BIOPSYCHOLOGY

Human Brain

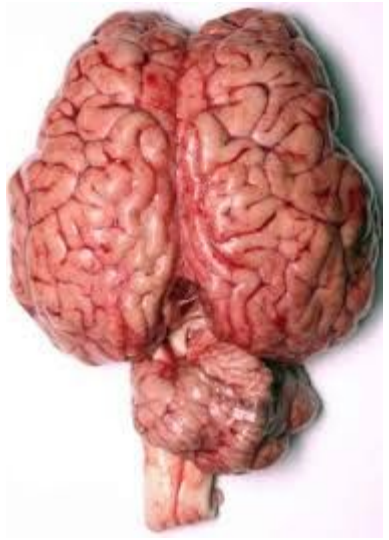
It's a squishy, wrinkled, walnut shaped.

The brain is located in the head.

The cerebral cortex contains approximately 10–20 billion neurons.

The estimated number of neurons in the cerebellum is 55–70 billion.

Weighs 1300-1400 gms.

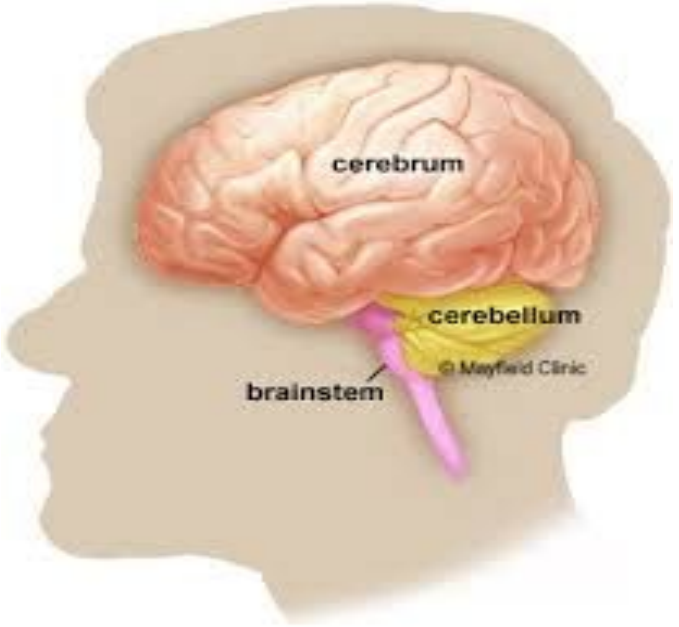


Human Brain

The most complex living structure on the universe.

It make us who we are.

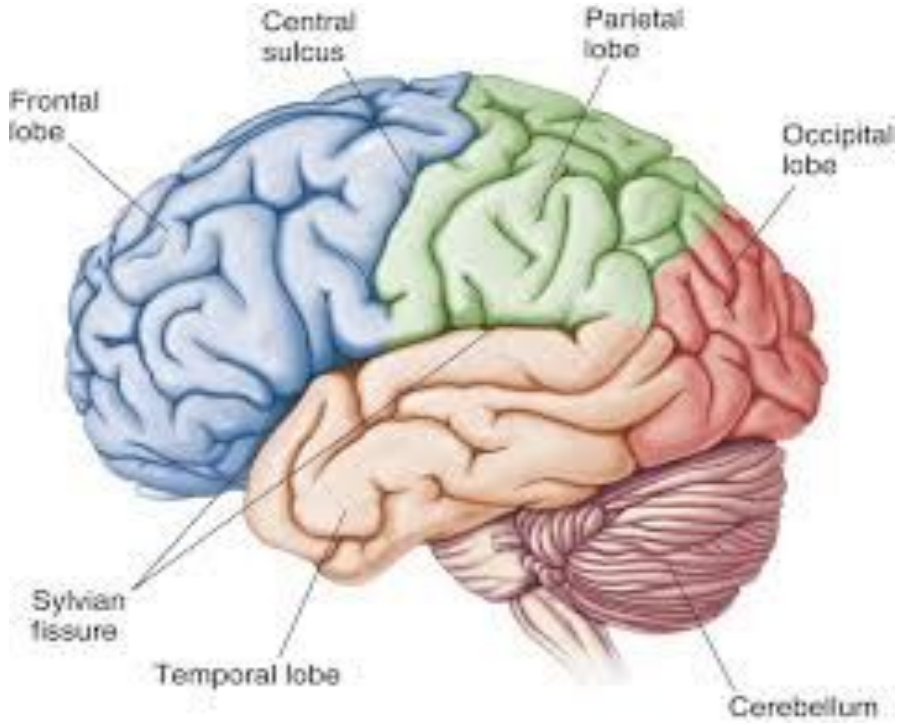
With the Brain- the persons can make Monalisa, an artificial limb, supersonic aircraft.



