UNIT I

DEFINITIONS OF PSYCHOLOGY

Psychology is the scientific study of behaviour and mental processes. Behaviour includes all of our outward or overt actions and reactions, such as verbal and facial expressions and movements.

Mental processes refer to all the internal and covert activity of our mind such as thinking, feeling and remembering. It is a scientific study because to study behaviour and mental processes, the psychologists use the scientific methods for understanding more precisely and accurately.

The word ***Psychology*** has its origin from two ***Greek*** words '***Psyche***' and '**Logos**', 'psyche' means 'soul' and 'logos' means 'study'. Thus literally, Psychology means '***the study of soul'*** or 'science of soul'.

NOTE:-Father of Psychology-Wilhelm Wundt

1. The first definition of the Psychology was the study of the soul:

The earliest attempts at defining Psychology owe their origin to the most mysterious and philosophical concept, namely that of soul. What is soul? How can it be studied? The inability to find clear answers to such questions led some ancient Greek philosophers to define psychology as the study of the mind.

2. In terms of the study of the mind:

Although the word mind was less mysterious and vague than soul, yet it also faced the same questions, namely what is mind? How can it be studied, etc. This definition was also rejected.

3. In terms of the study of consciousness:

The description and explanation of the states of consciousness is the task of Psychology which is usually done by the instrument introspection—process of looking within.

This definition was also rejected on the grounds that:

(i) It could not include the study of the consciousness of animals.

(ii) It would not include subconscious and unconscious activities of mind.

(iii) The introspection method for the study proved that it is most subjective and unscientific method.

4. In terms of the study of behaviour:

The most modern and widely accepted definition of psychology even today, is the study of behaviour, both humans and animals.

5. William McDougall:

In his book An Outline of Psychology, "Psychology is a science which aims to give us better understanding and control of the behaviour of the organism as a whole".

6. JB Watson:

Psychology is "the science of behaviour" (taking into account the human as well as animal behaviour).

7. NL Munn:

"Psychology is the science and the properly trained psychologist is a scientist, or at least a practitioner who uses scientific methods and information resulting from scientific investigations".

Science is the body of systematized knowledge that is gathered by carefully observing and measuring events. The observation of events are systematized in various ways but mainly classifying them into categories and establishing general laws and principles to describe and predict events as accurately as possible. Psychology has these characteristics; it clearly belongs within the province of science.

Thus it is not simply enough to describe behaviour. Like any other science, psychology attempts to explain, predict, modify and ultimately improve the lives of people in the world in which they live.

By using scientific methods psychologists are able to find answers to questions about the nature of human behaviour that are far more valid and legitimate than those resulting from mere intention and speculation. The experiments and observations which are made can be repeated and verified by others because of its objectivity, reliability, validity and predictability which are the characteristics of basic science.

GOALS OF PSYCHOLOGY

1.Describe

Psychology is a science. It aims to understand the behavior of others and gather information about the way the brain works in order to better serve humanity. By observing different human behaviors, psychologists determine what is normal and healthy and what is unhealthy. Psychology analyzes the thoughts, feelings, actions and goals of people through the help of various case studies, observations and surveys.

Pavlov noticed that his dogs were salivating as the result of a stimuli – the lab assistant approaching – before food was even presented to them. This observation acted as a description of what was happening. Once psychologists can describe a behavior or phenomenon, they can use that as a basis for learning more about that behavior.

2.Explain

Why does this behavior occur? Under what circumstances will it occur again? In order to explain a behavior, psychologists must conduct experiments to ensure that the behavior is not an anomaly. If there's only one person (or animal) exhibiting this behavior, it certainly isn't a cultural norm. In the case of Pavlov, he was able to conduct an experiment using multiple dogs that all seemed to behave in the same way. Through this experiment he was able to notice a handful of important things about the behavior of others. And thus, classical conditioning came to be.

When presented with an unconditioned stimulus (the food), the dogs began to salivate – which is the unconditioned response. When presented with delicious food, humans tend to salivate, right? After the dogs were fed for a period of time, Pavlov began to notice that even the presence of his lab assistant, who fed the dogs, caused them to salivate. Once he noticed this was happening, he realized that he had come across a wonderful psychological discovery. The lab assistant, which was once a neutral stimulus, had become a conditioned stimulus. To further his experiment, Pavlov introduced a bell as a neutral stimulus.

3.Predict

Based on past observed behavior, a psychologist aims to predict how that behavior will appear again in the future and if other people will exhibit the same behavior. Pavlov predicted that the new neutral stimulus – the bell – would become a conditioned stimulus if he presented it with food enough times. Sure enough, after presenting the dogs with food at the same time the bell was sounded, he was able to condition the dogs to salivate when the bell rang even when they weren't presented with food. This discovery held a lot of importance in the world of psychology and allowed many people to influence the behavior of others.

4.Control

What did Pavlov's discovery mean for the future of psychology? It meant that teachers could take control of their classroom easier, parents could teach their children to exhibit good behavior, and manipulative older siblings could control the behaviors of their younger siblings. In other areas of psychology, experiments are used to train new employees faster, increase the success of students and reduce drug addiction.

SCOPE OF PSYCHOLOGY/SUBFIELDS OF PSYCHOLOGY

The field of psychology can be understood by various subfields of psychology making an attempt in meeting the goals of psychology.

1. Physiological Psychology:

In the most fundamental sense, human beings are biological organisms. Physiological functions and the structure of our body work together to influence our behaviour. Biopsychology is the branch that specializes in the area. Bio-psychologists may examine the ways in which specific sites in the brain which are related to disorders such as Parkinson's disease or they may try to determine how our sensations are related to our behaviour.

2. Developmental Psychology:

Here the studies are with respect to how people grow and change throughout their life from prenatal stages, through childhood, adulthood and old age. Developmental psychologists work in a variety of settings like colleges, schools, healthcare centres, business centres, government and non-profit organizations, etc. They are also very much involved in studies of the disturbed children and advising parents about helping such children.

3. Personality Psychology:

This branch helps to explain both consistency and change in a person's behaviour over time, from birth till the end of life through the influence of parents, siblings, playmates, school, society and culture. It also studies the individual traits that differentiate the behaviour of one person from that of another person.

4. Health Psychology:

This explores the relations between the psychological factors and physical ailments and disease. Health psychologists focus on health maintenance and promotion of behaviour related to good health such as exercise, health habits and discouraging unhealthy behaviours like smoking, drug abuse and alcoholism.

Health psychologists work in healthcare setting and also in colleges and universities where they conduct research. They analyse and attempt to improve the healthcare system and formulate health policies.

5. Clinical Psychology:

It deals with the assessment and intervention of abnormal behaviour. As some observe and believe that psychological disorders arise from a person's unresolved conflicts and unconscious motives, others maintain that some of these patterns are merely learned responses, which can be unlearned with training, still others are contend with the knowledge of thinking that there are biological basis to certain psychological disorders, especially the more serious ones. Clinical psychologists are employed in hospitals, clinics and private practice. They often work closely with other specialists in the field of mental health.

6. Counselling Psychology:

This focuses primarily on educational, social and career adjustment problems. Counselling psychologists advise students on effective study habits and the kinds of job they might be best suited for, and provide help concerned with mild problems of social nature and strengthen healthy lifestyle, economical and emotional adjustments.

They make use of tests to measure aptitudes, interests and personality characteristics. They also do marriage and family counselling, provide strategies to improve family relations.

7. Educational Psychology:

Educational psychologists are concerned with all the concepts of education. This includes the study of motivation, intelligence, personality, use of rewards and punishments, size of the class, expectations, the personality traits and the effectiveness of the teacher, the student-teacher relationship, the attitudes, etc. It is also concerned with designing tests to evaluate student performance. They also help in designing the curriculum to make learning more interesting and enjoyable to children.

Educational psychology is used in elementary and secondary schools, planning and supervising special education, training teachers, counselling students having problems, assessing students with learning difficulties such as poor writing and reading skills and lack of concentration.

8. Social Psychology:

This studies the effect of society on the thoughts, feelings and actions of people. Our behaviour is not only the result of just our personality and predisposition. Social and environmental factors affect the way we think, say and do. Social psychologists conduct experiments to determine the effects of various groups, group pressures and influence on behaviour.

They investigate on the effects of propaganda, persuation, conformity, conflict, integration, race, prejudice and aggression. These investigations explain many incidents that would otherwise be difficult to understand. Social psychologists work largely in colleges and universities and also other organizations.

9. Industrial and Organizational Psychology:

The private and public organizations apply psychology to management and employee training, supervision of personnel, improve communication within the organization, counselling employees and reduce industrial disputes.

Thus we can say that in organizational and industrial sectors not only the psychological effects of working attitude of the employees are considered but also the physical aspects are given importance to make workers feel healthy.

10. Experimental Psychology:

It is the branch that studies the processes of sensing, perceiving, learning, thinking, etc. by using scientific methods. The outcome of the experimental psychology is cognitive psychology which focuses on studying higher mental processes including thinking, knowing, reasoning, judging and decision-making. Experimental psychologists often do research in lab by frequently using animals as their experimental subjects.

11. Environmental Psychology:

It focuses on the relationships between people and their physical and social surroundings. For example, the density of population and its relationship with crime, the noise pollution and its harmful effects and the influence of overcrowding upon lifestyle, etc.

12. Psychology of Women:

This concentrates on psychological factors of women's behaviour and development. It focuses on a broad range of issues such as discrimination against women, the possibility of structural differences in the brain of men and women, the effect of hormones on behaviour, and the cause of violence against women, fear of success, outsmarting nature of women with respect to men in various accomplishments.

13. Sports and Exercise Psychology:

It studies the role of motivation in sport, social aspects of sport and physiological issues like importance of training on muscle development, the coordination between eye and hand, the muscular coordination in track and field, swimming and gymnastics.

14. Cognitive Psychology:

It has its roots in the cognitive outlook of the Gestalt principles. It studies thinking, memory, language, development, perception, imagery and other mental processes in order to peep into the higher human mental functions like insight, creativity and problem-solving. The names of psychologists like Edward Tolman and Jean Piaget are associated with the propagation of the ideas of this school of thought.

15.Forensic psychology:

Production of psychological knowledge and its application to civil and criminal justice system.

ROLE OF A PSYCHOLOGIST IN SOCIETY

Psychologists contribute to the well-being of society by helping people understand their emotions and behaviors and managing them to lead a better life. The contribution of a psychologist is present at every stage of human life, from babyhood to old age. From enabling children to perform better at school to empowering adults to cope with relationships and life events, a psychologist's role in society is invaluable.

Human Behavior

Psychologists study human traits, behaviors and emotions, and then analyze these factors. They also observe the influence of cultural beliefs, environments and situations on human actions, including relationships and social interactions. Psychologists employ several techniques, such as hypnosis, clinical observations and subject interviews, for their studies. These studies help them understand the different personalities and behavioral aspects of people, and this understanding can help improve interactions between different people, cultures and countries to promote better relations. Psychologists also study behaviors and mental developments of human beings at all stages of life, from infancy to old age. Such studies help healthcare providers diagnose and treat harmful behaviors, such as smoking, drug addictions and alcohol abuse. These studies also help manage or even delay disabilities resulting from aging.

Medical Conditions

Psychologists diagnose mental health disorders and develop treatment plans for patients. They also provide emotional support for patients fighting terminal medical conditions and educate patients, as well as family members, in various coping techniques to make life tolerable for both. Psychologists use different techniques, including counseling and behavior therapy, to help patients and loved ones. They also conduct studies and research to understand mental conditions and terminal illnesses and to discover techniques for managing them better.

Improve Way of Life

Psychologists in school settings work with students to understand their learning and behavioral problems. They work in association with the school management, staff and parents to create solutions that address different learning needs of students, including that of gifted children and children with disabilities. In addition, they assist school administration in developing effective study and behavioral strategies for overall student development. In work settings, psychologists study and assess workplace conditions and recommend changes that can increase productivity; they also help management hire the right kind of staff and work with employees to cope with workplace stress. Psychologists also help people lead a richer life by helping them manage relationship problems and overcome emotional problems or past hurts.

Other Contributions

In legal settings, psychologists assist law enforcers by providing insight into the psychological aspect of civil and criminal cases. They investigate child abuse allegations, conduct mental capacity assessments of witnesses, and provide essential assistance in cases that involve child witnesses. Psychologists also provide counseling and other psychiatric help for crime victims.

PERSPECTIVES IN PSYCHOLOGY

Since Wilhelm Wundt opened the first psychology lab in 1879, psychologists have studied various aspects of human behavior, such as personality, brain functions and socio-cultural influences. As psychology progressed, it began to tackle the question of why we do what we do from different angles, including: biological, psychodynamic, behavioral, cognitive and humanistic perspectives.

1.Biological Approach

Biopsychologists look at how your nervous system, hormones and genetic makeup affect your behavior. Biological psychologists explore the connection between your mental states and your brain, nerves and hormones to explore how your thoughts, moods and actions are shaped.

So what does that mean? It means that for the biological approach, you are the sum of your parts. You think the way you do because of the way your brain is built and because of your body's needs. All of your choices are based on your physical body. The biological approach attempts to understand the healthy brain, but it also examines the mind and body to figure out how disorders like schizophrenia develop from genetic roots.

