PSYC 223
Biological Psychology

Session 1 – BIOLOGICAL PSYCHOLOGY: Biological Basis of Behavior

Lecturer: Dr. Adote Anum, Dept. of Psychology
Contact Information: aanum@ug.edu.gh

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College of Education
School of Continuing and Distance Education
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Session Overview

- Human behavior is directed mainly the brain and cells of the nervous system. To understand behavior, we need to understand the physiological, chemical, and electrical mechanisms that interact to control thoughts, movement, and feelings. The human Nervous System is a made of different systems. Each system has subsystems. Together these help the individual interact with the environment and help the individual react appropriately to stimulation. In this session, you will learn why it is important to study brain-behavior relations, the basic units of the nervous system.

Reading List

- Read Chapters One of Biological Psychology 9th Edition by J. W. Kalat; pages 1 – 8.,
- Read Chapter Two of Biological Psychology 9th Edition by J. W. Kalat; pages 30 – 48
- Read Chapter One of An Introduction to Brain and Behavior by Kolb and Wishaw.

Learning Outcomes

- At the end of this lecture you should be able to:

1. Define Biological Psychology
2. Answer questions about the relationship between biology and behaviour.
3. Explain what is meant by the 'mind-body problem'.
4. Describe the cells of the Nervous System

Session Outline

The key topics to be covered in the session are as follows:

- Defining Biological Psychology/Why study Biological Psychology
- The structure of the nervous system
- Purpose of the Nervous System
- Cell of the Nervous System

Topic One

DEFINING BIOLOGICAL PSYCHOLOGY

What is Biological Psychology?

- According to Kalat (2009) "*Biological psychology is the study of the physiological, evolutionary, and developmental mechanisms of behaviour and experience*". (Page 2)
- In biological psychology, behaviour is explained in physiological terms. This is because physiological mechanisms inform us a great deal about psychological processes
- There are chemical and electrical mechanism that control both voluntary and involuntary behaviour.
- You will learn about these in other sessions of this course.

Mind and Body Problem

- The mind and body problem deals with three important philosophical views.
  - **Idealism** suggest mental monism or the absence of the physical world.
  - **Materialism** is the idea that there is no mental. Those who believe this view behave extrovertly.
  - **Epiphenominalism** suggest that the mind is a side effect of the brain and the mind holds no power.
- These suggest to us that the connection between mind and body has been studied and proposed several years before.

Why Study Biological Psychology?

