

Mind and Reacting Mechanism of Nervous System

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“if the human brain were so simple that we could understand if we would be so simple that we couldn’t”. (Emerson Pugh)

Introduction

The mind is about mental processes, thought and consciousness. The body is about the physical aspects of the brain-neurone and how the brain is structured. The mind-body problem is about how these two interact. To understand human behaviour or human consciousness the concept of mind and its related physiological mechanisms are the basic key points of human body. The mind has been with us for ancient times. But at that time we did not understand the functioning of it. After that time different schools of psychology works on it to understand the mind and to understand how mind react with different stimulations. Nervous system takes an important participation to study consciousness and working of human mind.

Physiological and psychological concepts began as same discipline and related field. The brain can be characterized as the psychological and anatomical phenomena to controlling behaviour. In the 19th century the word “mind” was more commonly used than the “behaviour”. Boring (1950) stated that experimental psychology got its start within physiological psychology during the first half of 19th century. Good example of the relation between physiology and psychology is the work of J.Muller, who formulated the doctrine of “specific nerve energies”. In his book human physiology (1840).

Many theories have been put forward to explain the relationship between what we call your mind (defined as the conscious thinking ‘you’ which experience your thoughts) and your brain (i.e. part of our body) The mind which is the source of mental activity is the directive force controlling human action. Within me is the mind with which I feel, think and perform activities. Impressions from the external object are received by nerve impulses and carried to the brain and then mental processes interpret these reactions or stimuli. The nervous system is the mechanism on which the action of the mind depends.

The main reacting mechanisms of nervous system are following:-

1. A typical nerve cell.
2. The brain
3. The spinal cord

1. A Typical Nerve Cell:- The nervous system consists of a vast number of cells called neurones, supported by a special type of connective tissue, neuroglia. Each neurone consists of a cell body, nucleus, one axon and many dendrites. Bundles of axons bound together are called nerves. An impulse is initiated by stimulation of sensory nerve endings or by the passage of an impulse from another nerve.

Synapse and Neurotransmitters: synapse is the point where more than one neurone involved in the transmission of a nerve impulse from its end fibrils to its origin dendrites without any physical contact between these neurones. At its free end the axon of the presynaptic neurone breaks up into minute branches which terminate in small swellings called synaptic knobs or terminal buttons. These are close to the dendrites of cell body of postsynaptic neurone. The space between them is called synaptic cleft. In the ends of the synaptic knobs there are spherical synaptic vesicles contained a chemical i.e. Neurotransmitter which is released by synaptic cleft.

Neurotransmitters act on specific receptor sites on the postsynaptic membranes. Their action is short lived as immediately they have stimulated the post synaptic neurone or effectors organ such as a muscle fibre inactivated by the enzyme or taken back into the synaptic knob. Nor epinephrine is released by brain stem to almost every other part of the brain encouraging brain activity.

Synapses are the biological medium in which activities lay behaviour thinking and motion occurs. If you change the normal activity of synapse than you change how people behave, how they think and how they feel. Understanding the functioning of the synapse has leads to tremendous advances in our understanding of learning and memory, emotions, psychological disorders, drug addiction and in general the chemical formula for mental health (Rose 1973).

2. The Brain: Brain is the major structure of human body. It is located in the skull. Skull is the protecting covering of the brain. Which consist of numerous bones? Brain consists about $1/50^{\text{th}}$ of the body weight.

Left-brain and right-brain theory: - according to left brain and right brain theory every side of the brain controls different functions like thinking. For example a person who is “left brained” is known to be more logical and is highly analytical and the person who has “right- brained” said to be more thoughtful, ideational, intuitive and subjective. The right-brain left-brain theory originated in the work of Roger W. Sperry who was awarded the Nobel prize in 1981. Sperry works on epilepsy. He said that while cutting the corpus calosum it could reduce or eliminate the epilepsy seizures and he also suggested that language was controlled by the left side of the brain.

The Right Brain: According to the left -brain right-brain theory, right brain is best at expressions and creative tasks. Some important abilities of right brain are -

- * Recognizing faces
- * Colour recognition
- * Reading emotions
- * Music
- * Expressions
- * Images
- * Intuitions
- * Creativity tasks

The Left Brain:- this brain considered tasks that involve logic, language and analytical thinking. The main abilities are-

- * Language
- * Logic
- * Numbers
- * Reasoning

The later researches show that both hemispheres of the brain connected with the corpus calosum and both. The brain communicate with each other they work together than abilities of subjects are increased, they perform wide variety of the tasks.

Forebrain: Forebrain is responsible for a variety of functions including receiving and processing sensory information, thinking, perceiving, producing and understanding language and controlling motor functions. Forebrain has further divisions which are cerebrum, basal ganglia, cerebral cortex, hypothalamus, and thalamus.

Cerebrum: The main part of the brain- the cerebrum is divided into two halves: the right hemisphere and the left hemisphere. When seen from the side it looks like a walnut. In general to left hemisphere controls the right side of the body and receives impulses from the right side of the body and of external world; the right hemisphere controls the left side and receives impulses from it. One hemisphere is the mirror image of the other. Each hemisphere has 2 deep grooves known as fissure of Rolando or central sulcus.