2.Psychodynamic Approach

The psychodynamic approach was promoted by Sigmund Freud, who believed that many of our impulses are driven by sex. Psychologists in this school of thought believe that unconscious drives and experiences from early childhood are at the root of your behaviors and that conflict arises when societal restrictions are placed on these urges.

There are a lot of jokes about Freud and his now mostly outdated theories. But have you ever thought that something about who you are today comes from your experiences as a child? Say, you blame your smoking habit on an oral fixation that stems from being weaned from breastfeeding too early as a baby. Well, that also comes from Freud's theories, and it was an idea that revolutionized how we see ourselves.

3.Behavioral Approach

Behavioral psychologists believe that external environmental stimuli influence your behavior and that you can be trained to act a certain way. Behaviorists like B.F. Skinner don't believe in free will. They believe that you learn through a system of reinforcements and punishment.

The behavioral approach is really effective when you don't care what someone thinks, as long as you get the desired behavior. The influence of these theories affects us every day and throughout our lives, impacting everything from why we follow the rules of the road when driving to how advertising companies build campaigns to get us to buy their products.

4.Cognitive Approach

In contrast to behaviorists, cognitive psychologists believe that your behavior is determined by your expectations and emotions. Cognitive psychologist Jean Piaget would argue that you remember things based on what you already know. You also solve problems based on your memory of past experiences.

So, with this approach, we turn away from people as machines without free will and delve back into thoughts and feelings. How you act is based upon internal processes, and there is much more stress upon individuals. From a cognitive perspective, your expectations of an upcoming party will affect how you feel and act while you're there and will color your memory of the night after you return home.

5.Humanistic Approach

Humanistic psychologists believe that you're essentially good and that you're motivated to realize your full potential. Psychologists from this camp focus on how you can feel good about yourself by fulfilling your needs and goals. The prominent humanistic psychologist Carl Rogers called his patients 'clients' and offered a supportive environment in which clients could gain insight into their own feelings.

In contrast to the behavioral approach, the humanistic approach works on individual empowerment. Whether you are right or not, in a larger sense, you are motivated to be the best person you can be. All your choices come from trying to improve your life. So, if you're trying to cut back on your nightly wine consumption, a humanistic therapist would be encouraging and supportive but won't directly advise you to quit or try to analyze why you drink in the first place.

SCOPE OF FORENSIC PSYCHOLOGY

Forensic psychology involves application of psychological research, theory, and clinical practice to the legal/criminal justice system.

- Psychological Evaluation And Expert Testimony
- Testimony And Evaluation Regarding Civil Issues
- Assessment, Treatment, And Consultation Regarding Individuals With A High Risk For Aggressive Behavior
- Research, testimony and consultation on psychological issues impacting on the legal process
- Specialized treatment service to individuals involved with the legal system
- Consultation to lawmakers about public policy issues with psychological implications and training to law enforcement, criminal justice, correctional and mental health systems on forensic issues
- Analysis of issues related to human performance, product liability and safety
- Court-appointed monitoring of compliance with settlements in class-action suits affecting mental health or criminal justice settings."

Other sub-specialties of Forensic Psychology are:

- **Police Psychology:**
  Police Psychology is the application of psychological principles and clinical skills to law enforcement and public safety(Bartol,1996). Law enforcement agencies have become more professional, educated and the public more critical and concerned, there has been an increase in the need for services provided by forensic or police psychologist. They perform pre-employment psychological assessment, Fitness-For-Duty-Evaluations(FFDE), special-unit evaluations, hostage negotiation team and deadly force incident evaluations. Special-team evaluations include the selection and training of Special Weapons and Tactics Team(SWAT), Tactical Response Team(TRT) and Hostage Negotiation Team(HNT).
  Forensic psychologist are also involved in investigation activities such as developing criminal profiles, psychological autopsy, eye-witness testimonies, detecting deceptions etc.
- **Investigative Psychology and Offender Profiling**
- **Criminal Psychology & Criminal Behavior**
- **Correctional Psychology**
  Psychologists employed by prisons, jails and other correctional facilities and programs or who offer consulting services to these institutions and programs.
  Correctional psychologist has specific academic or training programs in correctional philosophy systems, offender management, forensic report writing, treatment aimed at reducing recidivism and outcome research.
  The main goal of correctional psychologist is to help inmate rehabilitation, treatment and reintegration into the community.
- **Victimology and Victims Services**
  Victimology refers to the study of persons who have experienced either actual or threatened physical, psychological, social and financial harm as a result of the commission or attempted commission of crime against them.
  The harm may be direct or primary(against those who experience it and its consequences first hand) or indirect or secondary (against family members, relatives, survivors or friends who experience the harm because of their closeness to the victim
  Violent victimization of children, such as terrifying abductions, school shootings and sexual attacks can disrupt the course of child development in very fundamental ways and can be associated with emotional and cognitive problems over the course of the life span.

NOTE:- Hugo Münsterberg, German psychologist, doctoral student of Wilhelm Wundt(1863-1916) is often referred to as the founding father of forensic psychology.

THE DUTIES OF A FORENSIC PSYCHOLOGIST

As many would expect, a Forensic Psychologist works very closely with the justice system. Some of the responsibilities they have are

- To conduct screenings or assessments of prisoners
- Investigate psychological disorders among criminal and civil court defendants, and
- To examine the mental state of criminals to determine if they are able to stand trial.
- Forensic Psychologists work among law enforcement agencies and are frequently called to testify in court on behalf of the defendant or in favor of a theory police or prosecutors have about the mind of a criminal defendant.
- Forensic Psychologists also develop a relationship with their clients by providing one-on-one therapy, especially in an instance where police have been involved or there is a court order situation. These sessions are not only for research and study purposes but for therapeutic reasons to the patient as well. It may require the psychologists to perform activities that are occasionally unpleasant. Prison life is stressful for people who are incarcerated, and they may experience or discover mental health issues while in the care of the prison psychologist. In some cases, the Forensic Psychologist may recommend group sessions. One primary objective that a Forensic Psychologist has is to protect the rights of each client they see. One of the job perks is that positions in Forensic Psychology often offer a nine to five schedule.

UNIT II

NERVOUS SYSTEM

The nervous system is the major controlling, regulatory, and communicating system in the body. It is the center of all mental activity including thought, learning, and memory. Together with the endocrine system, the nervous system is responsible for regulating and maintaining homeostasis. Through its receptors, the nervous system keeps us in touch with our environment, both external and internal.

Like other systems in the body, the nervous system is composed of organs, principally the brain, spinal cord, nerves, and ganglia. These, in turn, consist of various tissues, including nerve, blood, and connective tissue. Together these carry out the complex activities of the nervous system.

The various activities of the nervous system can be grouped together as three general, overlapping functions:

1. Sensory
2. Integrative
3. Motor

Millions of sensory receptors detect changes, called stimuli, which occur inside and outside the body. They monitor such things as temperature, light, and sound from the external environment. Inside the body, the internal environment, receptors detect variations in pressure, pH, carbon dioxide concentration, and the levels of various electrolytes. All of this gathered information is called sensory input.

Sensory input is converted into electrical signals called nerve impulses that are transmitted to the brain. There the signals are brought together to create sensations, to produce thoughts, or to add to memory; Decisions are made each moment based on the sensory input. This is integration.

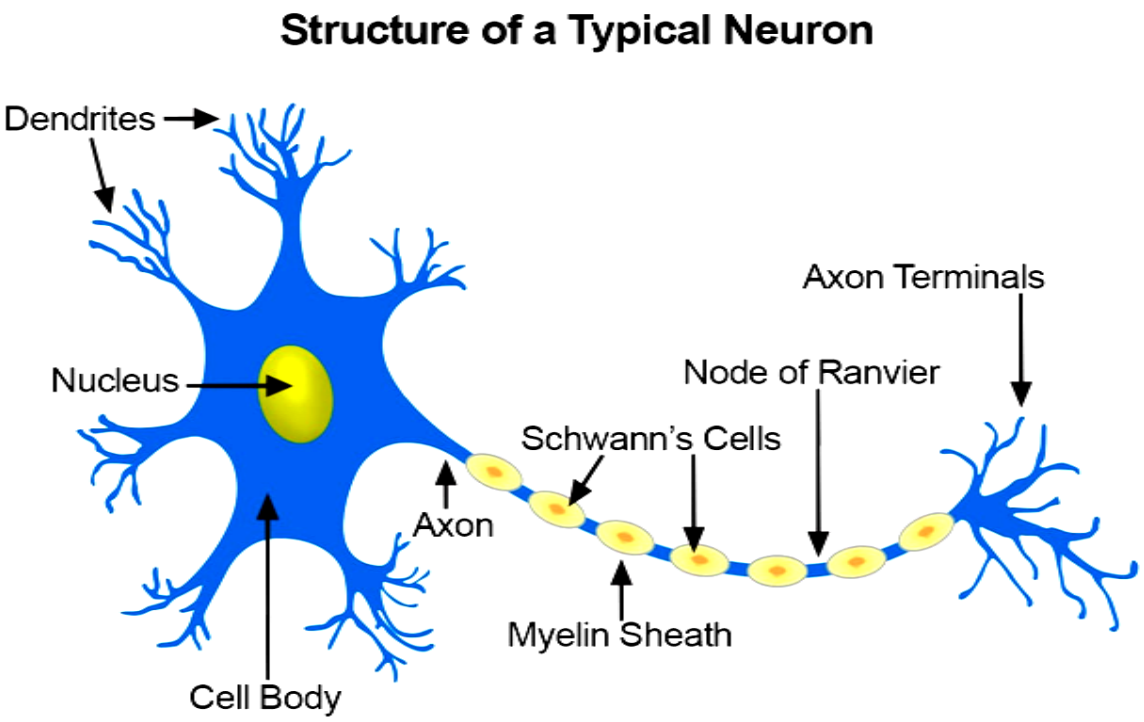
Based on the sensory input and integration, the nervous system responds by sending signals to muscles, causing them to contract, or to glands, causing them to produce secretions. Muscles and glands are called effectors because they cause an effect in response to directions from the nervous system. This is the motor output or motor function.

NEURONS

Neurons, or nerve cells, carry out the functions of the nervous system by conducting nerve impulses. They are highly specialized and amitotic. This means that if a neuron is destroyed, it cannot be replaced because neurons do not go through mitosis. The neurons, which are the

functional unit of the neural system, have this amazing ability to detect, receive and also transmit the various kinds of stimuli. In scientific terms, the way these neurons communicate with each other is a nerve impulse. They are generally electrical signals that travel along the axon of the neuron.

The neurons communicate with each other at specific points or junctions called the synapses. These synapses can be chemical, communicating through chemical messengers or electrical, where there is a flow of ions between the cells. The image below illustrates the structure of a typical neuron.



Each neuron has three basic parts: cell body (soma), one or more dendrites, and a single axon.

Neurons vary in size, shape, and structure depending on their role and location. However, nearly all neurons have three essential parts: a cell body, an axon, and dendrites.

Cell body

Also known as a soma, the cell body is the neuron's core. The cell body carries genetic information, maintains the neuron's structure, and provides energy to drive activities.

Like other cell bodies, a neuron's soma contains a nucleus and specialized organelles. It's enclosed by a membrane which both protects it and allows it to interact with its immediate surroundings.

Axon

An axon is a long, tail-like structure which joins the cell body at a specialized junction called the axon hillock. Many axons are insulated with a fatty substance called myelin. Myelin helps axons to conduct an electrical signal. Neurons generally have one main axon.

Dendrites

Dendrites are fibrous roots that branch out from the cell body. Like antennae, dendrites receive and process signals from the axons of other neurons. Neurons can have more than one set of dendrites, known as dendritic trees.

TYPES OF NEURONS

There are three major types of neurons: sensory neurons, motor neurons, and interneurons. All three have different functions, but the brain needs all of them to communicate effectively with the rest of the body (and vice versa).

- **Sensory Neurons**

Sensory neurons are neurons responsible for converting external stimuli from the environment into corresponding internal stimuli. They are activated by sensory input, and send projections to other elements of the nervous system, ultimately conveying sensory information to the brain or spinal cord. Unlike the motor neurons of the central nervous system (CNS), whose inputs come from other neurons, sensory neurons are activated by physical modalities (such as visible light, sound, heat, physical contact, etc.) or by chemical signals (such as smell and taste).

Most sensory neurons are pseudounipolar, meaning they have an axon that branches into two extensions—one connected to dendrites that receive sensory information and another that transmits this information to the spinal cord.

