

## **PSY101 Handout Highlight Important Topics**

**Prepared By:**

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**Introduction to Psychology (PSY101)**

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## WHAT IS PSYCHOLOGY?

## Lesson

### 1

Beginning with the first psychological laboratory, founded in 1879 by German philosopher and physiologist Wilhelm Wundt, modern psychology's can be

traced in many disciplines and countries. Psychology's historical perspectives and current activities lead us to define the field as the science of behavior and mental processes.

### **Theoretical perspectives of psychology**

There are many disciplines that study human nature. Psychology is one. Within psychology, the biological, behavioral, psychoanalytic, cognitive and social+/- cultural perspectives are complementary. Each has its own purposes, questions, and limits; together they provide a fuller understanding of mind and behavior.

### **Why do we study psychology?**

Scientific inquiry begins with an attitude of eagerness to skeptically investigate competing ideas, with an open- minded approach. Putting ideas to the test helps us in fully understanding them. The curiosity that drives us to test ideas, and to expose their underlying assumptions, can be experienced in every day life as critical thinking.

### *COURSE DESCRIPTION*

**The course will encompass basic concepts of psychology** Concepts like learning, memorizing, retention, emotions, process of thinking, how do Our sense organs work etc will be discussed.

Also, issues like what is normal and what is abnormal behavior, the interventions used For treating psychological problems, along with an overview of main and popular Areas of psychology will also be tackled.

**The main focus of the course will be on introducing essential terminology, theories, themes, concepts, and trends relevant to modern day psychology**

The main focus is to help students to learn and understand what are the essential and important areas of study in psychology. Also students will be enabled to understand and learn the basic concepts which psychology is mainly based on.

**Practical application of knowledge, besides a know how of theoretical constructs, will be encouraged**

How to use psychology and psychological concepts in every day life is an essential component, besides having a basic understanding of the theoretical part of it. It is expected that after completing this course, the student will be able to use the psychological concepts for resolving problems, or at least identifying, problem areas and situations where psychological intervention is required. **The course will be taught bilingually**

### *COURSE OBJECTIVES*

By the end of the term the students will be able to:

**Understand and use basic terminology of psychology:** Terms, concepts and processes when we are studying and applying psychology's principles in daily life tasks

**Understand and identify the various applications of the discipline as well as its**

**scientific**

**nature:** Understanding of how to conduct psychological research is very important and it needs thorough study of research techniques of how to conduct research, what are the basic steps involved, how to verify the findings; and most importantly, whether it is ethical as well as applicable to humans or not; The students will get a feel of it. The scientific methodology will not be discussed in detail since this is an introductory, foundation, course.

**Choose areas of their interest for higher academic qualification in future:** The students will be familiarized with a number of areas of psychology. After completing this course you may feel that you have developed a keen interest in psychology and want to carry on with studying this discipline; at that point the knowledge from this course will help you in choosing the desired field in which you want to specialize.

Also the knowledge and information gained from this course will help you in understanding the concepts in courses like organizational behavior, management, consumer behavior, and research methods.

**Identify situations where psychological intervention may be required:** While studying psychology, you come to know that psychology's applications are not limited to curing mental problems only, but have wide range of applications from the minor to the most extensive tasks in which psychological principles can be used. Here it is important for you to identify situations where psychology's principles and interventions can be used in order to resolve the issue.

### **Some Additional Advantages**

Besides these basic objectives, there are many other advantages that the students will, or may, enjoy. Knowledge of psychology affects your personality also by enriching your intellectual life and enlarging your vision to see and observe things around you. We will discuss a lot of things, and they will be explained in such a manner that they will add some skills and a better understanding to your present intellectual caliber. For example, if you want to enhance your learning by studying psychology, there are some important and useful tips for you:

### **Distribute your study time**

One of the psychologists' oldest findings is that "spaced practice" promotes better retention than "massed practice". You will remember material better if you space your time over several study periods rather than overcrowding your memory store house with information over load at one time for longer durations.

### **Learn to think critically**

Whether in class, or at home, or somewhere else, note people's personality, habits, assumptions and values and critically evaluate. What perspective or bias underlies an argument? Evaluate evidence. Is it anecdotal? Coincidental? Experimental? Based upon facts? Is what I see the only truth, or can there be other possible explanations?