Parts of the Cerebrum

Parts of the cerebrum:

- Frontal lobe
- Parietal lobe
- Temporal lobe
- Occipital lobe



The case of Jimmie G. : The man Frozen in Time.

- Jimmie G
- Neurologist Oliver Sacks

What is Biopsychology?

- It is scientific study of the biology of behavior. (Dewsbury 1991)
- Psychobiology, behavioral biology, behavioral neuroscience.
- It is best to tell biopsychology because it is biological approach to the study of psychology rather than a psychological approach to the study of biology.
- Psychology is the scientific study of behavior (all overt activities of the organism as well as internal process learning, memory, motivation, perception, emotion).

Started from

- The term "psychobiology" was first used in its modern sense by Knight Dunlap in his book An Outline of Psychobiology (1914).
- Dunlap also was the founder and editor-in-chief of the journal Psychobiology.
- The organization of behavior in 1949 by D.O.HEBB played a key role in its emergence.
- How complex psychological phenomena, perception, emotion, thoughts , memories might be produced by brain activity.

Relation between Bio psychology & other disciplines of neuroscience

- Neuroscience is a team effort and bio psychologists are important members of the team.
- Bio psychologist are neuroscientist who bring to their research a knowledge of behavior and of the methods of behavioral research.
- **Neuroanatomy**- the study of the structure of the nervous system.
- **Neurochemistry**- the study of the chemical bases of neural activity.
- **Neuroendocrinology**- the study of interactions between the nervous system and the endocrine system.
- **Neuropathology**- the study of nervous system disorders.
- **Neuropharmacology**- the study of the effects of drugs on neural activity.
- **Neurophysiology**- the study of the functions and activities of the nervous system.

Types of research in Bio psychological approach

- Both **humans and nonhumans** are the subject of biopsychological approach.
- Nonhumans- mice and rats, cats, dogs
- Advantages of human- 1. they can follow instruction.

  2. they can report their subjective experiences.

Advantages of non human- 1. they have simple brains.

2. it is easy to conduct experiments.

Classical and Operant Conditioning

Insight Learning

Experiments & non- experiments

- Experiments- the experiment is the method used by scientists to study causation, to find out what causes what.
- Two conditions- experimental and control
- **Independent variable**- the variable which is manipulated by the experimenter. The difference between the conditions.
- **Dependent variable**- the variable measured by the experimenter to assess the effect of the independent variable.
- **Confounded variable**- A confounding variable is an outside influence that changes the effect of a dependent and independent variable.

Non- experiment

- Quasi experiment- a quasi experimental design is one that looks a bit like an experimental design but lacks the key ingredient- random assignment.
- Random assignment- this ensures that each participant or subject has an equal chance of being placed in any group.
- Case studies- studies that focus on a single case or subject are called case studies. It provide more in- depth picture. Major problem is generalizability.

Pure and Applied Research

Pure research is motivated primarily by the curiosity of the researcher- it is done purely for the purpose of acquiring knowledge.

Applied research is intended to bring about some direct benefit to humankind.

