or strenuous activity, “fight or flight” response
 2. Parasympathetic NS – works to conserve energy and to enhance the body’s ability to recover from strenuous activity

Sec 2: Studying the Brain

Brain – 3 parts

1. Hindbrain – located at the rear base of the skull, involved in the basic processes of life
 - Cerebellum – behind spinal cord, helps control posture, balance, & voluntary movements
 - Medulla – controls breathing, heart rate, & a variety of reflexes
 - Pons – bridge between spinal cord & brain, involved in producing chemicals the body needs for sleep

2. Midbrain – small part of brain above pons that puts together (integrates) sensory info & relays it upward
3. Forebrain – cover the brain's central core
 - Thalamus – relay station for all info that travels to & from the cortex, receives all sensory info except smell
 - Hypothalamus – controls hunger, thirst, & sexual behavior, also controls body's reaction to temperature change
 - Cerebral Cortex – ability to learn & store complex & abstract info, and to project your thinking into the future (conscious thinking processes)
 - Limbic System – regulates our emotions & motivations

Lobes of Brain

- Corpus Callosum – band of fibers that connects the two hemispheres
- Lobes – different regions which the cerebral cortex is divided
 - Occipital Lobe – vision (back of brain)
 - Parietal Lobe – body sensations (upper sides)
 - Temporal Lobe – hearing, memory, emotion, & speaking (lower sides)
 - Frontal Lobe – organization, planning, & creative thinking (front)

Left and Right Hemispheres – complement & help each other, corpus callosum carries messages back & forth between hemispheres enabling coordinated brain activity

- Left Side – right side of body
- Right Side – left side of body

How Psychologists Study the Brain

1. Electroencephalograph (EEG) – records electrical activity of large portions of the brain (monitors activity of neurons)
 - Electrical activity rises & falls rhythmically & depends on whether a person is awake, drowsy, or asleep
2. Stimulation – electrodes used to stimulate the brain
3. Lesions – cutting or destroying part of the brain
4. Accidents – draw connections from the damaged part of the brain & behavior
 - Phineas Gage Accident
5. Computerized Axial Tomography (CAT) – imaging technique used to pinpoint injuries & brain deterioration
6. Positron Emission Tomography (PET) – used to see which brain areas are being activated while performing tasks (p 167)
7. Magnetic Resonance Imaging (MRI) – used to study brain structure & activity
 - Combines features of both CAT & PET scans

8. Functional Magnetic Resonance Imaging (fMRI) – provides high resolution reports of neural activity based on signals that are determined by blood oxygen level
- Does not use radio frequencies

Sec 3: The Endocrine System

Endocrine System – chemical communication system which uses hormones to send messages through the blood stream

- Hormones – chemical substances that carry messages thru the body in blood
 - Affect us physically, metabolically, sexually, and our moods & desires
1. Pituitary Gland – control center for the endocrine system that secretes large numbers of hormones, directed by the hypothalamus
 2. Thyroid Gland – regulates metabolism
 - Hypothyroidism – too little thyroxine (lazy & lethargic)
 - Hyperthyroidism – too much thyroxine (overactive, lose weight & sleep)
 3. Adrenal Glands – become active when a person is angry or frightened, “fight or flight”
 - Secrete epinephrine (adrenaline) & norepinephrine (noradrenaline) to help individuals deal w/ difficult situations by generating extra energy

4. Sex Glands

- Testes – produce sperm & testosterone
 - Testosterone – helps decide the sex of the fetus, important for growth of muscle, bone, & male sex characteristics
- Ovaries – produce eggs, estrogen, & progesterone
 - Estrogen & Progesterone – female sex hormones, regulates development of female sex characteristics & the reproductive cycle
 - Premenstrual Syndrome (PMS) – caused due to variances in levels of progesterone & estrogen

Hormones vs. Neurotransmitters

- Both effect the NS
- Some chemicals are used as both (norepinephrine)
- Neurotransmitters – released by the cell to excite or inhibit
- Hormone – released into blood, thus diffused throughout the body

Sec 4: Heredity and Environment

Heredity – genetic transmission of characteristics from parents to offspring

Nature vs. Nurture

- Nature – characteristics a person inherits (biological make-up)
 - Nurture – environmental factors, family, culture, education, & individual experience
 - Twin Studies – used to find out if a trait is inherited
 1. Identical Twins – develop from one fertilized egg, have the same genes
 - Genes – basic building blocks of heredity
 2. Fraternal twins – develop from two fertilized eggs, genes are not more similar than those of brothers or sisters
- If identical twins who grow up together prove to be more alike on a specific trait than fraternal twins do, it probably means genes are important for that trait
- Identical twins separated at birth who grow up in different environments share many common behaviors