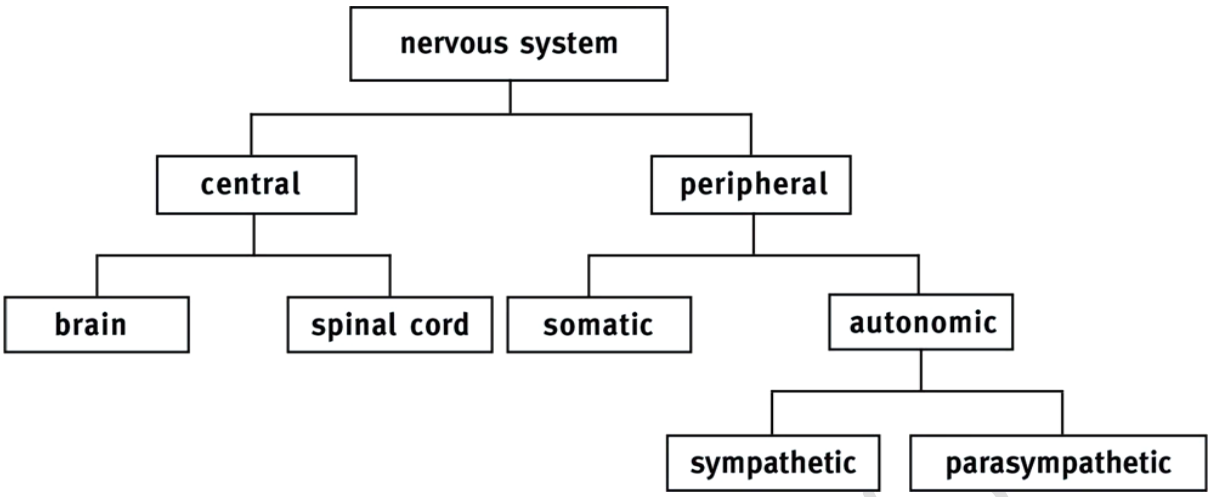
- **Motor Neurons**

Motor neurons are neurons located in the central nervous system, and they project their axons outside of the CNS to directly or indirectly control muscles. The interface between a motor neuron and muscle fiber is a specialized synapse called the neuromuscular junction. The structure of motor neurons is multipolar, meaning each cell contains a single axon and multiple dendrites. This is the most common type of neuron.

- **Interneurons**

Interneurons are neither sensory nor motor; rather, they act as the “middle men” that form connections between the other two types. Located in the CNS, they operate locally, meaning their axons connect only with nearby sensory or motor neurons. Interneurons can save time and therefore prevent injury by sending messages to the spinal cord and back instead of all the way to the brain. Like motor neurons, they are multipolar in structure.

CLASSIFICATION OF THE NERVOUS SYSTEM



Although terminology seems to indicate otherwise, there is really only one nervous system in the body. Although each subdivision of the system is also called a "nervous system," all of these smaller systems belong to the single, highly integrated nervous system. Each subdivision has structural and functional characteristics that distinguish it from the others. The nervous system as a whole is divided into two subdivisions: the central nervous system (CNS) and the peripheral nervous system (PNS).

The Central Nervous System

The brain and spinal cord are the organs of the central nervous system. Because they are so vitally important, the brain and spinal cord, located in the dorsal body cavity, are encased in bone for protection. The brain is in the cranial vault, and the spinal cord is in the vertebral canal of the vertebral column. Although considered to be two separate organs, the brain and spinal cord are continuous at the foramen magnum. In addition to bone, the CNS is surrounded by connective tissue membranes, called meninges, and by cerebrospinal fluid.

The Peripheral Nervous System

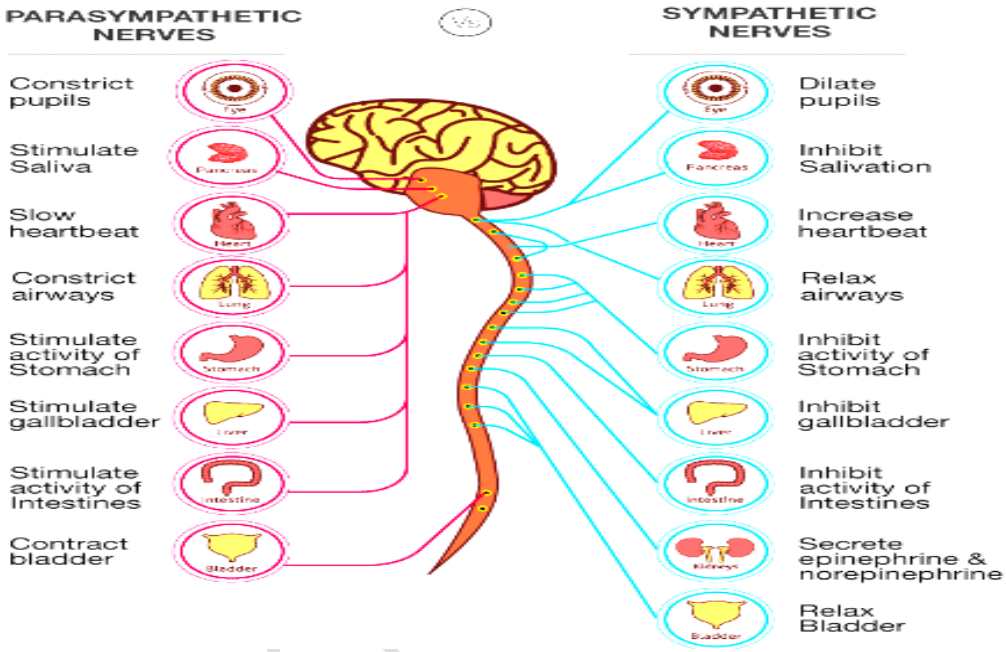
The organs of the peripheral nervous system are the nerves and ganglia. Nerves are bundles of nerve fibers, much like muscles are bundles of muscle fibers. Cranial nerves and spinal nerves extend from the CNS to peripheral organs such as muscles and glands. Ganglia are collections, or small knots, of nerve cell bodies outside the CNS.

The peripheral nervous system is further subdivided into an afferent (sensory) division and an efferent (motor) division. The afferent or sensory division transmits impulses from peripheral organs to the CNS. The efferent or motor division transmits impulses from the CNS out to the peripheral organs to cause an effect or action.

Finally***, the efferent or motor division is again subdivided into the somatic nervous system and the autonomic nervous system***.

The **somatic nervous system**, also called the somatomotor or somatic efferent nervous system, supplies motor impulses to the skeletal muscles. Because these nerves permit conscious control of the skeletal muscles, it is sometimes called the voluntary nervous system.

The **autonomic nervous system**, also called the visceral efferent nervous system, supplies motor impulses to cardiac muscle, to smooth muscle, and to glandular epithelium. It is further subdivided into **sympathetic** and **parasympathetic** divisions. Because the autonomic nervous system regulates involuntary or automatic functions, it is called the involuntary nervous system.



NERVE IMPULSE

The neurons are cells with some special abilities. These cells get excited, because of the membranes that are in a polarised state. Each neuron has a charged cellular membrane, which means there is a voltage difference between the inside and the outside membrane.

There are also different types of ion channels on the cellular membrane, which are selectively permeable to certain ions, present in the membrane of the neuron. Ions must pass through ion channels when they either enter or exit the neurons. These ion channels can be open, closed or inactive.

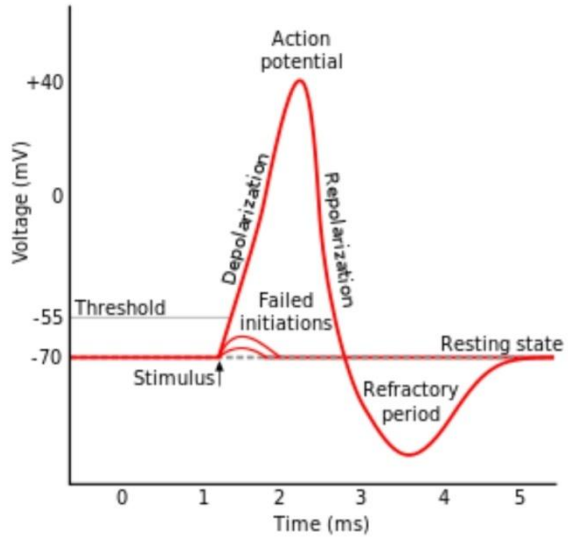
- Membrane potential – It is the difference in the total charge between the inside of the cell and the outside of the cell.
- Resting membrane potential – It is the difference in voltage across the cell membrane in a resting state. (A neuron is said to be at rest when it does not conduct any impulse. At this stage, the axonal membrane of the neuron is more permeable to the potassium ions and not permeable to the sodium ions.)

- Action potential – It is a short-term change in the electrical potential that travels across the neuron cell.

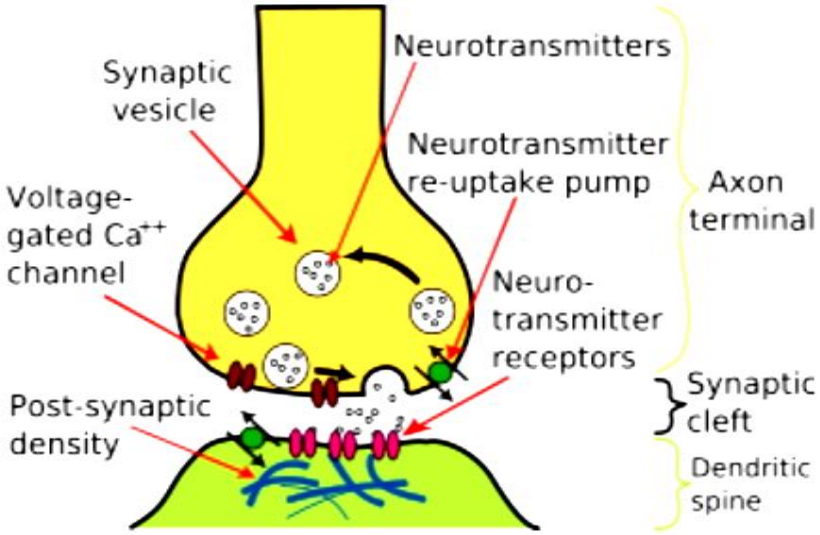
GENERATION AND TRANSMISSION OF THE NERVE IMPULSE

A nerve impulse is generated when the stimulus is strong. This stimulus triggers the electrical and chemical changes in the neuron. As mentioned already there are different ions on either side of the cell membrane. The exterior side has sodium ions that are positively charged and are more in number. The interior side of the cell is negatively charged with more potassium ions. Due to this difference in the charges, there is an electrochemical difference.

When a nerve impulse is generated, there is a change in the permeability of the cell membrane. The sodium ions flow inside and potassium ions flow outside, causing a reversal of charges. The cell is now depolarised. This depolarization results in an action potential which causes the nerve impulse to move along the length of the axon. This depolarization of the membrane occurs along the nerve. A series of reactions occur where the potassium ions flow back into the cell and sodium ions move out of the cell. This whole process again results in the cell getting polarised, with the charges being restored.



When the nerve impulse reaches the end of the axon, there are some chemicals released from the neurotransmitters. They diffuse across the synaptic gap, which is the small space present between the axon and the receptors. Nerve impulses can be transmitted either by the electrical synapse or the chemical synapse.



NEUROTRANSMITTERS AND THEIR FUNCTIONS

Neurotransmitters are often referred to as the body's chemical messengers. They are the molecules used by the nervous system to transmit messages between neurons, or from neurons to muscles.

Communication between two neurons happens in the synaptic cleft (the small gap between the synapses of neurons). Here, electrical signals that have travelled along the axon are briefly converted into chemical ones through the release of neurotransmitters, causing a specific response in the receiving neuron.

A neurotransmitter influences a neuron in one of three ways: excitatory, inhibitory or modulatory.

An excitatory transmitter promotes the generation of an electrical signal called an action potential in the receiving neuron, while an inhibitory transmitter prevents it. Whether a neurotransmitter is excitatory or inhibitory depends on the receptor it binds to.

Neuromodulators are a bit different, as they are not restricted to the synaptic cleft between two neurons, and so can affect large numbers of neurons at once. Neuromodulators therefore regulate populations of neurons, while also operating over a slower time course than excitatory and inhibitory transmitters.

Most neurotransmitters are either small amine molecules, amino acids, or neuropeptides. There are about a dozen known small-molecule neurotransmitters and more than 100 different neuropeptides, and neuroscientists are still discovering more about these chemical messengers. These chemicals and their interactions are involved in countless functions of the nervous system as well as controlling bodily functions.

- **Acetylcholine**

The first neurotransmitter to be discovered was a small molecule called **acetylcholine**. It plays a major role in the peripheral nervous system, where it is released by motor neurons and neurons of the autonomic nervous system. It also plays an important role in the central nervous system in maintaining cognitive function. Damage to the cholinergic neurons of the CNS is associated with Alzheimer disease. Acetylcholine

Acetylcholine triggers muscle contractions, stimulates some hormones, and controls the heartbeat. It also plays an important role in brain function and memory. It is an excitatory neurotransmitter.

Low levels of acetylcholine are linked with issues with memory and thinking, such as those that affect people with Alzheimer's disease. Some Alzheimer's medications help slow the breakdown of acetylcholine in the body, and this can help control some symptoms, such as memory loss.

Having high levels of acetylcholine can cause too much muscle contraction. This can lead to seizures, spasms, and other health issues.

- **Glutamate** is the primary excitatory transmitter in the central nervous system. Conversely, a major inhibitory transmitter is its derivative
- **γ-aminobutyric acid (GABA)**
  Gamma-aminobutyric acid (GABA) is a mood regulator. It has an inhibitory action, which stops neurons from becoming overexcited. This is why low levels of GABA can cause anxiety, irritability, and restlessness.
  Benzodiazepines, or "benzos," are drugs that can treat anxiety. They work by increasing the action of GABA. This has a calming effect that can treat anxiety attacks.
- **Glycine**,
  which is mainly found in the spinal cord.
- **Dopamine**

Many neuromodulators, such as dopamine**,** are monoamines. There are several dopamine pathways in the brain, and this neurotransmitter is involved in many functions, including motor control, reward and reinforcement, and motivation.

