

OpenStax Psychology
Chapter 3 Biopsychology
Study Guide

3.1 Human Genetics:

As seen from the different branches in Psychology, behaviors can stem from a variety of perspectives. The field of Biopsychology studies psychological behaviors from a more genealogical standpoint, focusing on how inherited genes can affect not just the physiological, but psychological traits of a person.

- Charles Darwin further explored the concept of inheritance of traits throughout generations in his theory of evolution through natural selection. In this Darwin explains that organisms with stronger traits and more durability within their environments will have a higher survivability rate in that those who are strong will live, leaving the weak to die.
- Borrowing Darwin's core concept, **Evolutionary Psychology** takes an introspective look on how behaviors and cognitive processes have evolved over time through inherited traits. Within the field, behavioral geneticists focus their research on the appearance on individual traits or differences within genes and the environment.
- To further study the origin of these differences, genetic variations in humans can be traced back to stages of egg, sperm and fertilization.
 - Each person comprises their genetic makeup, known as their **genotype**. The genes in our genetic makeup are made up of DNA, which are responsible for our traits.
 - Inherited physical characteristics through traits are called **phenotypes**.
 - The majority inheritable traits are delegated or controlled by more than just one gene in such cases, they are known as **polygenic traits**.
- Genes are not the sole influence to trait acquisition, however. Environmental interactions can prove to be just as impactful as inherent properties and play a pivotal role in not only the creation of traits or behaviors but demonstrate the malleability of innate behaviors as well.

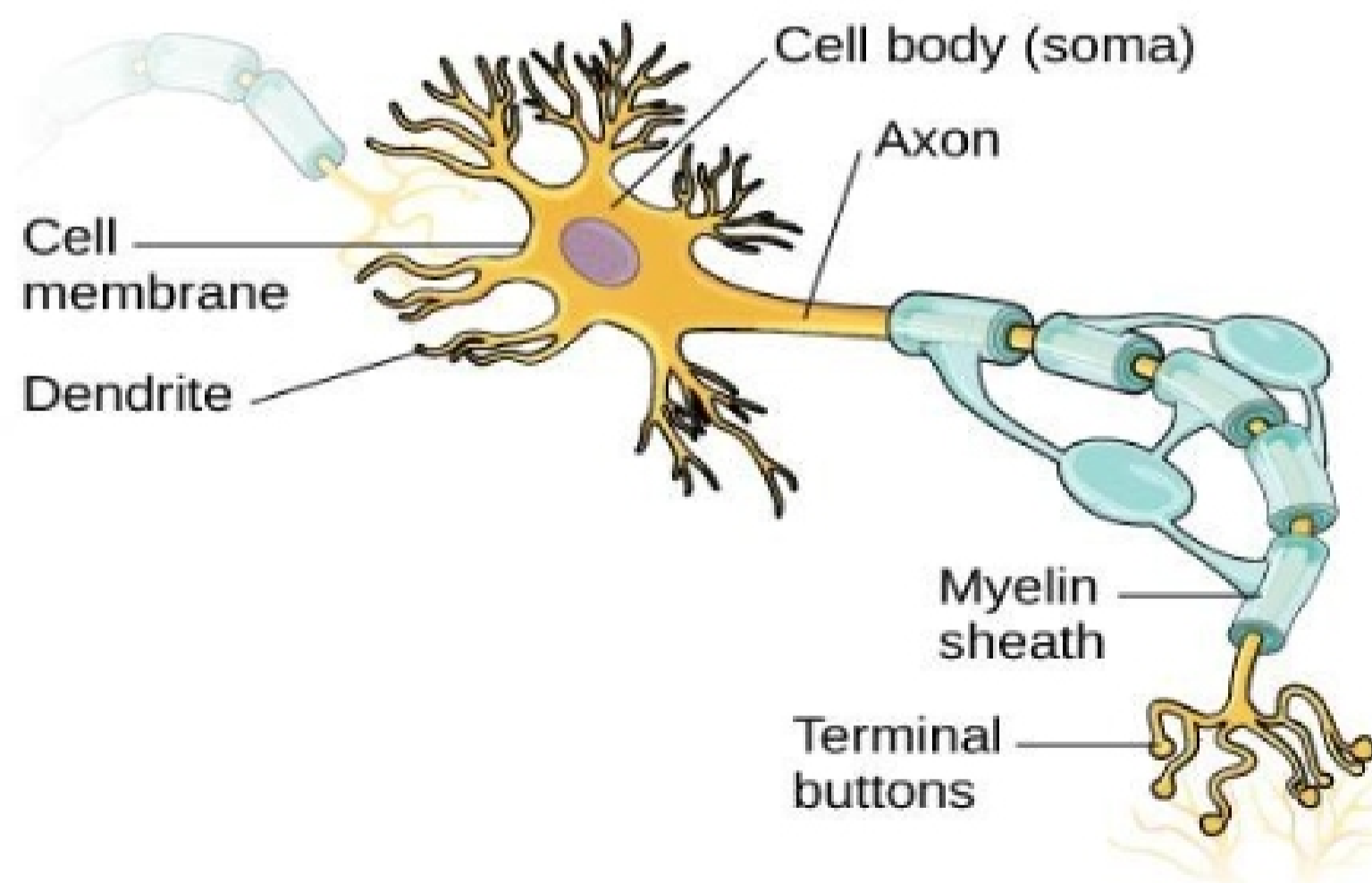
Questions:

1. In your own words, explain why a section on human genetics is included in this chapter?
2. How does the study of genetics help us understand behavior?
3. How do gene-environment interactions relate to behavior?
4. Why do studies on identical and fraternal twins help understand the gene-environment link?
5. Define the following terms:
 - i. Range of reaction
 - ii. Environmental correlation
 - iii. Epigenetics

3.2 Cells of the Nervous System

Biopsychology is not limited genealogical research. The study of cells and organs provide a more introspective look at our inherent properties as well as a better understanding of psychology from a more biological perspective.

- Our nervous system is responsible for processing the information received by the brain and consists of two parts: neurons and glial cells.
- **Glial cells** also referred to as neuroglia, assist neurons in communication between neuron cells. Neuroglia are not only responsible for supporting nerve tissue structure but help nourish neurons and protect them as well.
- **Neurons** are the basic units of the nervous system and are responsible for conducting nerve impulses needed for tasks throughout the nervous system.
 - A neuron consists of an outer membrane, or semipermeable membrane, that allows uncharged molecules to move freely through it.
 - The cell body called the **soma** includes a nucleus that is the general center of command within a neuron.
 - Outer root like structures known as **dendrites** branch out, taking in information from other nerve cells.
 - A longer branch called the **axon** has terminal buttons containing neurotransmitters at the tips allow communication within the nervous system.
 - Between these are a small space called the **synapse**, an important site where communication between neurons occurs. Located at the nerve endings are receptors that respond to neurotransmitters.
 - The axon servers are covered in fatty layer called the **myelin sheath** that acts as an insulator and aids in the speed of electrical impulse transfer.



- Communications between neurons are made up of a system of signals sent. Neurons exist in a fluid environment consisting extracellular and intracellular fluids.
 - The fluids are kept separate by the neuronal membrane due to the two fluids being electrically different.
 - The difference in charge between membranes is called the membrane potential, which provides energy for the signal.

- When inactive the neuron's membrane potential readies itself, a state called the resting potential. A shift occurs when cells become positively charged to a point, this state is known as the threshold of excitation. Signals created during the threshold of excitation are called action potentials.

Regarding behaviors, specific types of neurotransmitters are responsible for certain behaviors even psychological disorders. Because of this, psychotropic medications can be used to manipulate and treat some of these disorders by restoring balance between neurotransmitters

Questions:

NEURON STRUCTURE

1. What are the two basic cell types found in the nervous system and what are their main functions?
2. Study figure 3.8 and write down the names and functions of each the main parts of a typical neuron
 - iv. Which is the part of the neuron that receives the signal?
 - v. Which is the part of the neuron that sends the signal and how does it send it?
 - vi. Why is it important to have a healthy myelin sheath?
 - vii. What is the synaptic cleft and what happens there?
 - viii. What are receptors?

NEURONAL COMMUNICATION

3. The neuron exists in a fluid environment—it is surrounded by extracellular fluid and contains intracellular fluid (i.e., cytoplasm). The neuronal membrane keeps these two fluids separate
4. What is the difference in charge across the membrane called?
5. Take a look at figure 3.11 and
 - ix. Define what an action potential is
 - x. Describe each of the actions happening during the action potential.
 - xi. Be able to connect them with each other and to name the ions involved in each action.
 - xii. What happens when the action potential arrives at the terminal button?
 - xiii. What happens to excess neurotransmitters?

NEUROTRANSMITTERS AND DRUGS

6. Take a look at table 3.1 and think of the relationship between neurotransmitters and receptors
7. Think of ways in the different types of neurotransmitters listed on table 3.1 affect your own behavior. Write a sentences for each of the neurotransmitters.
8. What is the difference between agonist and antagonist drugs?
 - xiv. Give an example of an agonist drug
 - xv. Give an example of an antagonist drug

3.3 Parts of the Nervous System

In a broader perspective, the nervous system as a whole consists of two major subdivisions: the central and peripheral nervous systems.

- The **peripheral nervous system** is a network of thick bundled axons also called nerves. These nerves are responsible for relaying messages back and forth between the central nervous system as well as muscles, organs, as well as different senses within the periphery of the body. The peripheral nervous system is divided between the somatic nervous system and automatic nervous system.