### **Listen actively to lectures**

According to psychologist William James "no reception without reaction, and no impression without expression." Listen to the main and sub-ideas of the lecture, and after listening, process information by which you can understand and retain the material well.

### **Over learn**

"Over learning improves retention". Read, recite and over learn the material that you cover. Do not overestimate what you know. Rethink and review the lecture, and give some extra time to what you think you already know. It enhances your knowledge and the material will be better retained.

### **Carefully accessing questions while taking tests/ exams**

Read the question to be attempted carefully, think what you have to write and then start attempting questions

### **While exploring psychology, you will learn much more than effective study**

**techniques.** Psychology

polishes and sharpens our understanding of how people perceive, think, feel and act. By doing so, it definitely enriches our lives and enlarges our vision.

Misconceptions about psychology and psychologists

**Anybody who has studied psychology can read people's personality**

This is the most frequent thought that comes into the mind of people who believe that psychologists are like magicians who can tell every thing about any person, his thoughts, feelings emotions, personality and all that other people cannot tell. This actually is not the case, because psychologists are not the magicians or something like that. They are professionals and their area of interest is basically the study of human

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behavior and mental processes; and this requires good observation as well as good prediction. Another important thing that has to be kept in mind is that not all of those who have a degree in psychology can understand, explain, and predict the personality or behavior of a person, because it mainly requires not just good observation but proper training as well.

### **Psychologists can predict fate or destiny**

This is not actually the case. Lay people have these views because they see that psychologists are capable of accurately telling what type of people others are, what they are capable of doing, what are their potentials and capacities etc. In reality, the case is different since psychologists can only predict not the destiny but the direction that one may adopt in future; psychologists can assess and predict personality and behavior because they get professional training for studying human behavior and that is why they can easily tell what type of a person one is, what might be his potentials, and how much he/ she is capable of performing certain tasks.

### **Psychologists are doctors**

Another very common misconception is that psychologists are doctors. Psychologists are not at all doctors; they are specially trained people who deal with the psychological problems and not the medical problems. Psychiatrists, on the other hand, are doctors who have a professional degree in medicine as well as training in treating those suffering from psychiatric/ psychological problems.

### **Psychologists give medicines**

Not psychologist, but psychiatrists are the ones who prescribe medicine to the mentally ill patients, as they have a professional degree in medicine that authorizes them to prescribe medication.

### **DEFINITION**

**“Psychology is the scientific study of behavior and mental processes .... Human or Animal”**

Behavior is overt, manifest, obvious, and easy to study; the mental processes that help carryout these behaviors are covert, underlying, hidden, and not easy to study. Besides behavior, what causes these behaviors to occur and the mental processes involved in it is an important area of interest for a psychologist.

**Psychologists study animals' behavior too; to better understand and predict human behavior, the study of animal behavior becomes essential at times, especially because some researches cannot be carried out with humans due to safety reasons or ethical issues**

### **Goals of Psychology**

**Main and important goals of psychology, or in other words of understanding human behavior and mental processes, are;**

- To understand the nature and mechanisms of behavior and mental processes
- To develop an understanding of the relationship between behavior and mental processes
- To apply this understanding to real life situations and, on the basis of this understanding, predict for the future
- To employ the scientific approach for developing this understanding

- b) Description,
- c) Understanding,
- d) Explanation,
- e) Prediction, and
- f) Control of human behavior and mental processes.

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**Psychology is a science**

It employs the scientific method for gathering knowledge and information. It uses scientific procedure that is essential to be adopted in order to carry out psychological research; otherwise the research will not be considered authentic, reliable, or scientifically valuable.

**“Scientific method is a systematic and organized series of steps that scientists adopt for exploring any phenomenon in order to obtain accurate and consistent results. These steps involve observation, description, control, and replication”.**

These are the main components of any science or scientific discipline. The methods of how to gather, process, and analyze information properly and accurately are very important in psychology as well.

**Remember! Science does not deal with the supernatural**

A number of people commonly believe, and they did more so in olden times, that the evil spirits, demons, or ghosts are the root cause of mental illness. Therefore, for them, psychology may be the approach that can free man of the supernatural possessions, which is a wrong belief. Psychology does not deal with the supernatural phenomena like any other science; it deals with only those behaviors that are overt can be experienced by our senses, that can be understood in psychological/scientific terms, and that can be dealt with through psychology interventions.