Dopamine is important for memory, learning, behavior, and movement coordination. Many people know dopamine as a pleasure or reward neurotransmitter. The brain releases dopamine during pleasurable activities.

Dopamine is also responsible for muscle movement. A dopamine deficiency can cause Parkinson's disease.

A healthful diet may help balance dopamine levels. The body needs certain amino acids to produce dopamine, and amino acids are found in protein-rich foods.

Meanwhile, eating high amounts of saturated fat can lead to lower dopamine activity, according to research from 2015. Also, certain studies suggest that a deficiency in vitamin D can lead to low dopamine activity.

- **Noradrenaline**

Noradrenaline (or norepinephrine) is another monoamine, and is the primary neurotransmitter in the sympathetic nervous system where it works on the activity of various organs in the body to control blood pressure, heart rate, liver function and many other functions.

- **Serotonin**

Neurons that use **Serotonin** (another monoamine) project to various parts of the nervous system. As a result, serotonin is involved in functions such as sleep, memory, appetite, mood and others. It is also produced in the gastrointestinal tract in response to food.

- **Histamine**

Histamine the last of the major monoamines, plays a role in metabolism, temperature control, regulating various hormones, and controlling the sleep-wake cycle, amongst other functions.

- **Endorphins**

Endorphins inhibit pain signals and create an energized, euphoric feeling. They are also the body's natural pain relievers.

One of the best-known ways to boost levels of feel-good endorphins is through aerobic exercise. A "runner's high," for example, is a release of endorphins. Also, research indicates that laughter releases endorphins.

Endorphins may help fight pain. The National Headache Foundation say that low levels of endorphins may play a role in some headache disorders.

- **Epinephrine**

Also known as adrenaline, epinephrine is involved in the body's "fight or flight" response. It is both a hormone and a neurotransmitter.

When a person is stressed or scared, their body may release epinephrine. Epinephrine increases heart rate and breathing and gives the muscles a jolt of energy. It also helps the brain make quick decisions in the face of danger.

While epinephrine is useful if a person is threatened, chronic stress can cause the body to release too much of this hormone. Over time, chronic stress can lead to health problems, such as decreased immunity, high blood pressure, diabetes, and heart disease.

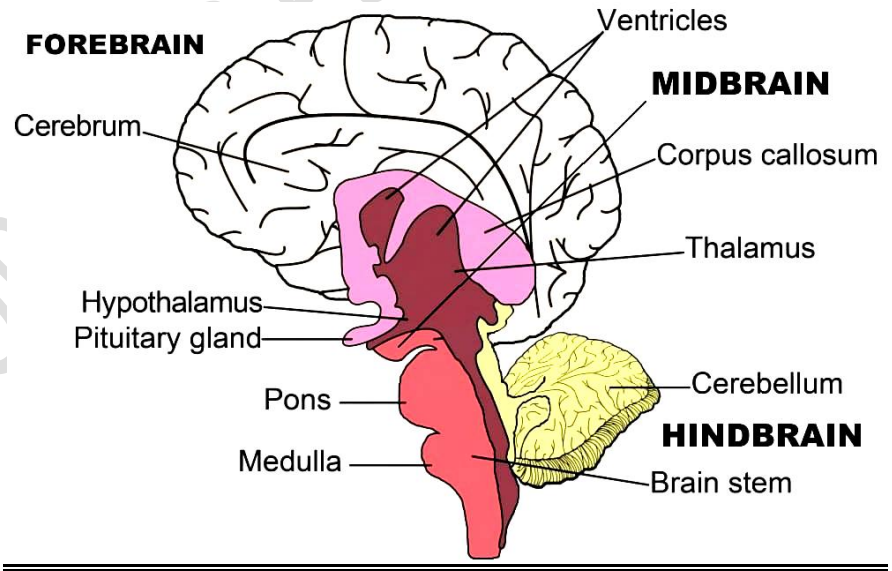
STRUCTURE OF BRAIN AND ITS PARTS

Brain is an organ of soft nervous tissue contained in the skull of vertebrates, functioning as the coordinating centre of sensation and intellectual and nervous activity.

The human brain controls the central nervous system by way of the cranial nerves and spinal cord, the peripheral nervous system and regulates virtually all human activity. The brain is made up of over 100 billion nerve cells with each brain cell connected to around 10,000 other cells, which equals around 1000 trillion connections in brain.

Human Brain is divided into 3 main parts on the basis of their function and placements

- **Fore Brain**
  It is the anterior part of the brain. It has 3 parts Cerebrum, Thalamus, Limbic System
- **Mid Brain**
  It is located below the cerebral cortex and above the hind brain. It controls reflex movements of the body and hearing reflexes
- **Hind Brain**
  It is present at the backside of the Brain. It consists of Cerebellum, Pons, Medulla Oblongata



Cerebrum: is the largest part of the brain and is composed of right and left hemispheres. It performs higher functions like interpreting touch, vision and hearing, as well as speech, reasoning, emotions, learning, and fine control of movement.

Cerebellum: is located under the cerebrum. Its function is to coordinate muscle movements, maintain posture, and balance.

Brainstem: acts as a relay center connecting the cerebrum and cerebellum to the spinal cord. It performs many automatic functions such as breathing, heart rate, body temperature, wake and sleep cycles, digestion, sneezing, coughing, vomiting, and swallowing.

Hypothalamus: is located under the thalamus and is the master control of the autonomic system. It plays a role in controlling behaviors such as hunger, thirst, sleep, and sexual response. It also regulates body temperature, blood pressure, emotions, and secretion of hormones.

Pituitary gland: lies in a small pocket of bone at the skull base called the sella turcica. The pituitary gland is connected to the hypothalamus of the brain by the pituitary stalk. Known as the "master gland," it controls other endocrine glands in the body. It secretes hormones that control sexual development, promote bone and muscle growth, and respond to stress.

Pineal gland: is located behind the third ventricle. It helps regulate the body's internal clock and circadian rhythms by secreting melatonin. It has some role in sexual development.

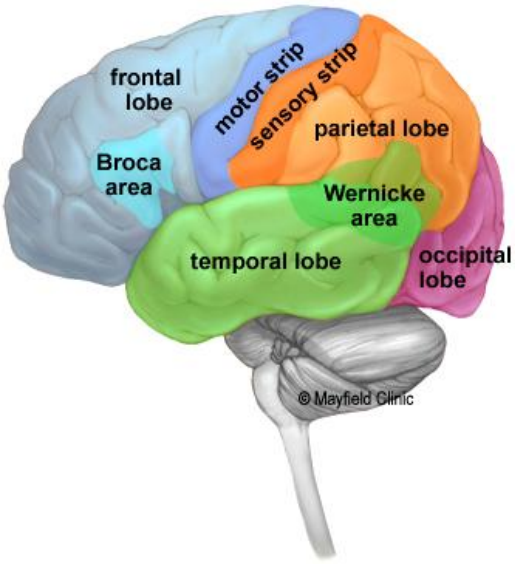
Thalamus: serves as a relay station for almost all information that comes and goes to the cortex. It plays a role in pain sensation, attention, alertness and memory. It carries sensory information from the body to Cerebrum and The Limbic System. It is located above the brain stem and between the cerebral cortex and mid-brain

Basal ganglia: includes the caudate, putamen and globus pallidus. These nuclei work with the cerebellum to coordinate fine motions, such as fingertip movements.

Limbic system: is the center of our emotions, learning, and memory. Included in this system are the cingulate gyri, hypothalamus, amygdala (emotional reactions) and hippocampus (memory). It is are shaped structure between thalamus and cerebrum

LOBES OF THE BRAIN

The cerebral hemispheres have distinct fissures, which divide the brain into lobes. Each hemisphere has 4 lobes: frontal, temporal, parietal, and occipital (Fig. 3). Each lobe may be divided, once again, into areas that serve very specific functions. It's important to understand that each lobe of the brain does not function alone. There are very complex relationships between the lobes of the brain and between the right and left hemispheres.



- **Frontal lobe**
  - Personality, behavior, emotions
  - Judgment, planning, problem solving
  - Speech: speaking and writing (Broca's area)
  - Body movement (motor strip)
  - Intelligence, concentration, self awareness

- **Parietal lobe**
  - Interprets language, words
  - Sense of touch, pain, temperature (sensory strip)
  - Interprets signals from vision, hearing, motor, sensory and memory
  - Spatial and visual perception

- **Occipital lobe**
  - Interprets vision (color, light, movement)

- **Temporal lobe**
  - Understanding language (Wernicke's area)
  - Memory
  - Hearing
  - Sequencing and organization

SIGNIFICANCE OF RIGHT AND LEFT BRAIN

The cerebrum is divided into two halves: the right and left hemispheres.They are joined by a bundle of fibers called the corpus callosum that transmits messages from one side to the other. Each hemisphere controls the opposite side of the body. If a stroke occurs on the right side of the brain, left arm or leg may be weak or paralyzed.

Not all functions of the hemispheres are shared. In general, the left hemisphere controls speech, comprehension, arithmetic, and writing. The right hemisphere controls creativity, spatial ability, artistic, and musical skills. The left hemisphere is dominant in hand use and language in about 92% of people.

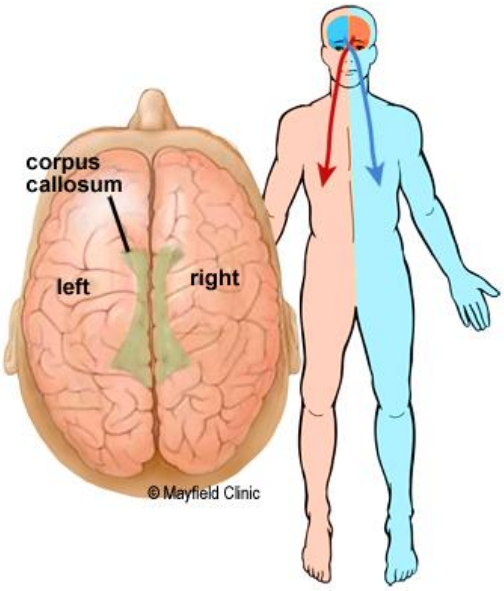
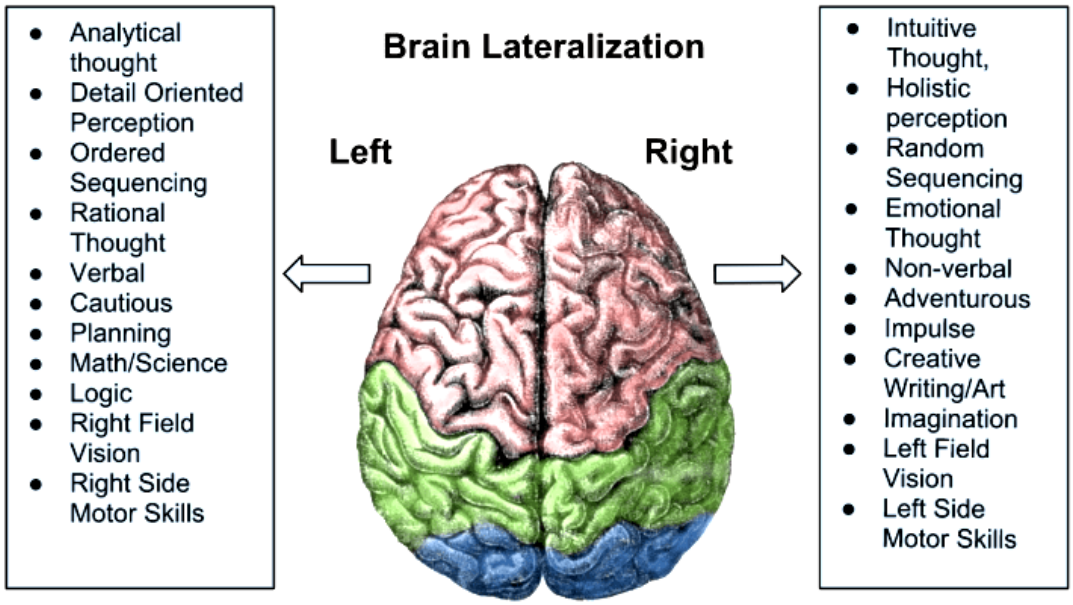


Figure . The cerebrum is divided into left and right hemispheres. The two sides are connected by the nerve fibers corpus callosum.

Information that enters the left hemisphere travel across the corpus callosum going to the right side of the brain and vice versa. The two hemispheres of the brain (right and left hemisphere) function interdependently.

Each of them has a role to play in the processing of information although the other is more dominant in certain functions. The process is called brain lateralization. The degree of brain lateralization is not the same in everyone.



STRUCTURE AND PSYCHOLOGICAL IMPORTANCE IN THOUGHTS AND LANGUAGE

In general, the left hemisphere of the brain is responsible for language and speech and is called the "dominant" hemisphere. The right hemisphere plays a large part in interpreting visual information and spatial processing. In about one third of people who are left-handed, speech function may be located on the right side of the brain. Left-handed people may need special testing to determine if their speech center is on the left or right side prior to any surgery in that area.

Aphasia is a disturbance of language affecting speech production, comprehension, reading or writing, due to brain injury – most commonly from stroke or trauma. The type of aphasia depends on the brain area damaged.