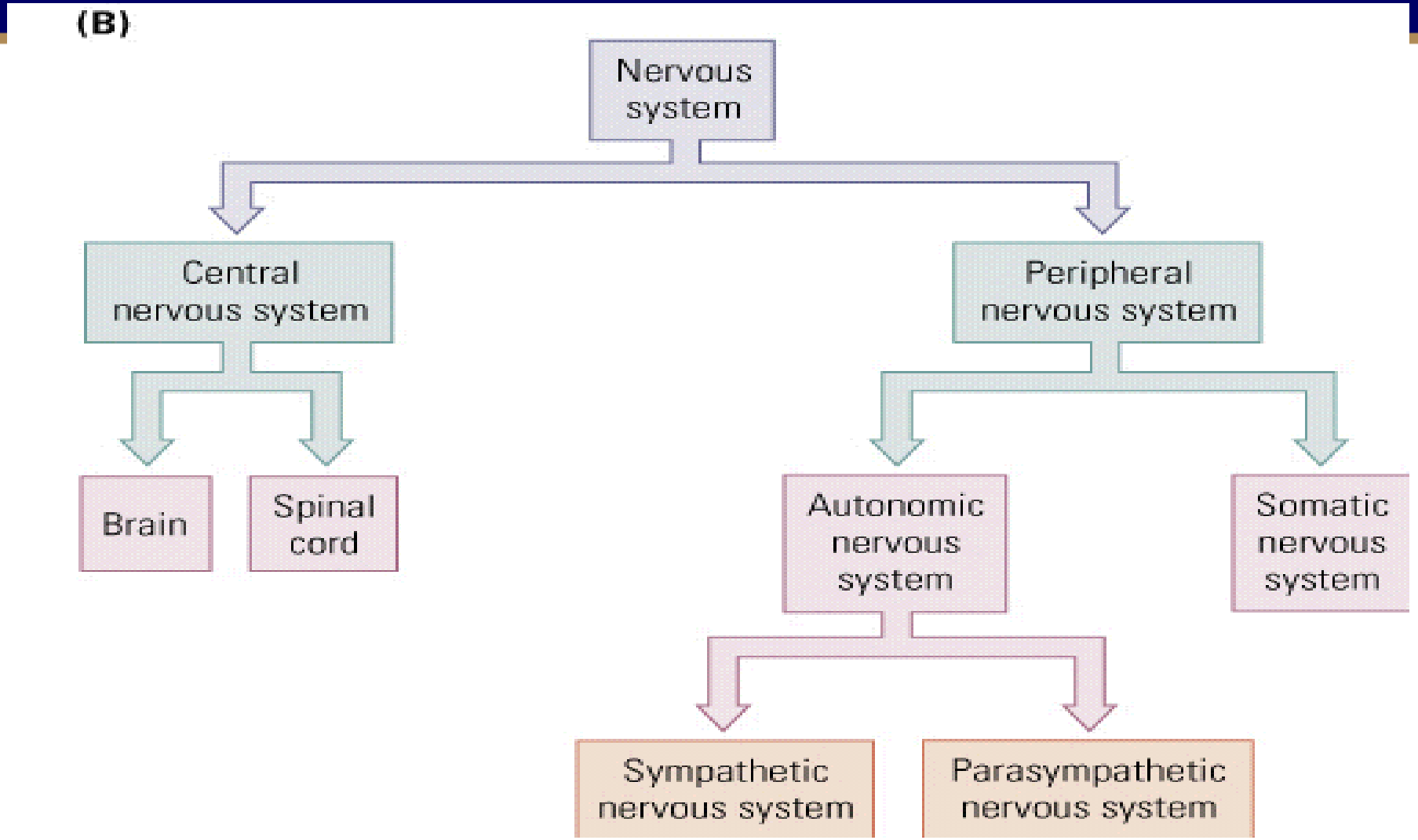
- Psychology uses many ways to explain Behavior
  - 1) Social, developmental, evolutionary, etc.
  - 2) **Biological**

- Biological basis of behaviour: 2 questions arise
  - a) What are the biological causes of behaviour?
  - b) What is the relation between activity in the brain and behaviour?

Topic Two

DIVISIONS OF THE NERVOUS SYSTEM

Divisions of The Nervous System



Divisions of The Nervous System

- The Nervous system is made up of the Central Nervous System (CNS) and the Peripheral Nervous
- The CNS is further divided into the Brain and Spinal Cord.
- The Peripheral Nervous System is also further divided into Autonomic and Somatic Nervous Systems.
- Autonomic Nervous System is a bundle of neural network (also called nerves) that connect the organs and muscles to the CNS.
- There are two other subsystems of the ANS- *sympathetic and parasympathetic* which we will discuss in detail later.
- The Somatic Nervous System is made up of organs and muscles. The term Somatic refers to *BODY* in Greek.

Purpose of the Nervous System

- The purpose of the nervous system is threefold:
  - Detect and to react to things around you
    - Input – or sensory information
  - Acquire, combine, and store information about stimulation
    - Interpretation of signals
  - Select appropriate response in reaction to first two functions. Think about what happens when you touch a hot plate.