**Scope of psychology**

After doing a degree course in psychology one may join a variety of work settings, the most common being:

- **Education/teaching**
- **Research**
- **Hospitals/clinics**
- **Recruiting/screening agencies**
- **Specialized professional settings e.g. armed forces, social welfare etc.**

**Popular areas of psychology****Clinical Psychology**

A branch of psychology concerned with the study, diagnosis, and treatment of abnormal behavior. It is the oldest as well as the most well known branch of psychology. Clinical psychologists are trained to diagnose and treat problems ranging from the every day crises of life such as grief due to the death of a loved one, to more extreme conditions, such as a loss of touch with reality. Some clinical psychologists also conduct research, investigating issues that range from identifying the early signs of psychological disturbance, and studying the relationship between how family members communicate with one another, to the understanding of a wide variety of psychological disorders.

**Industrial / Organizational Psychology**

A branch of psychology that studies the psychology in action at the workplace, including productivity, job satisfaction, and decision-making.

**Health Psychology**

The branch of psychology that explores the relationship of psychological factors and

physical ailments or disease e.g. Health psychologists are interested in how the long- term stress (a psychological factor) can affect physical health. They are also concerned with identifying ways of promoting behaviors related to good health (such as exercise) or discouraging unhealthy behaviors (such as smoking, drinking etc).

### **Consumer Psychology**

-A branch of psychology that studies and explains our buying habits and our effects of advertising a buying behavior. Mainly dealt with the likes and dislikes and preferences of people.

**Environmental Psychology**

A branch of psychology, that focuses upon the relationship between people and their physical environment. It is one of the newly emerging, and in-demand, areas of psychology. Environmental psychologists have made significant progress in understanding how our physical environment affects the way we behave toward others, our emotions, and how much stress we experience in a particular setting.

**Sport Psychology**

The branch of psychology, that studies the psychological variables that have an impact upon the sportspersons' performance; e.g. how stress can affect sport performance, how morale can be boosted, the role of self-concept and esteem, the impact of crowd behavior etc.

**Forensic Psychology**

The branch of psychology that investigates legal issues and psychological variables involved in criminal behavior ; e.g. what factors determine criminal tendencies, how criminals be reformed, deciding what criteria indicate that a person is legally insane, and whether larger and smaller juries make fairer decisions.

Note: For more details see the website of American Psychological Association:  
[www.apa.org/about/division.html](http://www.apa.org/about/division.html)

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## Lesson 2

## HISTORICAL ROOTS OF MODERN PSYCHOLOGY

Throughout some twelve or so decades, psychology has led an active life, developing gradually into a true science. As part of evolution, it has produced a number of conceptual models, approaches, theories, interrelated ideas and concepts used to explain phenomena, that has guided the work being carried out.

Earlier views of the philosophies and concepts were important because they gave the outline with the help of which modern ideas were developed and further formulated.

“Psychology has a long past, but only a short history.” (Hermann Ebbinghaus, 1908)

Wilhelm Wundt set the foundations of modern psychology in 1879, by establishing the first psychology laboratory in Leipzig, Germany.

Man was always curious about human behavior, nature of consciousness, origin of “madness”, emotions and much more about other people’s nature.

Control and desirable modification of behavior interested man; he always wanted to become powerful and be able to make others do what he wanted them to do.