Broca's area: lies in the left frontal lobe . If this area is damaged, one may have difficulty moving the tongue or facial muscles to produce the sounds of speech. The person can still read and understand spoken language but has difficulty in speaking and writing (i.e. forming letters and words, doesn't write within lines) – called Broca's aphasia.

Wernicke's area: lies in the left temporal lobe . Damage to this area causes Wernicke's aphasia. The individual may speak in long sentences that have no meaning, add unnecessary words, and even create new words. They can make speech sounds, however they have difficulty understanding speech and are therefore unaware of their mistakes.

Cognitive development, or the gradual development of the brain's ability to think, make decisions, solve problems, and so on. Humans are not born with language, but learn it over time. This means that language is almost the first thing we ever learn. Although we may not be able to create words for a few months, our minds start beginning to acquire language from the first time we hear it. Therefore, the way we learn language actually can impact the way we will learn for the rest of our lives

As our minds learn language, that language creates a framework that allows our mind to form consistent and conscious thought. Humans are amazingly self-reflective, thinking about ourselves and our experiences and our very existence. Language allows our minds to process this information in a consistent way. As it turns out, the more language we learn, the faster our mind may be able to work. There's a reason smart people often seem to have a larger vocabulary: an increased learning of language lets the mind respond more efficiently to various situations. That same logic is why children raised bilingually may have an easier time learning other forms of information later in life.

The notion that language influences thought has a long history in a variety of fields. There are two bodies of thought forming around this debate. One body of thought stems from linguistics and is known as the Sapir-Whorf hypothesis. There is a strong and a weak version of the hypothesis which argue for more or less influence of language on thought. The strong version, linguistic determinism, argues that without language there is and can be no thought while the weak version, linguistic relativity, supports the idea that there are some influences

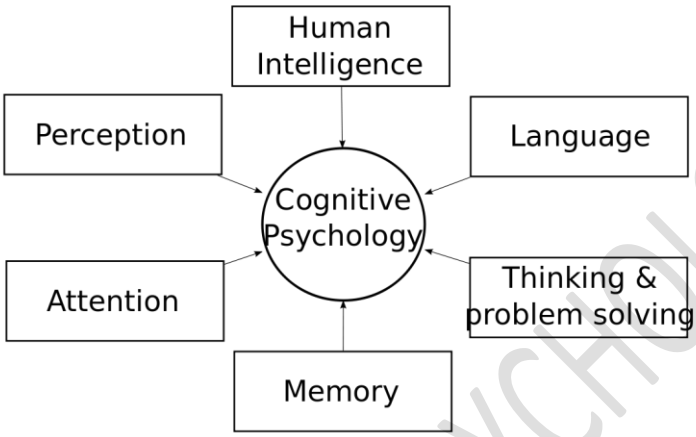
from language on thought. And on the opposing side, there are 'language of thought' theories (LOTH) which believe that public language is inessential to private thought. LOTH theories address the debate of whether thought is possible without language which is related to the question of whether language evolved for thought.

The main use of language is to transfer thoughts from one mind, to another mind. The bits of linguistic information that enter into one person's mind, from another, cause people to entertain a new thought with profound effects on his world knowledge, inferencing, and subsequent behavior. Language neither creates nor distorts conceptual life. Thought comes first, while language is an expression. There are certain limitations among language, and humans cannot express all that they think.

UNIT III

COGNITION

Cognition is a term referring to the mental processes involved in gaining knowledge and comprehension. These processes include thinking, knowing, remembering, judging and problem-solving. These are higher-level functions of the brain and encompass language, imagination, perception, and planning.



Definition of Cognitive Psychology

Cognitive psychology is the branch of psychology that focuses on the way people process information. It looks at how we process information we receive and how the treatment of this information leads to our responses. In other words, cognitive psychology is interested in what is happening within our minds that links stimulus (input) and response (output).

Cognitive psychologists study internal processes that include perception, attention, language, memory, and thinking. They ask questions like:

- How do we receive information about the outside world?
- How do we store and process information?
- How do we solve problems?
- How does a breakdown in our perceptions cause errors in our thinking?
- How do errors in our thinking lead to emotional distress and negative behaviors?

Overview of Cognitive Psychology

The term 'cognitive psychology' was first used by Ulric Neisser in 1967. Since then, many interventions have emerged from cognitive study that have benefited the field of psychology.

Cognitive psychology also touches on many other disciplines. Because of this, it is frequently studied by people in a number of different fields including medicine, education, and business.

Cognitive psychology is goal-oriented and problem-focused from the beginning. Imagine you are entering treatment with a cognitive psychologist. One of the first things you will be asked to do is identify your problems and formulate specific goals for yourself. Then you will be helped to organize your problems in a way that will increase the chances of meeting your goals.

Suppose that as you are preparing for your presentation at work tomorrow, you fear you will fail. Because of this, you are using distractions around you as a way to avoid working on the presentation. This prevents you from preparing properly, which actually causes you to fail. You believe that you failed because you are worthless. A cognitive psychologist would help you examine and then rationalize the situation in order to understand the most valid reason for your failure. Then they would teach you how to make changes that will help you succeed.

All forms of cognitive psychology have these four characteristics:

- A collaborative relationship between client and therapist.
- The belief that psychological distress is largely the result of a disturbance in cognitive processes.
- A focus on changing cognition to produce desired changes in emotions and/or behavior.
- A time-limited, educational treatment that focuses on specific problems.

Though often grouped together, cognitive psychology can be divided into two areas: cognitive therapy (CT) and cognitive behavior therapy (CBT). CT and CBT are very similar in their theory and application. The difference is that cognitive therapy focuses on eliminating psychological distress, while cognitive behavioral therapy targets the elimination of negative behavior as well.

SENSATION

Sensation is the process that allows our brains to take in information via our five senses, which can then be experienced and interpreted by the brain. Sensation occurs thanks to our five sensory systems: vision, hearing, taste, smell and touch. Each of these systems maintains unique neural pathways with the brain which allows them to transfer information from the environment to the brain very rapidly.

Each sensory system contains unique sensory receptors, which are designed to detect specific environmental stimuli .Once detected; sensory receptors convert environmental stimulus energy into electrochemical neural impulses. The brain then interprets those neural messages, which allow the brain to experience and make decisions about the environment.

Sight

Sight or vision is the capability of the eyes to focus and detect images of visible light and generate electrical nerve impulses for varying colors, hues, and brightness. Visual perception is how the brain processes these impulses – recognizing, differentiating and interpreting visual stimuli through comparison with experiences made earlier in life

Smell

Smell or olfaction is our ability to detect scent – chemical, odour molecules in the air. Our olfactory system begins in our nose which has hundreds of olfactory receptors. Odour molecules possess a variety of features and, thus, excite specific receptors more or less strongly. This combination of excitement is interpreted by the brain to perceive the 'smell'.

How olfactory information is coded in the brain to allow for proper perception is still being researched and the process is not completely understood, however, what is known is that the chemical nature of the odorant is particularly important, as there may be a chemotopic map in the brain.

Taste

Taste, or gustation, refers to the capability to detect the taste of substances such as food, certain minerals, and poisons, etc. The sense of taste is often confused with the "sense" of flavour, which is a combination of taste and smell perception.

Humans receive tastes through sensory organs called taste buds concentrated on the upper surface of the tongue. There are five basic tastes: sweet, bitter, sour, salty and umami.

Hearing

Hearing, or audition, is the ability to perceive sound by detecting vibrations, changes in the pressure of the surrounding medium through time, through an organ such as the ear. As with sight, auditory processing relies on how the brain interprets, recognizes and differentiates sound stimuli.

Touch

Touch, or Tactile, is a perception resulting from activation of neural receptors, generally in the skin including hair follicles and a variety of pressure receptors respond to variations in pressure (firm, brushing, sustained, etc.).

The tactile system is a diverse sensory system that is spread through all major parts of our body. At its simplest, the system works when activity in a sensory receptor is triggered by a specific stimulus (such as heat); this signal eventually passes to an area in the brain uniquely attributed to that area on the body and this allows the processed stimulus to be felt at the correct location.

SENSORY RECEPTORS

One of the characteristics of a living organism is its ability to respond to stimuli. The human sensory system is highly evolved and processes thousands of incoming messages simultaneously. This complexity allows you to be aware of your surroundings and take appropriate actions.

Sensory receptors are dendrites of sensory neurons specialized for receiving specific kinds of stimuli. Sensory receptors are classified by three methods:

Classification by receptor complexity:

- Free nerve endings are dendrites whose terminal ends have little or no physical specialization.
- Encapsulated nerve endings are dendrites whose terminal ends are enclosed in a capsule of connective tissue.
- Sense organs (such as the eyes and ears) consist of sensory neurons with receptors for the special senses (vision, hearing, smell, taste, and equilibrium) together with connective, epithelial, or other tissues.

Classification by location:

- **Exteroceptors** occur at or near the surface of the skin and are sensitive to stimuli occurring outside or on the surface of the body. These receptors include those for tactile sensations, such as touch, pain, and temperature, as well as those for vision, hearing, smell, and taste.
- **Interoceptors** (visceroceptors) respond to stimuli occurring in the body from visceral organs and blood vessels. These receptors are the sensory neurons associated with the autonomic nervous system.
- **Proprioceptors** respond to stimuli occurring in skeletal muscles, tendons, ligaments, and joints. These receptors collect information concerning body position and the physical conditions of these locations.

Classification by type of stimulus detected:

- **Mechanoreceptors** respond to physical force such as pressure (touch or blood pressure) and stretch.
- **Photoreceptors** respond to light.
- **Thermoreceptors** respond to temperature changes.
- **Chemoreceptors** respond to dissolved chemicals during sensations of taste and smell and to changes in internal body chemistry such as variations of O 2, CO 2, or H + in the blood.
- **Nociceptors** respond to a variety of stimuli associated with tissue damage. The brain interprets the pain.

RECEPTORS INVOLVED IN EACH OF THE SENSORY MODALITIES

- There are currently three known types of photoreceptor cells in mammalian eyes: rods, cones, and intrinsically photosensitive retinal ganglion cells. The two classic photoreceptor cells are rods and cones, each contributing information used by the visual system to form a representation of the visual world, sight.
- Auditory Receptors : Resting on the basilar membrane of the cochlear duct is the spiral organ of Corti ,which contains the auditory receptor cells along with several types of supporting cells. The inner hair cells are the receptors for hearing, while the outer hair cells are for modulation
- The gustatory system is the sensory system responsible for the perception of taste and flavour. In humans, the gustatory system is comprised of taste cells in the mouth (which sense the five taste modalities: salty, sweet, bitter, sour and umami), several cranial nerves, and the gustatory cortex. Detected by way of G protein-coupled taste receptors. Gustatory receptors are present on the papillae of the tongue and are used for detecting taste. Sensory signals are sent by these receptors to the brain by sensory nerves
- Olfactory receptor, also called smell receptor, protein capable of binding odour molecules that plays a central role in the sense of smell (olfaction).The cilia are covered by the mucus of the nasal cavity, facilitating the detection of and response to odour molecules by olfactory receptors.
- Tactile receptors are sensory receptors which respond to touch. The density of Meissner and Merkel receptors determines the two-point discrimination. Pacinian corpuscles are quite big to be seen with naked eye, and they respond to pressure.

NOTE:-Each type of sensations (touch,vision,hearing,pain etc) is called sensory modalities

SENSORY ADAPTATION

"Sensory adaptation is defined as the diminished sensitivity to a stimulus as a consequence of constant exposure to that stimulus."

Sensory adaptation happens when our senses no longer perceive a stimulus because of our sensory receptor 's continuous contact with it. If you've ever entered a room that has a terrible odor, but after a few minutes realized that you barely noticed it anymore, then you have experienced sensory adaptation. Like thresholds, adaptation can occur with any sense, whether it's forgetting that the radio is on while you work or not noticing that the water in the pool is cold after you've been swimming for a while.

Examples:-

- **Light-Dark Adaptation**:-Our body's visual system is able to adjust automatically to the intensity level of light in the environment. This adaptation happens when you enter a dark building after exposure to the sunlight. Your pupils dilate in order for the retina to gain access to additional light. The cones of your eyes increase in sensitivity as a reaction to the darkness; however, they adapt within approximately five minutes. The rods in your eyes have chemicals that increase with limited light and assist in the adaptation as well.
- **Noise Adaptation**:-Individuals adapt to the noise within their environment. For those who live in an area with continuous traffic, their ears adapt to the constant sound until they no longer hear the noise of the traffic. With louder sounds, such as a rock band playing while entering a nightclub, the muscle attached to the inner ear bone contracts, reducing the sound vibration transmission. This decreases the vibrations to the inner ear, thereby adjusting to the noise level.
- **Smell Adaptation**:-Those who smoke tobacco do not notice the smell of cigarettes. Nonsmokers can usually smell the cigarette odor intensely and, if in the presence of a smoker, can smell it not only in the smoker's presence but will continue to smell the odor on their clothes, hair and other items long after the two have parted. This same adaptation happens when wearing perfume or cologne: Within an hour of applying the fragrance, the wearer no longer smells the scent.
- **Temperature Adaptation**:-The feeling of hot and cold is an adaptation to the sensation of touch. A primary example is how quickly our bodies adjust to the water temperature when taking a bath. The bathwater may feel extremely hot when entering the tub; however, within minutes the water may feel cool to the touch. The water temperature has not changed significantly; our bodies have adapted to the temperature.
- **Taste Adaptation**:-The taste buds in our mouth play a critical role during eating. Our tongues have approximately 2,000 to 8,000 taste buds divided into four basic tastes: sour, sweet, bitter and salty. When eating a specific food, the initial taste is very distinct and identified by the tongue's sensory neurons. As you continue eating the food, the taste is not as strong and does not have the same impact, which is due to sensory adaptation.