There are four lobes which are following:-

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

Frontal lobe: It involves motor cortex. It involved in speaking and muscle movements and in making plans, personality judgements, insight, reasoning and problem solving.

Parietal lobe: It involves sensory cortex. Recognizing objects by touch, body sensations, perception.

Occipital lobe: It involves visual cortex. It includes the visual areas which receive visual information from the opposite visual field.

Temporal lobe: It includes auditory cortex. It includes each area which receive auditory information primarily from the opposite ear. Complex memory and language are tasks.

Cerebral cortex: Cortex means bark. Different regions of cerebral cortex perform different functions. Three regions receive information from the sensory organs. The cerebral cortex covers the surface of brain and where a great amount of information is processed. Different areas of cerebral cortex control memory, language and even your personality. If the part of cerebral cortex is damaged it may lead to loss of awareness of part of our surroundings. For example many people who have lesion in their parietal lobe lose awareness of left side of their external surroundings. If they asked to draw a diagram of anything then they will only draw the right side of that thing.

There may involve these following areas:-

1. Aphasia: impairment of language, usually caused by left hemisphere damage either to broca's area (impairing speaking)

2. **Broca's area:** an area of left frontal lobe that directs the muscle movement involved in speech.

3. **Wernicke's area:** an area of left temporal lobe involved in language comprehension and expression.

Reticular activating system: The brainstem contains many essential structures for breathing, moving alertness and staying awake. Nor epinephrine is released to increased brain activity. **RAS** (reticular activating system) in brain is the most important area which receives signals from many other parts of the brain.

Hypothalamus: The hypothalamus lies at the base of brain under the thalamus. The **RAS** also send signals to the hypothalamus which controls functions such as heart rate and also release histamine which helps in consciousness. Hypothalamus connects with many other regions of the brain and is responsible for controlling hunger, thirst, emotions, body temperature regulation. It helps to govern the endocrine system via the pituitary gland.

Thalamus: **RAS** also communicates with the thalamus. Thalamus commands movement of back from brainstem to the body.

Limbic system: A neuroanatomist Popez (1937) suggested that a set of interconnected brain structures formed a circuit whose primary function was motivation and emotion. Limbic system is the part of cerebral cortex and located around the medial edge of cerebral hemisphere. The cingulated gyrus is the important structure of limbic cortex which is involved with sensory input and concerning emotions and regulation of aggressive behaviour.

Midbrain: The midbrain serves to relay station of information between the hindbrain and forebrain. The mostly information is coming from the eyes and ears. It contains reticular formation. It is a neural network located in the medulla that helps control functions such as sleep, attention, walking reflexes.

Hindbrain: The mid brain, pons and medulla oblongata are often together termed as the brain stem. Hindbrain parts include the medulla, the cerebellum and the Pons.

Medulla: Spinal cord enters the skull where medulla situated. Medulla joins the spinal cord and is anatomically the lowest and the most essential

part of the brain because it contains the centres that maintain the vital functions. Those are following:

- * Cardiac centre
- * Respiratory centre
- * Vasomotor centre
- * Reflex centre of vomiting, coughing, sneezing and swallowing.

Cerebellum: Cerebellum is the second largest part of the brain. It lies between the Pons and medulla. It is also known as little brain. It integrates information and modifies the various activities which related to above set of areas that are auditory, somatosensory information. Damage to this part impairs standing, walking, or performance of coordinated movements. Cerebellum is an important part of the hindbrain, mainly resemble for muscle tone, posture movement etc.

Pons varoli: - Pons means bridge between the 2 hemispheres of the cerebellum. Pons contains a portion of reticular formation including some nuclei that appear to be important in arousal (consciousness) and sleep. It also helps in relaying sensory impulses to and from the brain.

4. Spinal Cord: Spinal cord is elongated almost cylindrical part of central nervous system. The spinal cord is protected by the vertebral column. The inside of the spinal cord consist of cell bodies especially grey matter whereas external part consists of connective axons ie. **White matter.** *Grey matter* resembles the H shape in cross section and contains cell bodies of association neurones, sensory cells which receive impulse from the periphery of the body, lower motor neurone which transmit impulses to the skeletal muscles. *White matter* it collects somatosensory information i.e. Passed on to the brain.

Studies Related To Brain:

1. **Receptors in brain:** There are no pain receptors in the brain. But the meninges (covering around the brain), periosteum (covering on the bones) and scalp having pain receptors. Surgery can be done on the brain without any pain because the brain lacks nociceptors (the pain causing receptors).

2. **Study finds brain changes in young marijuana (it is a name for cannabis a strong smelling plant and a drug) users:** The Boston scientists found that the degree of brain changes appeared to be directly related to the amount participants smoked per week. According to the Boston researchers, the young adults who occasionally smoke marijuana show

abnormalities in 2 areas of the brain which relates to emotion, motivation and decision making, raising concern that it could be damage their development of the brain at a critical time. These researchers found that the degree of brain changes appeared to be directly related to the amount of smoking a participant smoked in a week.

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