## Historical Roots of Modern Psychology

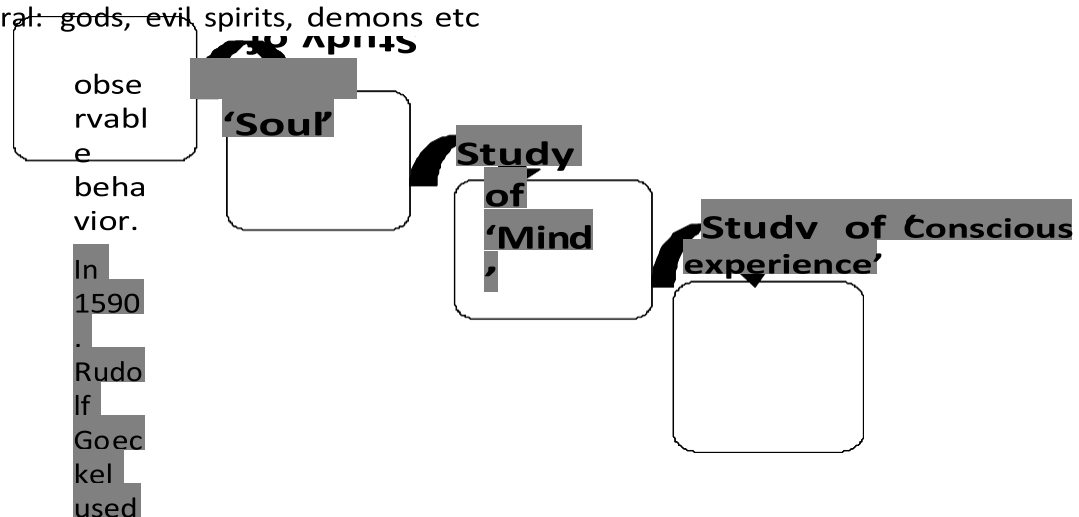
Although psychology did not exist in its present form thousands of years ago, its application can be traced even at that stage of history. The following facts indicate that man was always interested in understanding and managing psyche and behavior, and was capable of controlling and modifying it:

Domestication of dogs was practiced even 10,000 years ago. Babylonians made speculation about etiology of epilepsy and tried to cure it accordingly. Egyptians performed crude brain surgery thousands of years ago. Evidence is available through an examination of ancient human skeletons, that 'trephining' was performed even half a million years ago; trephining was a procedure whereby a hole was drilled into the skull of a mental patient. This was done in order to let the evil spirits or demons escape from the sufferer's body. The basic assumption was that abnormal behavior was caused by supernatural beings.

Such evidence suggests that man sought explanations of human behavior, and tried to control it according to the explanation he believed in. Ancient explanations

centered on the supernatural: gods, evil spirits, demons etc

Today psychology is considered as the scientific study of human behavior and mental processes. But the case was always not so. Initially the soul; of man interested the philosophers, then mind and conscious experience, and lastly



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the term “psychology”. This word is the combination of two Greek words “psyche” and “logos”, the former means the “soul” and the later “discursive knowledge”.

Thus literally, psychology means the science of soul.

Aristotle gave a very important place to soul in human life. Life has no meaning without soul. But he couldn't explain the relationship of the soul to the body. The problem of the relationship between body and soul persisted for centuries. it was not solved by philosophers because it was based on

false dualism and involved a separate study of physical and spiritual phenomena. Later on, the spiritual aspect was discarded altogether and substituted by a more comprehensive word “mind”.

Psychology was also defined as the “science of mind”. But psychologists were never satisfied with this definition because mind was a vague term that could not be defined in objective terms. Mind and mental experiences were primarily subjective in nature. Therefore the later psychologists switched their positions and began investigations into behavior that was an objective and observable phenomenon. So it should not be surprising for a student of psychology that definitions of psychology have varied considerably over the years according to the theoretical orientation of particular “schools”.

Modern psychology is no longer interested in the study of mind. Mental processes have substituted mind. The “mind approach” in psychology was rejected because mind can not be studied using scientific procedures; besides there is no scientific way to determine whether an entity such as mind actually exists.

Also those who used the word mind or mental processes were not unanimous in their explanations of the very nature of mind.

This definition also does not include the overt behavior of man and animals, which forms a major subject of study in the present day psychology.

Psychology has also been defined as the science of consciousness. Structuralism, an important early school of thought in psychology, considered psychology as the study of conscious experience. In the words of Wilhelm Wundt, “psychology has to investigate that which we call internal processes or experiences

-----i.e

..

our own sensations and feelings, our thoughts and volitions in contradistinction to the subject of external experience”. This definition of psychology as a science of consciousness is now discarded and rejected on the following grounds:

Modern day psychology does not believe in consciousness as it used to. Mental processes have substituted consciousness.