SENSORY THRESHOLD& ABSOLUTE THRESHOLD

"Sensory threshold: The point at which a stimulus causes a sensation within an individual; below the sensory threshold, there will be no sensation."

A sensory threshold is the level of strength a stimulus must reach to be detected. Psychologists study sensory thresholds to learn how humans and animals process sensory information. An absolute threshold is the lowest level of strength necessary for detection. For example, when sounds are just loud enough to hear (but no louder), they occur at the absolute threshold. Absolute thresholds vary according to sensory adaptation (diminished sensitivity to

stimulus after prolonged exposure). Animals often have different absolute thresholds than people. The differential threshold is the point of lowest intensity at which one can tell that a stimulus has strengthened.

"Absolute threshold is the smallest level of energy required by an external stimulus to be detectable by the human senses, including vision, hearing, taste, smell and touch."

A threshold is the minimum level at which a given event can occur. In neuroscience and psychophysics, there are several types of sensory threshold. The recognition threshold is the level at which a stimulus can not only be detected but also recognized; the differential threshold is the level at which a difference in a detected stimulus can be perceived; the terminal threshold is the level beyond which a stimulus is no longer detected. However, perhaps the most important sensory threshold is the absolute threshold, which is the smallest detectable level of a stimulus.

The absolute threshold is defined as the lowest intensity at which a stimulus can be detected. A classic example of absolute threshold is an odor test, in which a fragrance is released into an environment. The absolute threshold in that scenario would be the least amount of fragrance necessary for a subject to detect that there is an odor.

Smell is not the only sense with absolute thresholds. Imagine you're in a room and someone behind you slowly begins turning up the volume on the radio; the absolute threshold is the softest volume at which you would notice what they're doing. Sound thresholds can be about more than volume; they can also be about frequency. For example, humans cannot hear dog whistles. This is because dog whistles are at a frequency higher than the absolute threshold for frequency for human hearing.

Similarly, the minimum amount of light necessary to see something in the dark is the absolute threshold for vision. Every sense has an absolute threshold.

WEBER'S LAW

"Weber's law, also called Weber-Fechner law, historically important psychological law quantifying the perception of change in a given stimulus. The law states that the change in a stimulus that will be just noticeable is a constant ratio of the original stimulus."

The Difference Threshold (or "Just Noticeable Difference") is the minimum amount by which stimulus intensity must be changed in order to produce a noticeable variation in sensory experience.

Ernst Weber a 19th century experimental psychologist observed that the size of the difference threshold appeared to be lawfully related to initial stimulus magnitude. This relationship, known since as Weber's Law, can be expressed as:

$$\frac{\Delta I}{I} = k$$

where ΔI (delta I) represents the difference threshold, I represents the initial stimulus intensity and k signifies that the proportion on the left side of the equation remains constant despite variations in the I term

Weber's Law, more simply stated, says that the size of the just noticeable difference (i.e., delta I) is a constant proportion of the original stimulus value. For example: Suppose that you presented two spots of light each with an intensity of 100 units to an observer. Then you asked the observer to increase the intensity of one of the spots until it was just noticeably brighter than the other. If the brightness needed to yield the just noticeable difference was 110 then the observer's difference threshold would be 10 units (i.e., delta I =110 - 100 = 10). The Weber fraction equivalent for this difference threshold would be 0.1 (delta I/I = 10/100 = 0.1). Using Weber's Law, one could now predict the size of the observer's difference threshold for a light spot of any other intensity value (so long as it was not extremely dim or extremely bright). That is, if the Weber fraction for discriminating changes in stimulus brightness is a constant proportion equal to 0.1 then the size of the just noticeable difference for a spot having an intensity of 1000 would be 100 (i.e., delta I = 0.1 X 1000 = 100).

Weber's Law can be applied to variety of sensory modalities (brightness, loudness, mass, line length, etc.). The size of the Weber fraction varies across modalities but in most cases tends to be a constant within a specific task modality.

UNIT IV

INTRODUCTION TO ATTENTION

"Attention is the behavioral and cognitive process of selectively concentrating on a discrete stimulus while ignoring other perceivable stimuli. It is a major area of investigation within education, psychology, and neuroscience."

- Attention is your brain function that allocates cognitive processing resources to focus on information or stimuli. It deals with how you mentally process specific information present in your environment that you are experiencing through your five senses.
- Your attention span is your ability to keep your mind focused on something through careful observing or listening. It can be just momentarily such as turning around after hearing a loud noise, or it may be for a sustained period of time such as playing a video game.
- Attention is often the beginning to other cognitive functions. You first must pay attention to something before you can process it for meaning and understanding.
- Attention is your ability to selectively filter out and focus on relevant information from the environment, without getting distracted. It is a cognitive resource that you can employ to focus on a single task or, as required, divide to handle more activities within a specific time frame, switching between tasks.
- You use your selective attention when you focus on a work task while avoiding distractions, e.g., additional work that you could be doing. You pay selective attention when you totally concentrate on an engaging and demanding task, such as reading a detailed report.
- You experience divided attention when you have to handle more than one activity, such as chairing a meeting. You may have to make sure everyone has their say while sticking to the agenda, and giving your own input. This is possible when each task does not require the entirety of your attention resources.
- Your attention is distributed when you are in a general condition of awareness or alertness towards everything in the surrounding environment. For example, when you are at a networking meeting, or when you are reading while waiting for your train/plane to be called.

TYPES OF ATTENTION

1. **Selective attention**

> ***"Selective attention is the process of focusing on a particular object in the environment for a certain period of time. Attention is a limited resource, so selective attention allows us to tune out unimportant details and focus on what matters."***

Have you ever been at a loud concert or a busy restaurant, and you are trying to listen to the person you are with? While it can be hard to hear every word, you can usually pick up most of the conversation if you're trying hard enough. This is because you are choosing to focus on this one person's voice, as opposed to say, the people speaking around you. Selective attention takes place when we block out certain features of our environment and focus on one particular feature, like the conversation you are having with your friend.

2. **Divided attention**

> ***"Divided attention occurs when mental focus is on multiple tasks or ideas at once. Also known as multitasking, individuals do this all the time. Examples are singing along to a song while driving, having a conversation while walking, or listening to music while grocery shopping."***

Do you ever do two things at once? If you're like most people, you do that a lot. Maybe you talk to a friend on the phone while you're straightening up the house. Nowadays, there are people everywhere texting on their phones while they're spending time with someone. When we are paying attention to two things at once, we are using divided attention.

3. **Sustained attention**

> ***"Sustained attention is the ability to focus on an activity or stimulus over a long period of time.. It is what makes it possible to concentrate on an activity for as long as it takes to finish, even if there are other distracting stimuli present."***

Are you someone who can work at one task for a long time? If you are, you are good at using sustained attention. This happens when we can concentrate on a task, event, or feature in our environment for a prolonged period of time. Think about people you have watched who spend a lot of time working on a project, like painting or even listening intently to another share their story.

Sustained attention is also commonly referred to as one's attention span. It takes place when we can continually focus on one thing happening, rather than losing focus and having to keep bringing it back. People can get better at sustained attention as they practice it.

4. **Executive attention**

Do you feel able to focus intently enough to create goals and monitor your progress? If you are inclined to do these things, you are displaying executive attention. Executive attention is

particularly good at blocking out unimportant features of the environment and attending to what really matters. It is the attention we use when we are making steps toward a particular end.

For example, maybe you need to finish a research project by the end of the day. You might start by making a plan, or you might jump into it and attack different parts of it as they come. You keep track of what you've done, what more you have to do, and how you are progressing. You are focusing on these things in order to reach the goal of a finished research paper. That is using your executive attention

CHARACTERISTICS OF ATTENTION

- Attention is selective.
- Attention has shifting nature.
- Attention has cognitive, affective and conative aspects.
- Attention has narrow range.
- Attention increases of clearness of the stimulus.
- Attention needs motor adjustment.

1. Mental Activity

The process of focussing attention on any object or aim is performed by the mind, but the activity of the mind requires that the aim of concentrating upon the object or the goal should be clear. In the absence of clarity, the mental process does not become active. If the process is active, it provides a stimulus for attention.

2. Selectiveness of Attention

Our attention does not focus upon a number of objects simultaneously; instead, at any one moment our attention focusses upon one specific object. The object on which our attention focusses itself is selected from among a number of objects, and that object possesses some specific and special feature or interest for us. This explains why, from among a class of 30 or 40 students, the teacher's attention often directs itself primarily towards the naughty or the extremely dull students.

3. Shifting Nature

It is the nature of attention that it is unstable or shifting. The individual focusses his attention upon one particular object only with effort, and even then he manages to keep it fixed upon that object for hardly three or four seconds. However, there are notable exceptions to this, specially observable among students preparing for examination or devotees singing religious songs these being situations in which persons concentrate their attention for many hours continuously.

4. Narrow Span

The span of attention, at the moment of its initiation, is quite limited. As soon as the task is completed or when a particular series is completed, attention automatically changes to some other object. Adults can usually concentrate attention upon number of things simultaneously, whereas children focus their attention upon single objects.

5. Mobility

Attention is always in such a state that it does not remain fixed upon one object for any length of time. Exhaustions or boredom are also responsible for this fact. When we become exhausted with studying text-books, we change over to novels or stories. The turning of attention from one object or activity to another is called its mobility.

6. Activeness or Alertness

Attention is made possible because of consciousness, and for this reason it is alert. The activities or goals on which we focus our attention have their existence in our consciousness.

7. Readiness

According to Wood worth, "The preparatory set of readiness is the essential response in attending." This is a profoundly true statement. Our body prepares itself for a particular activity even before the process or activity is initiated. Our body reacts according to attention."

8. Motor Adjustment

Whatever the object on which our attention is focussed, our sense organs and motor organs adapt themselves to take part in the activity required. As soon as the students seat themselves in the class, their ears, eyes, necks and their bodily positions adapt themselves with reference to the teacher. As N.L. Munn has put, "The act of attending is characterised by reporter adjustment, postural adjustment, muscle tension and central neural adjustment."

9. Purposiveness

It is a universal truth that we focus our attention only upon those objects which satisfy our needs or serve our interests, and that, for the achievement of our goals, we become completely attentive. During examinations, students focus their entire attention on their studies because their interest lies in passing the examination.

10. Inquisitiveness

Our attention is influenced by mobility and explore for novelty. Woodworth named it as inquisitiveness. It explore for new objects.

11. Three Aspects

There are three aspects of attention:

(i) Cognitive,

(ii) Conative, and

(iii) Affective.

The process of attention complete in all these three aspects.

Our mental life is a stream of consciousness. We do not attend to all those incidents; facts go on at the same time. We select one out of them. Fechner has rightly said, "Attention represents a selection or singling out of certain aspects of the observable environment to the exclusion of others which may at the time be impinging upon the sense organs."

PERCEPTION

> "***Perception is the organization, identification, and interpretation of sensory information in order to represent and understand the presented information or environment***."

Perception refers to the set of processes we use to make sense of all the stimuli you encounter every second. Our perceptions are based on how we interpret all different sensations, which are sensory impressions we get from the stimuli in the world around us. Perception enables us to navigate the world and to make decisions about everything, from which T-shirt to wear or how fast to run away from a bear.

Our brains simply don't have the capacity to attend to every single detail in the world around us. Optical illusions highlight this tendency. Have you ever looked at an optical illusion and seen one thing, while a friend sees something completely different? Our brains engage in a three-step process when presented with stimuli: **selection, organization,** and **interpretation.**

For example, think of Rubin's Vase, a well-known optical illusion depicted below. First we select the item to attend to and block out most of everything else. It's our brain's way of focusing on the task at hand to give it our attention. In this case, we have chosen to attend to the image. Then, we organize the elements in our brain. Some individuals organize the dark parts of the image as the foreground and the light parts as the background, while others have the opposite interpretation.

Rubin's Vase: Rubin's Vase is a popular optical illusion used to illustrate differences in perception of stimuli.

Some individuals see a vase because they attend to the black part of the image, while some individuals see two faces because they attend to the white parts of the image. Most people can see both, but only one at a time, depending on the processes described above. All stages of the perception process often happen unconsciously and in less than a second.

THE PERCEPTION PROCESS

The perceptual process is a sequence of steps that begins with stimuli in the environment and ends with our interpretation of those stimuli. This process is typically unconscious and happens hundreds of thousands of times a day. An unconscious process is simply one that happens without awareness or intention.