Topic Three

CELLS OF THE NERVOUS SYSTEM

CELLS

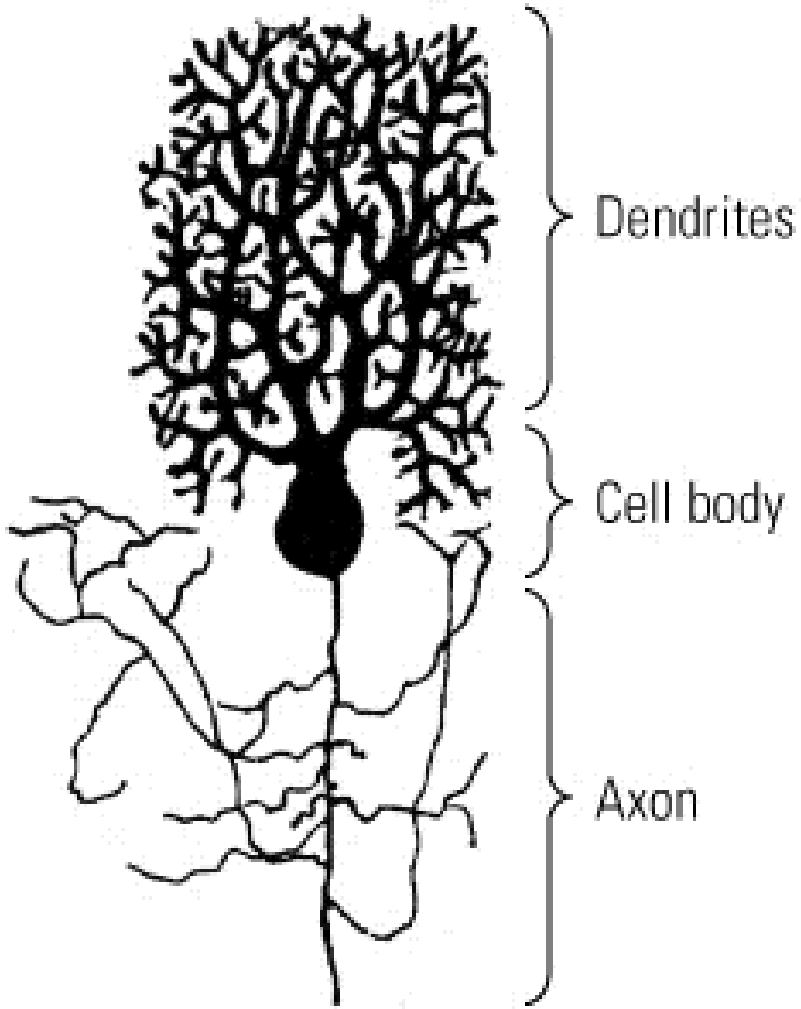
- What is a cell?
  - A cell is the smallest unit in the body.
  - In the nervous system, there are two types of cells – *Neurons* and *Glial*.
- Cells have unique features and these include:
  - Membrane - covering
  - Nucleus
  - Endoplastic Reticulum
  - Golgi Bodies
  - Microtubules
- It will be useful to review the functions of these features in …
- Neurons, like other cells are covered with a membrane

NEURONS

- A neuron has three distinct features
  - Dendrite, branch-like feature that receives signals/information from other neurons
  - Soma, also called cell body. Contains the nucleus. Dendrites send signals to this area where they are integrated and processed before being resent to other neurons
  - Axon, this is a thin fibre that extend away from the soma carrying signals towards other neurons.

NEURONS

- Other features of the neuron
  - Dendritic Spines (tips of dendrites)
  - Axon Hillock (point on the cell body where signals or impulses are initiated)
  - Axon Collaterals (branches of the axon)
  - End foot (terminal buttons)



Glial Cell and Functions

- Initially named after Glue, Glia cells were taught to hold neurons together.
- They provide supportive roles in the nervous system such as:
  - Nutrition
  - Removal of waste and dead neurons from the nervous system
  - Produce myelin sheath (fatty substance) used to insulate neurons to prevent short-circuits.

Types of Glia Cells and Functions

- Ependymal – forms lining in ventricles (cavities in the brain).
- Astrocyte – help to regulate activities of some neurons; remove waste e.g., dead neurons
- Microglia – remove waste from the nervous system e.g., virus
- Schwann – form myelin around axons in the peripheral nervous system
- Oligodendroglia – forms myelin around axons found in the CNS

References

- Kalat, J.W. (2009). Biological Psychology 9th Edition. Belmont,CA: Wadsworth Cengage Learning

- Kolb, B. & Whishaw, I. Q. (2013). An Introduction to Brain and Behavior, 4th Edition. McMillan Learning.