

Chapter 1:

Biological Approach to Behavior

1. What are four ways behavior can be explained using a bio-psychological perspective?
 - **Physiological**-relates a behavior to the activity of the brain and other organs, deals with machinery of body. Example: chemical reaction that causes muscle contraction
 - **Otogenic**-describes how a structure of behavior develops including influence of genes, nutrition experiences, and interactions
 - **Evolutionary**-emphasizes historical influences of natural selection example: Goosebumps
 - **Functional**-describes why a structure of behavior evolved as it did, the advantage of that behavior
2. What are four reasons that animals are used to explore research questions?
 - Animals are used to explore research questions because of their similarity to humans, their differences from humans, evolutionary perspective, and because of ethics and limitations.

Genetics and Behavior

1. What are genes (e.g., composition, location) and how do they influence behavior?
 - Genes are units of heredity, maintain identity throughout generations, composed of DNA located in the cell's nucleus, and usually come in pairs because they are aligned along chromosomes. **DNA** is an instruction template isolated in the nucleus, DNA is then **transcribed** into **RNA**, which takes information out of the nucleus and serves as a template for amino acid sequencing. The next process is **translation** where RNA is translated into proteins, which become body tissue and functional components. For behavior to persist across generations, it must have some adaptive significance
2. What attributes of genes determines what type of trait will be expressed?
 - **Homozygous**-genes on each chromosome are identical (b,b)
 - **Heterozygous**-genes on each chromosome are different (B,b)
 - **Dominant**-expressed trait will show through in either homozygous or heterozygous condition (B,B) (B,b)
 - **Recessive**: expressed trait will *only* show through in homozygous condition (b,b)
3. Differentiate between *sex-linked* and *sex-limited* genes.
 - **Sex-linked genes**-found only on sex chromosomes, more often expressed in Males
 - **Sex-limited genes**- found on autosomes, expression based on hormones
4. Name two phenomena that alter genetic material and describe how they are different.

- **Mutation**-change in gene expression due to a change to DNA, results in altered amino acid sequencing and thus protein construction, is heritable
 - **Epigenetics**-change in gene expression *without* a change to the DNA sequence. Typically due to environmental factors or experience, can be heritable
5. What types of experimental procedures can be used to differentiate between genetic and environmental influences on behavior
- Studies with genetically modified animals.
 - Knockout mice.
 - Twin studies.
 - Monozygotic: identical genetic code.
 - Dizygotic: fraternal, as genetically similar as typical siblings.
 - Adoption studies.
 - Gene association studies.

Chapter 2:

Nerve and Glial Cells

1. Link cell structures with their function.
 - **Membrane**-separates inside of cell from outside/protects cell
 - **Nucleus**-structure that contains the chromosomes/heredity control
 - **Mitochondria**-power house of cell, convert things to ATP/energy
 - **Ribosomes**-sites at which cells synthesize new protein molecules
 - **Endoplasmic reticulum**-transport newly synthesized proteins to other locations
2. What are neurons specialized to do? Name the parts of neurons that enable this specialization.

-Neurons receive information and transmit it to other cells. They are made up of a cell body (soma) and branching extensions specialized to receive and transmit signals.

 - **Dendrites**- branching fibers that get narrower near the ends l=, lined with specialized **synaptic receptors**. Dendrites receive information, may be equipped with **spines** to increase surface area
 - **Axon**-thin fiber of constant diameter, sends information. May be coated in **myelin sheath** so information can be conducted faster. Spaces (interruptions) between myelin sheath are called **Nodes of Ranvier**.
 - **Presynaptic Terminal**-end of axon where electrical action turns chemical/ point which the axon releases chemicals that cross through the junction between one neuron and the next.

* A neuron can have a number of dendrites but only one axon, axon can have branches far from the soma (meter long in length)
3. Name three types of neurons, how they differ, and what their function is.
 - **Motor Neuron**-has its soma in the spinal cord, it receives excitation from other neurons through its dendrites and conducts impulses along its axon to a muscle.

- **Sensory Neuron**-receives information from the environment and sends information to the rest of the Nervous System. Interneurons or intrinsic neurons connect sensory to motor neuron within a single structure. A sensory neuron is specialized at one end to be highly sensitive to a particular type of stimulation (light, sound, touch, etc.) and then sends a signal on.
4. What is meant by the directional terms afferent and efferent?
 - **Afferent**-projecting to/ axon brings information into structure ex: receptor in skin
 - **Efferent**-projecting from/ carries information away from structure
 - *every sensory neuron is an afferent to the rest of the Nervous System/ every motor neuron is an efferent from the Nervous System/ within the nervous system a given neuron is an efferent from on structure and afferent to another.
 5. What do specific glia cells do? What "structure" is composed of glia?

Glia are "support" cells, they do not transmit information over long distances as neurons do.

 - **Astrocytes**- star shaped, wrap around the presynaptic terminals of a group of functionally related axons. By taking up ions released by axons then releasing them back to axons, they help synchronize activity, enabling them to send messages in waves, they also remove waste material, control amount of blood flow to brain and recycle glutamate.
 - **Microglia**-very small, immune system of nervous system; removes waste
 - **Oligodendrocytes**-build myelin sheaths that surround and insulate neurons of the brain and spinal cord
 - **Schwann**-build myelin sheaths on neurons other than those in the brain and spinal cord
 - **Radial glia**-guide placement of neurons during development, then differentiate into other glia.

Nerve Impulses

1. The distribution of what particles is responsible for the resting membrane potential of neurons?

-The distribution of ions such as sodium and potassium are responsible for the resting membrane potential of neurons. The cell membrane has a resting potential because the charge differs on either side of the membrane, the membrane is said to have an electrical gradient or to be polarized.

 - **Sodium Potassium Pump**- an active transport that requires energy, repeatedly transports 3 sodium ions out while drawing 2 potassium in which is against natural electrical and concentration gradient. Sodium more concentrated outside, Potassium inside, when at rest concentration gradient drives potassium out but electrical drives them in, sodium channels are closed, potassium nearly but not entirely closed.