- **Selection**

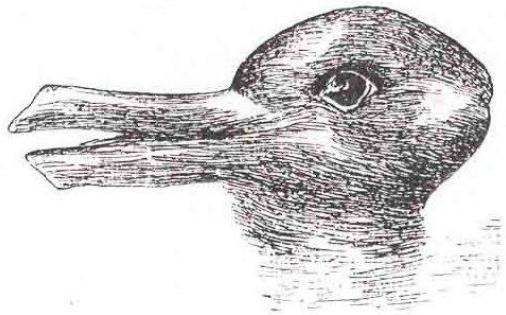
The world around us is filled with an infinite number of stimuli that we might attend to, but our brains do not have the resources to pay attention to everything. Thus, the first step of perception is the (usually unconscious, but sometimes intentional) decision of what to attend to. Depending on the environment, and depending on us as individuals, we might focus on a familiar stimulus or something new. When we attend to one specific thing in our environment—whether it is a smell, a feeling, a sound, or something else entirely—it becomes the attended stimulus.

- **Organization**

Once we have chosen to attend to a stimulus in the environment (consciously or unconsciously, though usually the latter), the choice sets off a series of reactions in our brain. This neural process starts with the activation of our sensory receptors (touch, taste, smell, sight, and hearing). The receptors transduce the input energy into neural activity, which is transmitted to our brains, where we construct a mental representation of the stimulus (or, in most cases, the multiple related stimuli) called a percept. An ambiguous stimulus may be translated into multiple percepts, experienced randomly, one at a time, in what is called "multistable perception."

- **Interpretation**

After we have attended to a stimulus, and our brains have received and organized the information, we interpret it in a way that makes sense using our existing information about the world. Interpretation simply means that we take the information that we have sensed and organized and turn it into something that we can categorize. For instance, in the Rubin's Vase illusion mentioned earlier, some individuals will interpret the sensory information as "vase," while some will interpret it as "faces." This happens unconsciously thousands of times a day. By putting different stimuli into categories, we can better understand and react to the world around us.



Duck or Rabbit: In this famous optical illusion, your interpretation of this image as a duck or a rabbit depends on how you organize the information that you attend to.

GESTALT LAWS

The Gestalt laws of grouping is a set of principles in psychology first proposed by Gestalt psychologists to explain how humans naturally perceive stimuli as organized patterns and objects. Gestalt psychology tries to understand the laws of our ability to acquire and maintain meaningful perceptions in an apparently chaotic world. The central principle of gestalt psychology is that the mind forms a global whole with self-organizing tendencies. The gestalt effect is the capability of our brain to generate whole forms, particularly with respect to the visual recognition of global figures, instead of just collections of simpler and unrelated elements. Essentially, gestalt psychology says that our brain groups elements together whenever possible instead of keeping them as separate elements.

➢ Figure-ground organization

"The Gestalt psychologists proposed that the simplest organization involves grouping some sensations into an object, or figure, that stands out on a plainer background."

Figure-ground organization is organizing a perception so that part of a stimulus appears to stand out as an object (figure) against a less prominent background (ground).
In normal figure-ground perception, only one figure is seen. In reversible figures, however figure and ground can be switched.

- **Figure**, which has a definite shape and a location in space.
- **Ground**, which has no shape, seems to continue behind the figure, and has no definite location.
- The figure–ground relationship helps clarify the distinction between sensation and perception.

➢ Laws of Grouping

"Laws of Grouping: Simple principles describing how we tend to group discrete stimuli together in the perceptual world."

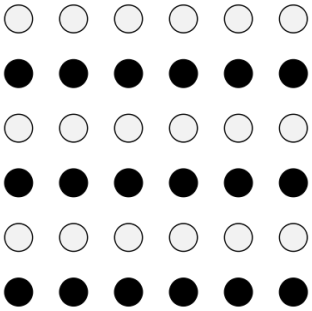
- **Laws of Proximity: "Tendency to perceive items located together as a group**."

This law posits that when we perceive a collection of objects we will perceptually group together objects that are physically close to each other. This allows for the grouping together of elements into larger sets, and reduces the need to process a larger number of smaller stimuli. For this reason, people tend to see clusters of dots on a page instead of a large number of individual dots. The brain groups together the elements instead of processing a large number of smaller stimuli, allowing us to understand and conceptualize information more quickly.

Gestalt law of proximity: Because of the law of proximity, people tend to see group of dots on a page instead of a large number of individual dots.

- **Laws of Similarity: "Tendency to perceive similar items as a group."**

This law states that people will perceive similar elements will be perceptually grouped together. This allows us to distinguish between adjacent and overlapping objects based on their visual texture and resemblance.



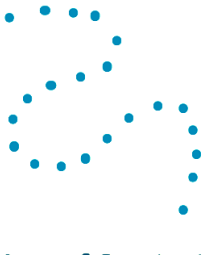
The law of similarity: Because of the law of similarity, people tend to see this as six clusters of black and white dots rather than 36 individual dots.

- **Laws of Common Region: "Tendency to perceive objects as a group if they occupy the same place within a plane."**

The Law of Common Region. This Gestalt law of perceptual organization suggests that elements that are grouped together within the same region of space tend to be grouped together

- **Law of Good Continuation: "Tendency to perceive stimuli as part of a continuous pattern."**

The law of continuation asserts that the human eye follows lines, curves, or a sequence of shapes in order to determine a relationship between design elements.



- **Law of Closure: "Tendency to perceive objects as whole entities, despite the fact that some parts may be missing or obstructed from view."**

The law of closure explains that our perception will complete incomplete objects, such as the lines of the IBM logo.

IBM logo: The IBM logo plays on the law of closure. While it is made up of just lines, we perceive the three letters

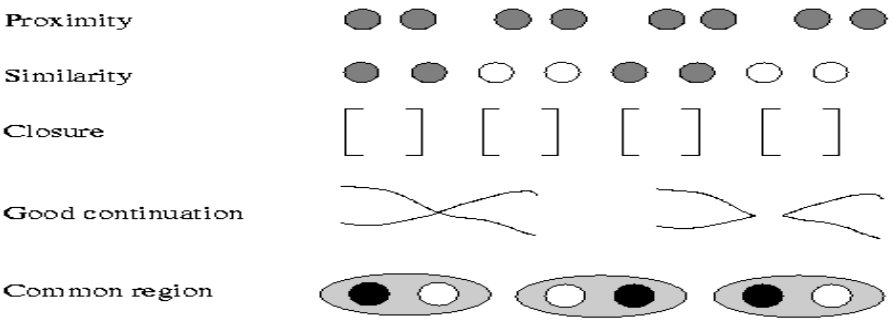
- **Laws of Simplicity:** ***"Tendency to perceive complex patterns in terms of simpler shapes."***

Gestalt is also known as the "Law of Simplicity" or the "Law of Pragnanz" (the entire figure or configuration), which states that every stimulus is perceived in its most simple form.

People will perceive and interpret ambiguous or complex images as the **simplest forms possible**.

Before

After



PROCESS OF PERCEPTION

- **Depth perception**

Depth perception is the visual ability to perceive the world in three dimensions, coupled with the ability to gauge how far away an object is. Depth perception, size, and distance are ascertained through both monocular (one eye) and binocular (two eyes) cues. Monocular vision is poor at determining depth. When an image is projected onto a single retina, cues about the relative size of the object compared to other objects are obtained. In binocular vision, these relative sizes are compared, since each individual eye is seeing a slightly different image from a different angle.

Depth perception relies on the convergence of both eyes upon a single object, the relative differences between the shape and size of the images on each retina, the relative size of objects in relation to each other, and other cues such as texture and constancy. For example, shape constancy allows the individual to see an object as a constant shape from different angles, so that each eye is recognizing a single shape and not two distinct images. When the input from both eyes is compared, stereopsis, or the impression of depth, occurs.

- **Motion perception**

Motion perception is the process of inferring the speed and direction of elements in a scene based on visual input. Monocular vision, or vision from one eye, can detect nearby motion; however, this type of vision is poor at depth perception. For this reason, binocular vision is better at perceiving motion from a distance. In monocular vision, the eye sees a two-dimensional image in motion, which is sufficient at near distances but not from farther away. In binocular vision, both eyes are used together to perceive motion of an object by tracking the differences in size, location, and angle of the object between the two eyes. Motion perception happens in two ways that are generally referred to as first-order motion perception and second-order motion perception.First-order motion perception occurs through specialized neurons located in the retina, which track motion through luminance. However, this type of motion perception is limited. An object must be directly in front of the retina, with motion perpendicular to the retina, in order to be perceived as moving. The motion-sensing neurons detect a change in luminance at one point on the retina and correlate it with a change in luminance at a neighboring point on the retina after a short delay.Second-order motion perception occurs by examining the changes in an objects' position over time through feature tracking on the retina. This method detects motion through changes in size, texture, contrast, and other features. One advantage to feature-tracking is that motion can be separated both by motion and by blank intervals where no motion is occurring. This type of motion perception can be used to figure out how fast something is moving toward you—TTC, or "time to contact."

- **Perceptual Constancy**

There is a tendency to maintain constancy (of size, color, and shape) in the perception of stimuli even though the stimuli have changed.

Example: Suppose you are at a neighborhood bus stop with a friend. You see the bus as it turns the corner a few blocks away. From a distance, the bus looks like a mere dot in your field of vision. You put up your palm and notice that you can cover the entire area of the bus with your palm. As the bus approaches the stop, it begins to take up more and more of your field of vision. Your palm no longer covers the area of the bus.

By the time the bus reaches the stop, you realize that the bus is twice as tall as you. Despite the fact that the bus now takes up a majority of your field of vision, you don't perceive the bus as having grown. You know that the bus has the same size, rectangular shape, and brightness now as it did when you saw it in the distance. The reason you know this is due to perceptual constancy.

CORRELATED OF PERCEPTION

- **Awareness**

Awareness is the state of being conscious or the quality of being perceptually knowledgable. It is also the ability to perceive, feel, know, or be cognizant of events. There are many different states of awareness. To be asleep or in a state of psychosis is to have a lack of awareness. Being intoxicated on alcohol or drugs can lead to a reduction of awareness. Someone who has high anxiety levels or is paranoid may have a heightened sense of awareness.

- **Motive**

A motive is something that causes us to act or behave in order to reach a a goal or desired endpoint. It comes from the latin word that means 'moving'. A motive is the reason WHY you do something.

For example, a motive for exercise is better health and weight loss. In criminology a motive is the reason an individual committed a crime or offense. For instance, the motive for someone who robbed a store is most likely that they needed money.

- **Needs**

We all have them, but what are they? A simple way to think about needs is that they are states of deprivation that emerge within the body. Hunger is a common urge or need that motivates you to go to the nearest refrigerator, dining hall or supermarket. The drive theory postulates that needs motivates us or living things to act and regain homeostasis.

- **Illusion**

Neverending staircase in sepia toneAn illusion is an inaccurate perception of a stimulus. The term is also broadly used to refer to inaccurate beliefs or perceptions. In scientific usage, however, an illusion is a sensory distortion.

Illusions provide powerful clues about how the brain processes information. Scientifically, they can pose a problem for empirical research as they demonstrate the ways in which even direct observation can be misleading. Most people can be tricked by optical illusions, and scientists can use information about this visual phenomenon to better understand perception and brain organization. Some conditions that affect the brain may also cause illusions. For example, people who experience migraine headaches frequently report seeing auras, which consist of movement or colors along the outer edges of a person's view.

Illusions can occur with any of the five senses. Examples include:

- **Optical illusions,** which may be seen when an image is constructed in such a way that it relays misleading information to the brain. For example, two people of different heights standing on a slanted floor covered in check marks may appear to be standing on a flat floor and thus appear to be the same size.
- **Auditory illusions,** which occur when a person hears sounds that are not actually being made or sounds that are distortions of the actual tones. One well-known example is the Shepard tone, which seems to be constantly rising or falling in pitch but is actually doing neither.
- **Tactile illusions,** which cause the brain to perceive touch stimuli that is not actually present, or that is not present in the way the brain perceives it. Phantom limb syndrome, or the experience of feeling an amputated limb, is an example of a tactile illusion.
- **Smell and taste illusions,** which are not as common as other types of illusions. However, certain people may perceive smells differently than others do, especially when given conflicting information about the stimuli producing the smell. Similar phenomena can occur with taste.

What causes illusions?

Illusions are different from hallucinations in that hallucinations occur without an external stimuli. Like hallucinations, though, illusions are not necessarily a sign of a psychiatric condition, and anyone might experience them. They can occur for many reasons, such as the effect of light on an object, insufficient sensory information about an object, or errors in an individual's processing of sensory details. The refraction of light can cause rainbows and mirages, two illusions that are dependent on the atmosphere.

Certain illusions, known as pseudohallucinations, can be signs of a psychiatric disturbance. One may experience a pseudohallucination under conditions of anxiety or fear or when he or she projects their feelings onto external objects or people. People in intensive psychiatric care

have been reported to see people around them as monsters or devils, for example. Illusions can also be characteristic of certain mental health conditions, such as schizophrenia.

- **Subliminal perception**

Perception without awareness is not the same thing as "subliminal perception." Subliminal perception occurs when a stimulus is too weak to be perceived yet a person is influenced by it.The registration of stimuli below the level of awareness, particularly stimuli that are too weak (or too rapid) for an individual to consciously perceive them. There has been much debate about whether responses to subliminal stimuli actually occur and whether it is possible for subliminal commands or advertising messages to influence behavior. Experimental evidence indicates that subliminal commands may not directly affect behavior but may prime later responses

- **Extrasensory Perception**

Extrasensory perception or ESP refers to the reception and processing of information not obtained through the physical senses, but are sensed by through an individual's mind.The four types of extrasensory perception include clairvoyance, psychokinesis, telepathy and precognition.