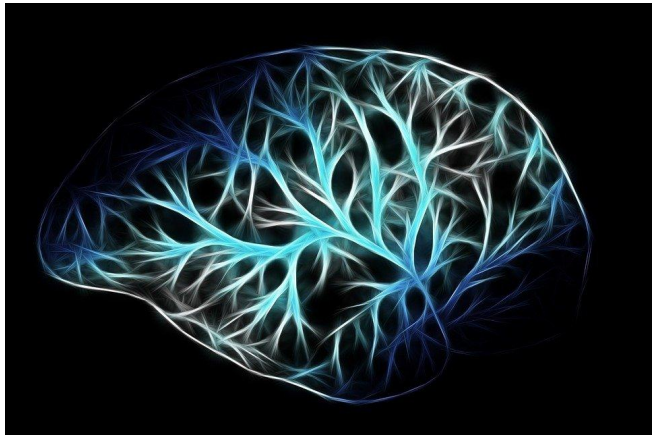
Scope of Bio psychology

- Evolution of brain and behavior; development of the nervous system and behavior over the life span; psychopharmacology; sensory and perceptual processes; control and coordination of movement and actions; control of behavioral states (motivation), including sex and reproductive behavior, and regulation of internal states; biological rhythms and sleep; emotions and mental disorders; neural mechanisms of learning and memory, language and cognition; and recovery of function after damage to the nervous system. Developing from biological psychology and overlapping with parts of it are such fields as behavior genetics as well as hormones and behavior.

Divisions of Biopsychology

PHYSIOLOGICAL PSYCHOLOGY-

It studies the neural mechanisms of behavior through the direct manipulation and recording of the brain in controlled experiments- surgical and electrical methods are most common.



Division of Bio Psychology

PSYCHOPHARAMACOLOGY-

It focuses on the manipulation of neural activity and behavior with drugs.

Psychopharmacologists study the effects of drugs on laboratory species- and on humans if the ethics of the situation permits it.

Divisions of Bio Psychology

NEUROPSYCHOLOGY

It is the study of the psychological effects of brain damage in human patients.

It deals almost exclusively with case studies and quasi experimental studies of patients with brain damage resulting from disease, accident or neurosurgery.

The outer layer of the cerebral hemispheres- the cerebral cortex- is most likely to be damaged by accident or surgery; this is one reason why neuropsychology has focused on this important part of the human brain.

Case of Mr. R, the brain damaged student who switched to architecture

Mr. R, a 21 year old left handed mam, struck his head on the dashboard in a car accident. Prior to his accident, Mr. R. was an honor student at a university. A year after the accident he had become a mediocre students who had particular trouble completing term papers. He was referred to neuropsychologist for the assessment.

1) He was about one third of left handers whose language functions are represented in the right rather than left hemispheres.
2) He had a superior IQ, his verbal memory and reading speed were only low average.

This indicates that his right temporal lobe may have slightly damaged in car accident resulting in an impairment of his language skills.

on the basis of neuropsychological investigations, recommended vocations did not require superior verbal memory skills, he is currently studying architecture.

Divisions of Bio Psychology

PSYCHOPHISIOLOGY

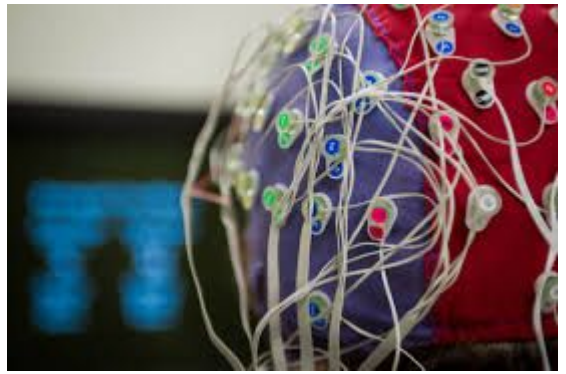
It is the division of bio psychology that studies the relation between physiological activity and psychological processes in human subjects.