Even those thinkers, who use the word consciousness, do not agree on its meaning. According to some, it is a substance while for others it is a process or a stream. The word consciousness does not include animal or human behavior. Psychology also studies unconscious and sub-conscious processes. Therefore there is sufficient rationale behind the belief that it cannot be called the science of consciousness alone.

Modern psychologists define it as a science of behavior, both of animals and humans. It was Watson, the founder of the behaviorist school of thought, who postulated this definition. This definition is comprehensive in the sense that it identifies behaviors that are overt and can be observed. But this definition also has some limitations.

This definition takes behavior in a very narrow sense; behavior, as Watson saw it, was merely stimulus-response. Behavior, for modern psychologists, includes both the overt behavior as well as the mental processes that accompany those behaviors i.e., the inner experiences that carry out those behaviors

### **Philosophical Influences on Modern Psychology**

**The new scientific psychology is a fusion of two psychologies, i.e.,**

-

**philosopher's psychology and the sensory psychology of the physiologists. Brain physiology, reflexology, and phenomenology all these sciences have contributed to the development of psychology. So basically:**

- Psychology emerged from Philosophy
- Philosophers in the West as well as East were explaining thought and behavior
- Addition of newer and better methods of investigating these explanations led to the emergence of psychology

**Sub- continental Philosophic Tradition**

The ancient Indian Philosophy existed much earlier than any other formal explanation. The earliest traces are found in the Yogic philosophy prevailing in 1000 BC. According to this philosophy, mind and body are interlinked and affect each other. Physical exercise helps mental development and vice versa. The later philosophies e.g. Vedic, postulated varied explanations in this regard.

**The Greek Philosophers**

*HIPPOCRATES (460-377 B.C.)*

**One of the more important advances in Greek philosophy and science was the separation of the practice of medicine from religion. Hippocrates was a physician, who not only raised the standard of medical investigation but also developed the code of ethics for the physicians. He, like Alcamaeon, stressed upon the significance of the brain in psychological processes, and he approached the problems of medicine systematically.**

**He postulated a theory of “humors” that account for the basic human activity.** He believed that the perfect health is the result of the proportionate mixture of these humors. To him, there were four basic humors that were associated with different temperaments.

**He believed that four temperaments form personality:**

- Sanguine (Cheerful and Active)
- Melancholic (Sad)
- Choleric (Angry and Aggressive)
- Phlegmatic (Calm and Passive)

*PLATO (427-347 B.C.)*

**He was the first person in history to produce a great all- embracing system of philosophy. He not only developed the theory of knowledge, theory of conduct, and a theory of state, but also the theory of universe.**

**Parts of soul**

**According to Plato, the soul has three parts or components, which he calls reason, spirit, and**

**appetite.** He discovered that there are three different kinds of activity going on in a person. First, an awareness of the goal or a value and this is the act of reason. Secondly, there is a drive towards action, the spirit, which is neutral at first but responds to the direction of reason. Last, there is the desire for the things of the body, the appetites. The body itself is inanimate, and therefore, when it acts or moves, it must be moved by the principle of life, the soul. In the body the soul experiences sensation, desire, pleasure, and pain as well as fear and anger. There is love, too, that can satisfy some taste to love of the truth or beauty that is pure and eternal. The rational or thinking part is the highest in order

**When a person moves from believing to thinking, he moves from the visible world to the intelligible world, from the realm of opinion to the realm of knowledge. Thinking is particularly the characteristic of the scientist. For him, visible things are the symbol of a reality that can be thought but**

not seen. By using visible symbols, science provides a bridge from the visible to the intelligible world. Plato believed that thinking gives us knowledge of truth.

*ARISTOTLE (384-322 B.C.)*

He was not only a philosopher in the modern sense but he was a man of universal learning. There was no branch of knowledge, which did not receive his attention except, mathematics. It is to him that we owe the first systematic treatment of psychology. His method was two- fold, both inductive and deductive. He was an acute observer, and his psychological treatises are overwhelmed by his observations, many of which have stood the test of time, e.g. he introduced:

- The first theory of learning
- Succession of ideas
- The theory that ideas are generated in consciousness based on four principles: o Contiguity o Similarity o Contrast, and o Succession

**SOCRATES (469- 399)**

He believed in the care of the soul to be man's most important task. For him, soul was the essential man. For him, soul was not any faculty, nor was it any special kind of substance, but rather the capacity for intelligence and character. It was man's conscious personality. The activity of soul is to know and to direct a person's daily conduct. The man's greatest concern should be the proper care of his soul so as to make the soul as good as possible.

