Biological roots of Behavioral Sciences

Methods of studying schools in Behavioral sciences

Dr Maha Younis
The term Behavioral sciences is often confused with the term social sciences. They are interrelated and study systematic processes of behavior through empirical data analysis of various dimensions of behavior. It abstracts decision processes and communication strategies within and between organisms in a social system. This involves fields like Psychology, Social Neuroscience, and even genetic studies among others. In contrast, Social Sciences provide a perceptive framework to study the processes of a social system through social organization on structural adjustment of the individual and of groups. They typically include fields like Sociology, Economics, History, Counseling, Public Health, and Political Sciences.
Why do we study behavioral sciences

• gain insight into individual behavior
• develop an understanding of their own society and the world as part of larger human experience in time and place
• analyze social, political, cultural, historical, and economic institutions and relationships that both link and separate societies throughout the world
• develop analytical, critical thinking, and communication skills necessary to understand and influence the world in which they live
• Comprehend methods of inquiry employed by social and behavioral scientists
Types and careers of psychologists

Occupational places of Psychologists

Most psychologists work in the following places;
1. Colleges and universities, psychologists who are interested in researches and scientists, or special research institutes.
2. Private practice like clinics.
3. Schools.
4. Industry and organizations.
5. Mental hospitals.

The contemporary psychiatric practice is attached to psychology in many ways, as psychologists play an important role in the treating team with the psychiatrist, also clinical psychologists are the primary therapists in treating many mental disorders based on pathological cognitions and inappropriate behaviors like for example phobic disorders, rituals in obsessive compulsive disorder, disorders of sexual perversions.
Methods of studying behavioral sciences

Studying psychology was associated with establishment of scientific ways and means in order to give evidences supporting its hypothesis, also critical ways of thinking can motivate psychologists to test their hypothesis by doing experiments and to debate others theories.

The scientific method consists of four major steps:

1. Experiments are the primary scientific method in examining cause-effect relationship
Identifying the problem and formulate hypothetical-1 cause and effect relations among variables: testing the hypothesis on the ground of relations of two different events

Design and execute an experiment: manipulating-2 independent variables and observing dependent variables

Determining the truth of hypothesis by examining-3 data from the experiment: to test whether an observed relation is statistically significant

Communicate the results: writing an article that-4 includes a description of the procedure to be published and documented

;Hypothesis
Is the starting point of any experiment? It's an idea, phrased as a general statement that the scientists wish to test in an experiment. It’s a tentative statement about a relation between two or more events while theory is an elaborate form of hypothesis that can be a related hypothesizes to explain some larger aspect of nature.
Operational definition

Is to generalize the findings of experiments derived from a particular general concept into set of operations. Validity and reliability of any operational definition should be examined.

Ethical Standards in Human Research

Research participants are expected to receive a full description of the procedures to be followed.

To be informed about any risk that might be involved.

To be told that they are free to withdraw from a study at any time without penalty.

True informed consent should be obtained from the parents or guardians of children or mentally ill patients before any experiment done to them.
Biological foundations of behavior

The central nervous system (brain) • which is a delicate structure protected by the hard bones of the skull, forms the primary control over the human emotions and behavior, it works through a net of billion neurons (the nerve cell) disseminated in the body via the peripheral nervous system •
Neurons

Specialized cells considered as the basic building blocks of the nervous system, they are linked together in circuits, each neuron has three main parts:

1. **the cell body (soma)** contains the biochemical structures needed to keep the neuron alive and its nucleus that carries the genetic information that determines how the cell develops and functions.

2. **dendrites**; they are branchlike specialized fibers that collect messages from neighboring neurons and send them to the cell body.

3. **axons**; it is a single tract of fibers extending from one side of the cell body responsible for conducting electrical impulses away from the cell body to other neurons, muscles, or glands.

4. **glial cells**; they are supporting cells that surround and protect the nerve cells, they do not send or receive impulses, but mainly help in the nutrition of the nerve cells.