The physiological activity is recorded from the surface of the body. The usual measure of brain activity is the scalp electroencephalogram (EEG).

Other common psychophysiological measures are muscle tension, eye movement and several indicators of autonomic nervous systems (heart rate, blood pressure, pupil dilation, electrical conductance of skin.

Autonomic nervous system- it is the division of the nervous system that regulates the body's inner environment

Psychphysiology



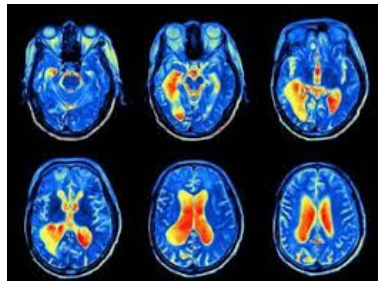
Divisions of Bio psychology

COGNITIVE NEUROSCIENCE

It is the youngest division of Bio psychology

It study the neural bases of cognition, a term that generally refers to higher intellectual processes such as thought, memory, attention, and complex perceptual processes.

The major method of cognitive neuroscience is functional brain imaging recording images of the activity of the living brain.



Divisions of Biopsychology

COMPARATIVE PSYCHOLOGY

Comparative Psychologists compare the behavior of different species in order to understand the evolution, genetics, and adaptiveness of behavior.

TABLE 1.2 The Six Major Divisions of Biopsychology, with Examples of How They Have Approached the Study of Memory

The Six Divisions of Biopsychology	*Examples of How Each Division Approached the Study of Memory*
Physiological psychology: study of the neural mechanisms of behavior by manipulating the nervous systems of nonhuman animals in controlled experiments.	**Physiological psychologists:** have studied the contributions of the hippocampus to memory by surgically removing the hippocampus in rats and assessing their ability to perform various memory tasks.
Psychopharmacology: study of the effects of drugs on the brain and behavior.	**Psychopharmacologists:** have tried to improve the memory of Alzheimer's patients by administering drugs that increase the levels of the neurotransmitter acetylcholine.
Neuropsychology: study of the psychological effects of brain damage in human patients.	**Neuropsychologists:** have shown that patients with alcohol-produced brain damage have particular difficulty in remembering recent events.
Psychophysiology: study of the relation between physiological activity and psychological processes in human subjects by noninvasive physiological recording.	**Psychophysiologists:** have shown that familiar faces elicit the usual changes in autonomic nervous system activity even when patients with brain damage report that they do not recognize a face.
Cognitive neuroscience: study of the neural mechanisms of human cognition, largely through the use of functional brain imaging.	**Cognitive neuroscientists:** have used brain-imaging technology to observe the changes that occur in various parts of the brain while human volunteers perform memory tasks.
Comparative psychology: study of the evolution, genetics, and adaptiveness of behavior, largely through the use of the comparative method.	**Comparative psychologists:** have shown that species of birds that cache their seeds tend to have big hippocampi, confirming that the hippocampus is involved in memory for location.

Converging Operations

Major bio-psychological issues are rarely resolved by a single experiment or even by a single series of experiments taking the same general approach.

Progress is most likely when different approaches are focused on a single problem in such a way that the strengths of one approach compensate for the weaknesses of the others; this combined approach is called **Converging Operations.**

For eg. Korsakoff's Syndrome

Contd...

The point of this discussion of Korsakoff's syndrome is to show you that progress in biopsychology typically comes from converging operations- in this case, from the convergence of neuropsychological case studies (case studies of Korsakoff patients), quasi experiments with human subjects (comparison of alcoholics with people who don't drink alcohol), and controlled experiments on laboratory animals (comparison of thiamine deficient and control rats).

the strength of biopsychology lies in the diversity of its methods and approaches. This means that, in evaluating bio-psychological claims, it is rarely even sufficient to consider the results of one study or even of one line of experiments using the same methods or approach.

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