**ALCAMEON: (500 BC)**

**A physician, who performed the first dissection. He was interested in**

## Introduction to Psychology –

**philosophy and directed his attention to understanding perception**

- **Origin of Physiological Psychology:** **He believed that sensations and thoughts occur in the brain.**  
**He was known as “father of Greek medicine”**
- **Brain is the seat of all human intellectual faculties:** He recognized the importance of brain and clearly distinguished between sensory perceiving and thinking. He was the first to take anatomical dissection for research purposes and also the first vivisectionist.

### Muslim Influence

- The contributions of the Muslim scientists in the field of physiological treatment are very significant besides their contribution to “psychotherapy.”

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- The period which was called Europe's Dark Age was the period when Muslim philosophy, science, and knowledge flourished.
- Initially mental disorders were taken to be caused by super-natural phenomena and therefore the cure was done through witchcraft and magic. On the contrary, Muslims presented the "humane concept" of mental treatment. They gave new ideas and concepts about mental health, personality and rehabilitation of the mentally ill
- Muslim thinkers and philosophers established the first mental hospital in Spain

### Muslim Philosophy: Types of Soul

Man is a compound of body and soul. Soul is of two types:

1. ROOH-E-RABBANI
2. ROOH-E- HAEWANI

#### Rooh-e -Rabbani

The part of the soul that makes it possible for man to make a connection with God. At the same time bodily needs should also be not denied satisfaction. If there is a balance between body and soul, then the individual is normal.

#### Rooh-e-Haewani

- Man possesses 'Nafs' or the soul.
- It is the force with the help of which man fulfills all his desires.

### Levels of 'Nafs'

Nafs is divided into three levels:

1. Nafs-e-Mutmaina.
2. Nafs-e-Liwama. /Nafs-e- Natiqia.
3. Nafs-e- Ammaraa **Nafs-e- Mutmaina**

- At this stage, the body and soul are in complete harmony.
- There is no conflict between good and bad and man is satisfied physically, mentally and spiritually.

#### Nafs-e- Liwama/Nafs-e-Natiqia

- At this stage, the conflict between good and bad starts, both positive and negative forces clash with each other.
- Man is in a state of "do" and "don't".

#### Nafs-e- Ammaraa

- At this stage, negative forces have a complete control over the individual.
- It is the animal tendency of man, the baser self.
- All bad habits and wrong doings are due to this Nafs e.g. greed, pride, anger, lust, hatred etc.

That's why; philosophers emphasized the control of this Nafs. The outlet of these negative forces is essential; otherwise man becomes mentally ill, and enemy of himself.

### Muslim Philosophy and Mental Health

- Muslim Philosophers presented concise and clear ideas about the types, actions and functions of human nature

### Introduction to Psychology –

- A child is born pure. He has both the positive and negative forces, but they are not at conflict at that time and are in complete harmony. Man has been given the ability to differentiate between

good and bad

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### Imam-Razi (850-925 Ad)

- A person maintains sentimental attachment with the physical/material object and when he has to part away from the object he becomes frustrated and a mental patient due to the sentimental attachment with the mortal things
- He keeps on increasing his attachment with these things until it become more important than “necessary”
- Believed that person should love others through God. These physical things are granted by God and He takes them back whenever He wants *AL-FARABI (870-950 AD)*
- Philosopher and poet
- According to him, Man is composed of two elements; body and soul
- Believed in dualistic nature of Man
- He was of the view that there exists no relationship between body and soul

### Ibne- Muskavia (930-1030 Ad)

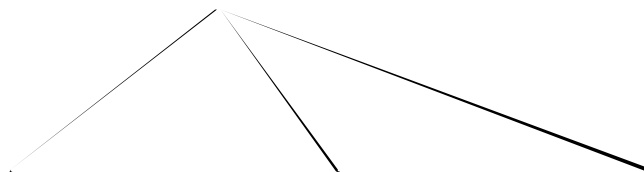
- “Man is a compound of body and soul”
- ‘Rooh’ is the main factor that controls our actions and maintain them
- If ‘soul’ rules over the body then person remains mentally healthy but if body rules over the soul then the person becomes mentally ill