Neurons vary in size and shape from microscopic size to axons that extend hundreds of centimeters like the spinal cord, they function like batteries in that their own
Peripheral nervous system

- is divided into somatic system which has the sensory and motor function
- autonomic system which is responsible for directing the activity of the body's internal organs and glands, consists of sympathetic system which has an arousal function and tends to act as a unit and parasympathetic system which slows down body processes and is more specific in its actions
The Spinal cord

connective function between the central and peripheral nervous system. Passage of the impulses by positron emission technique PET and magnetic resonance imaging MRI across the synapse is mediated by chemical transmitter substances. Neurons are selective in the neurotransmitters that can stimulate them. Some neurotransmitters excite neurons, whereas others inhibit firing of the post synaptic neuron. Discoveries about the brain–behavior relations are made using techniques such as neuropsychological tests, surgical ablation, electrical and chemical stimulation of the brain, EEG, and the recent progress in studying living brain...
Central nervous System

Composed of three parts: the forebrain, midbrain and hindbrain, the major structures within hindbrain include the medulla which monitor and control vital body functions, the pons which contains important groups of sensory and motor neurons, and the cerebellum, which is concerned with motor co-ordination. The mid brain contains important sensory and motor neurons and tracts connecting higher and lower parts of the nervous system. The reticular formation plays a vital role in consciousness, attention and sleep, activity of the ascending reticular formation excites higher areas of the brain and prepare them to respond to stimulation. The descending reticular formation acts as a gate, determining which stimuli get through to enter into consciousness.

The cerebral cortex is divided into frontal, parietal, occipital, and temporal lobes with the thalamus being in the center controlling emotions and behavior and the hypothalamus plays a major role in many aspects of motivational and emotional
Nervous system interaction with the endocrine and immune system

The nervous and endocrine and immune systems have extensive neural and chemical means of communication and each is capable of affecting and being affected by the others.

The endocrine system secretes hormones into the bloodstream, these chemical messengers affect many body processes including the activities of the central and autonomic nervous system. Hormonal effects during pregnancy may produce differences in certain psychological function.
Genetic influences in behavior

Hereditary potential is carried within the DNA portion of the 23 pairs of chromosomes in units called genes. Genotype and phenotype are not identical because some genes are dominant while others are recessive. Many characteristics are polygenic in origin, influenced by the interactions of multiple genes.
Genetic engineering allows scientists to duplicate and alter genetic material or potentially to repair dysfunctional genes. The major research method used is the adoption study and the twin study, both identical and fraternal rose in different environments.
Research Concepts

One of the important concepts in researches are the control groups which are considered to be the core of experimental designs that are identical as possible to the experimental group upon which experimentation is done and only differ in the experimental treatment being applied mainly two
Research methodology

• No treatment control group-1
  It serves examining the treatment efficacy as two groups having the same pathology are compared after one of them receives treatment.

• Same–subject control-2
  Groups in which measurement on criterion of change is taken before a treatment is applied and again after treatment, scores are examined for significance of change, it serves to control the external factors affecting independent persons.
Research design

It is the method in which data are collected on a given research topic constitutes the research design, it varies according to the study plan and objectives of the authors, in researches of psychology, any modality of research design can be used to meet the aim of the study, the most common modalities are:

- Longitudinal study; is the study that follows the same group of subjects over an extended time period with observation to changes in the group, like the treatment
Cross sectional

It examines different groups at various levels of a given variable all at the same time and compare the different groups for a given effect.

Double-Blind; are those in which neither the subject(S) nor the experimenter (E) knows if the treatment an S is receiving is true treatment or a (placebo), this design is useful to control the subjective bias of both the S and E which frequently without awareness influences the outcome of research.
Cross Over

are combination of no –treatment and same-subject control groups. The experimental group is subjected to the events applied to the control group and vice versa. It serves ethical and scientific standards of an experiment.

Independent variables; are those group who has been manipulated like for example (given medication) while dependent variables are those that reflect the effect of independent variables.