PSYO111—Midterm 2—Study Guide

Chapter 3—Neuroscience and Behavior

**Neurons: The Origin of Behavior**

1. Explain the function of Neurons
2. Outline the components of the neuron
   1. cell body
   2. dendrites
   3. axon
3. Differentiate the three major types of neurons by their function
   1. *cell body (soma):* largest component of neuron
      1. coordinates information processing tasks
      2. keeps cell alive
      3. protein synthesis, energy production, metabolism
      4. contains nucleus that houses chromosomes with DNA
      5. enclosed by porous cell membrane (molecules can go in and out)
   2. *dendrites:* receive information form other neurons and relay it to the cell body
      1. comes from Greek word for tree
   3. *axon:* carries information to other neurons, muscles, or glands
      1. can be very long
      2. covered by a myelin sheath
4. What do neurons do?
5. What are the three primary components of the neuron?
6. Do neurons actually touch when they communicate? Explain.
7. What is the function of the myelin sheath?
8. What critical functions do the glial cells play?
9. How do the three types of neurons work together to transmit information

Terms & Definitions:

*Neurons*: cells in the nervous system that communicate with each other to perform information-processing tasks

Names & Dates:

*Santiago Ramon y Cajal*: Spanish physician who learned a new technique for staining neurons in late 1880s that revealed that brain cells came in different shapes and sizes (Golgi stain).

**The Electrochemical Actions of Neurons: Information Processing**

1. Describe how an electrical signal moves across a neuron
2. Outline the steps in synaptic transmission
3. Explain how drugs are able to mimic neurotransmitters
4. What difference between the inside an outside of the neuron’s cell membrane creates the resting potential?
5. How does the neuron’s membrane change over the course of an action potential?
6. What is the role of neurotransmitters in neural communication?
7. Choose two neurotransmitters and compare and contrast their functions
8. Is L-dopa an agonist for dopamine or an antagonist? Why?

**The Organization of the Nervous System**

1. Differentiate the functions of the central and peripheral nervous systems
2. Understand the nature of the reflex arc
3. Demonstrate the hierarchical structure of the central nervous system
4. What is the neuron’s role in the body’s nervous system?
5. What are the components of the central nervous system?
6. What are the two divisions of the peripheral nervous system?
7. What triggers the increase in your heart rate when you feel threatened?
8. What important functions does the spinal cord perform on its own?

**Structure of the Brain**

1. Differentiate the functions of the major divisions of the brain
2. Explain the functions of the cerebral cortex according to organization across hemispheres, within hemispheres, and within specific lobes
3. Identify the causes and consequences of brain plasticity
4. Explain the progression of the human brain’s evolution
5. Which part of the brain controls the basic functions of life, such as respiration?
6. Which part of the brain helps with orientation to the environment?
7. How is the thalamus like a computer?
8. Which area of the brain is associated with emotional memories?
9. Why is Parkinson’s disease a good example of the interrelationship between the brain and behavior?
10. What is the main function of the pituitary gland?
11. Why is the part of the somatosensory cortex relating to the lips bigger than the area corresponding to the feet?
12. What types of thinking occur in the frontal lobe?
13. Give examples of research that proves the brain is able to change because of a person’s life experience
14. What is the structural difference between the brain of a reptile or bird and the brain of a mammal?

**Genes, Epigenetics, and the Environment**

1. Outline the structure of a gene
2. Differentiate between monozygotic and dizygotic twins
3. Explain how epigenetic influences work
4. What are the two ways that “genes” can be defined?
5. why do dizygotic twins share 50% of their genes, just as do siblings born separately?
6. Are abilities such as intelligence and memory inherited through our genes?