Clairvoyance

Clairvoyance is the capability to acquire information about a particular object, scenario, physical event or location using extrasensory means. The term is a combination of two French words "clair" which means "clear" and "voyant" which means "seeing". Clairvoyants are people who allegedly have this ability.

For over 130 years, researchers had tried to conduct scientific studies on clairvoyance. One study revealed a 32% success rate versus the 25% chance rate of self-proclaimed clairvoyants being able to transmit one of four given images to "receivers" who were placed in another room, deprived of any related sensation. However, succeeding studies failed to replicate this finding, which shows that the hypothesis has poor validity. Several self-proclaimed clairvoyants include Sylvia Browne, John Edwards, and Rudolf Steiner.

Psychokinesis

Publisher Henry Holt created the term "psychokinesis" to describe the direct effect of the mind on a physical object or scene without the application of any physical energy. The term comes from the two Greek words "psyche" (breath, or mind, soul, or heart), and "kinesis" (movement or motion). A related purported ability is telekinesis, which literally means "distant movement". Many references use the terms psychokinesis and telekinesis interchangeably.

Precognition

Another form of ESP, precognition refers to the ability to achieve and perceive information about locations, scenarios, and events before they actually occur. The term comes from the two Latin words "pre" (prior to) and "cognitio" (getting to know). Scientific research on precognition revealed non-existence of this phenomenon.

Telepathy

Telepathy is the purported ability to perform direct communication between two or more minds without the use of speech, body language, writings, or any other extrapersonal means. Out of the four types of extrasensory perception, telepathy is the most researched and popularized by the media and related industries.

John Arthur Hill, a physical researcher, summarized the current research on telepathy by writing," No physical theory of telepathy has been worked out — there are no "brain-waves" known, and no receiving stations yet discovered inside our skulls." Popular self-professed telepaths include Alice Bailey and Vinko Rajic.

UNIT V

INTRODUCTION TO THINKING:

cognitive behavior in which ideas, images, mental representations, or other hypothetical elements of thought are experienced or manipulated. In this sense, thinking includes imagining, remembering, problem solving, daydreaming, free association, concept formation, and many other processes. Thinking may be said to have two defining characteristics: (a) It is covert—that is, it is not directly observable but must be inferred from actions or self-reports; and (b) it is symbolic—that is, it seems to involve operations on mental symbols or representations, the nature of which remains obscure and controversial (see symbolic process

Cognitive abilities like thinking, reasoning and problem-solving may be considered to be some of the chief characteristics which distinguish human beings from other species including the higher animals.

The challenges and problems faced by the individual or by society, in general are solved through series of efforts involving thinking and reasoning. The powers of thinking and reasoning may thus be considered to be the essential tools for the welfare and meaningful existence of the individual as well as society.

DEFINITIONS OF THINKING

1. Ross:

"Thinking is a mental activity in its cognitive aspect or mental activity with regard to psychological aspects".

2. Garrett:

"Thinking is a behaviour which is often implicit and hidden and in which symbols are ordinarily employed".

3. Gilmer:

"Thinking is a problem-solving process in which we use ideas or symbols in place of overt activity".

4. Mohsin:

"Thinking is an implicit problem-solving behaviour".

TYPES OF THINKING:

Thinking can be classified as follows:

1. **Perceptual or Concrete Thinking:**

This is the simplest form of thinking the basis of this type is perception, i.e. interpretation of sensation according to one's experience. It is also called concrete thinking as it is carried out on the perception of actual or concrete objects and events.

2. **Conceptual or Abstract Thinking:**

Here one makes use of concepts, the generalized objects and languages, it is regarded as being superior to perceptual thinking as it economizes efforts in understanding and problem-solving.

3. **Reflective Thinking:**

This type of thinking aims in solving complex problems, thus it requires reorganization of all the relevant experiences to a situation or removing obstacles instead of relating with that experiences or ideas.This is an insightful cognitive approach in reflective thinking as the mental activity here does not involve the mechanical trial and error type of efforts.In this type, thinking processes take all the relevant facts arranged in a logical order into an account in order to arrive at a solution of the problem.

4. **Creative Thinking:**

This type of thinking is associated with one's ability to create or construct something new, novel or unusual. It looks for new relationships and associations to describe and interpret the nature of things, events and situations. Here the individual himself usually formulates the evidences and tools for its solution. For example; scientists, artists or inventors.

Skinner, the famous psychologist says creative thinking means that the prediction and inferences for the individual are new, original, ingenious and unusual. The creative thinker is one who expresses new ideas and makes new observations, new predictions and new inferences.

Characteristics of Creative Thinking:

a. Creative thinking, in all its shapes and forms is absolutely an internal mental process and hence should be considered as an important component of one's cognitive behaviour.

b. Every one of us is capable of creative thinking and hence it is a universal phenomenon.

c. Creative thinking results in the production of something new or novel including a new form of arrangement of old elements.

d. Creative thinking in all its dimensions involve divergent thinking instead of the routine and final types of convergent thinking. The mind must have complete freedom to wander around to create a new idea.

e. The field of creative thinking and its out part is quite comprehensive and built wide. It covers all the aspects of human accomplishments belonging to an individual's life.

5. **Critical Thinking:**

It is a type of thinking that helps a person in stepping aside from his own personal beliefs, prejudices and opinions to sort out the faiths and discover the truth, even at the expense of his basic belief system.

Here one resorts to set higher cognitive abilities and skills for the proper interpretation, analysis, evaluation and inference, as well as explanation of the gathered or communicated information resulting in a purposeful unbiased and self-regulatory judgement.

An ideal thinker is habitually inquisitive, well-informed, open-minded, flexible, fair-minded in evaluation, free from personal bias and prejudices, honest in seeking relevant information, skilled in the proper use of the abilities like interpretation, analysis, synthesis, evaluation and drawing conclusion and inferences, etc.

The critical thinking is of a higher order well-disciplined thought process which involves the use of cognitive skills like conceptualization, interpretation, analysis, synthesis and evaluation for arriving at an unbiased, valid and reliable judgment of the gathered or communicated information or data as a guide to one's belief and action.

6. **Non-directed or Associative Thinking:**

There are times when we find ourselves engaged in a unique type of thinking which is non-directed and without goal. It is reflected through dreaming and other free-flowing uncontrolled activities. Psychologically these forms of thought are termed as associative thinking.

Here day-dreaming, fantasy and delusions all fall in the category of withdrawal behaviour that helps an individual to escape from the demands of the real world by making his thinking face non-directed and floating, placing him somewhere, ordering something unconnected with his environment.

We hear there is nothing seriously abnormal in behaviour involving day-dreaming and fantasy but behaviour involving delusions definitely points towards abnormality.A person under the

influence of such delusions may think or believe that he is a millionaire, the ruler of the universe, a great inventor, a noted historian or even God. In contrast, a person in the grip of delusion may be inclined to be the most incapable, unworthy and unwanted person and may develop guilt feelings or complain that he is the victim of some incurable physical or mental diseases.

DEVELOPMENT OF THINKING:

Thinking is one of the most important aspects of learning process. Our ability to learn and solve the problems depends upon our ability to think correctly which helps us in adjustment and is necessary for a successful living.Only those men who can think distinctly, constructively and carefully can very much contribute something worthwhile to the society.As no person is born-thinker, one has to acquire knowledge of technique and practise of proper thinking.

There are few methods which help to develop thinking through training.

1. **Adequacy of the Knowledge and Experience:**

Adequacy of the knowledge and experience is considered to be the background of systematic thinking.

So care should be taken to help the children with adequate knowledge and experiences which can be done by:

(a) Training the children to enhance the process of sensation and perception to gain better knowledge and experience to improve critical thinking.

(b) A person should be provided with opportunities for gaining adequate experiences and should be encouraged for self-study, discussion and participation in healthy and stimulating activities.

2. **Adequate Motivation and Definiteness of Aims:**

Motivation helps in mobilizing our energy for thinking. It creates genuine interest and voluntary attention in the process of thinking, and thus helps a lot in increasing the adequacy and efficiency of our thinking. Thus one should try to think on definite lines with a definite end or purpose, the problems we solve should have intimate connection with our immediate needs and basic motives, and such thinking should be directed on creative and productive activities.

3. **Adequate Freedom and Flexibility:**

Thinking should not be obstructed by imposing unnecessary restrictions and narrowing of the field of thought process. If the past experiences or habitual methods do not help in solving the problem we should strive for new association, relationships and possibilities for arriving at satisfactory results.

4. **Incubation:**

When we set ourselves to solve a problem but fail to solve it in-spite of our strain, putting more efforts to thinking and persistent thinking, it is better to lay aside the problem for some time and relax for a while or engage in some other activity. During this interval a solution is evolved to that specific problem through the efforts of our unconscious mind. This phenomenon of incubation is helpful.

5. **Intelligence and Wisdom:**

Intelligence is defined as the ability to think properly, and thus proper development of intelligence is essential for bringing adequate thinking. Proper care should be taken to use intelligence, wisdom and other cognitive abilities for carrying out the process of thinking.

6. **Proper Development of Concepts and Language:**

Concept is a word or idea with a generalized meaning which represents an entire class of objects, ideas or events; for example, a word "saree" is a concept, when you think this word it represents all kinds of sarees which are six yards or eight yards long sarees made of silk, cotton, nylon or a mixture of the concept formation begins in early childhood which are first hand face-to-face example. It can be +ve or -ve.Language is a highly developed system of symbols in which words within a grammar can be written or spoken in different combinations. Much of the thinking depends upon language although some imaging are also present.Concepts, symbols, signs, words and language are the vehicles as well as instruments of thought. Without their proper development one cannot proceed effectively on the path of thinking. Their development stimulates and guides the thought process.Improper development and faulty formation of concepts and likewise, symbolic behaviour not only hampers a person's progress in thinking but also proves fatal, as they may provoke perverted thinking and wrong conclusions.

7. **Adequacy of Reasoning Process:**

Thinking is also influenced by the mode of reasons one adopts. Illogical reasoning often leads to incorrect thinking. Logic is the science of correct reasoning which helps to think correctly. Therefore, we should cultivate the habit of logical reasoning among our children.

TOOLS OF THINKING:

There are a few important elements involved in the thinking process:

1. Images:

As mental pictures consist of personal experiences of objects, persons or situations, heard and felt. These mental pictures symbolize actual objects, experiences and activities. In thinking, we usually manipulate the images rather than the actual objects, experiences or activities.

2. Concepts:

A concept is a general idea that stands for a general class and represents the common characteristics of all objects or events of this general class. Concept, as a tool, economize the efforts in thinking, for example, when we hear the word 'elephant' we are at once reminded not only about the nature and qualities of elephant as a class but also our own experiences and understanding of them come to the surface in our consciousness to stimulate our thinking at that time.

3. Symbols and signs:

Symbols and signs represent and stand for substitute of the actual objects, experiences and activities. For example, traffic lights, railway signals, school bells, badges, songs, flags and slogans all are symbolic expressions, they stimulate and motivate resultant thinking because they tell us what to do or how to act.

4. **Language:**

Is the most efficient and developed vehicle used for carrying out the process of thinking. When a person reads, writes or hears words or sentences or observes gesture in any language one is stimulated to think. Thus reading and writing of documents and literature also help in stimulating and promoting the thinking process.

5. **Muscular activities:**

Thinking in one way or the other shows the evidence of the involvement of some incipient movements of groups of our muscles. A high positive relation has been found to exist for the thinking and muscular activities of an individual. The more we engage ourselves in thought, the greater is the general muscular tension and conversely as we moved towards muscular relation, our thought processes gradually diminish.

6. Brain functions:

Whatever may be the role of the muscles, thinking is primarily a function of the brain. Our mind is said to be the chief instrument of the thinking process. The experiences registered by our sense organs have no meaning, and thus cannot serve as stimulating agents, or instruments for thinking unless these impressions are received by our brain cells and properly interpreted to derive some meaning.The mental pictures or images can be stored, reconstructed or put to use only on being processed by the brain. What happens in our thought process is simply the function or product of the activities of our brain.

Errors in Thinking:

Our thinking, reasoning and problem-solving behaviour all are largely influenced by our "sets", which is a kind of habit or a way in which we have accustomed ourselves in perceiving certain

situations.Whatever registered earlier in our perceptions or experiences provide the base for our present and future thinking. We won't change from our preset path of thinking which leads towards a rigid behaviour.We happen to make mistakes because of our attitude, likes and dislikes, bias or oversimplified thinking, reasoning and problem-solving, etc. These mental sets have been gained from previous experiences surely interfere with our subsequent thinking resulting in ineffective behaviour.Thus our thinking will be defective and harmful if it is not based on correct data or information. Our biases, prejudices and beliefs sometimes do not enable us to think logically. We make wrong conclusion because of our prejudices, hence we are inclined to ignore and overlook those facts which support right conclusion.

1. Our thinking is defective because we have allowed ourselves to be swayed by our emotions. Many people do not think clearly and accurately during an examination because they have been disturbed by fear and failure.

2. Many times our thinking become fallacious, and cannot view the problem from different angles broadly.

3. Many of our thinking may also be distorted by superstitions or by lack of information that is relevant to the subject.

4. Many of our wishful thinking are also unscientific thinking. Our prejudices and biases cause conflicts, rationalizations and delusions which are defective thinking as well.