### Ibn-E-Sina/Avicenna (980-1037 Ad)

- A physician, scientist and a philosopher
- Considered as the great physicians of ‘Middle Ages’
- Gave importance to the ‘sentiments’ of the individual
- He said,” When man is away from God’s love, he is also away from man’s love”
- Gave the systematic account of kinds of mind and its faculties

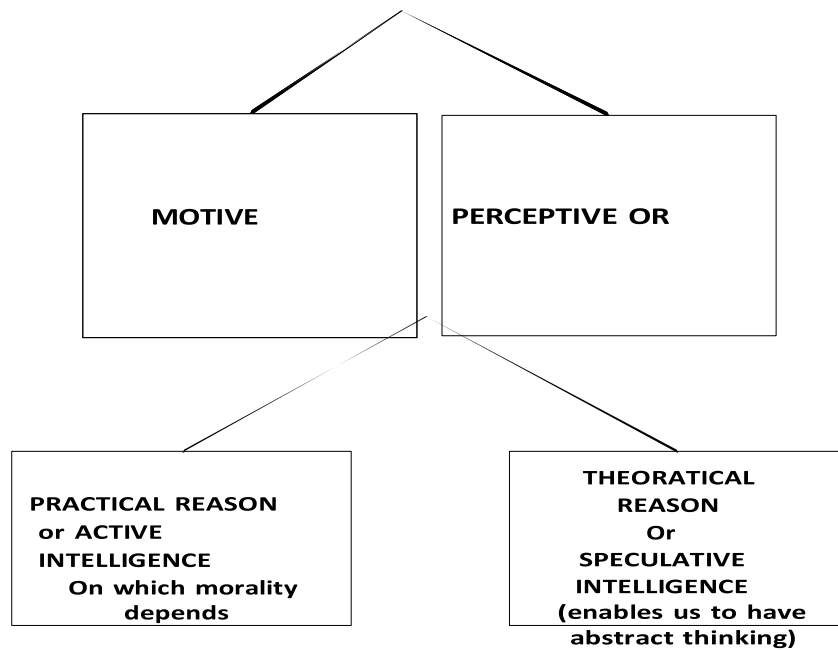
According to him, there are three kinds of mind:

- Vegetable Mind
- Animal Mind



|                 |                                |                                                                                |                                     |   |
|-----------------|--------------------------------|--------------------------------------------------------------------------------|-------------------------------------|---|
| Introduction to | NUTRITIVE MIND<br>Psychology – | THE POWER<br>OF<br>GROWTH<br>(body does not<br>change its form<br>and continue | THE POWER<br>OF<br>REPRODUCTIO<br>N | V |
|-----------------|--------------------------------|--------------------------------------------------------------------------------|-------------------------------------|---|

- Human Mind



Human Mind

### Imam-Ghazali (1058-1111 Ad)

- Believed that 'self' which is called 'Qalb' is the essence of Man.
  - It is the spiritual entity residing in the human body which controls the organic and physical functions of an individual
  - 'Self' is the center of personality from which all the psychological phenomena originate
  - He classified the behavioral mal-adjustments into the bodily and spiritual disorders
- According to him there are *SIX* powers of

"Self":

- Anger
- Impulse
- Apprehension
- Intellect
- Appetite • Will

o Anger is the 'beastly power' and 'intellect' is the 'Devine power'.

o His method of treatment is called "contradictory treatment"

i.e., illiteracy is treated with literacy. o The therapist was named 'Sheikh' and patient called 'Mureed'.

### Ibne Arabi (1165-1240 Ad)

- Believed in the idea of "WAHDAT- UL WAJOOD" which means that Man is the part of God himself.
- Because Man is created by God, so for mental health, it is essential that he should perish himself in the "ZAAT" of God.

### Mujadad Alfsani (1564-1625 Ad)

- Supported the idea of “WAHADT -UL-SHAHOOD” means “REFLECTION OF GOD” which means that the God’s reflection can be seen in the things, which have been created by God.
- A person who is complete in his self and a follower of Shariat and Tareequat is mentally healthy.
- Believed that God does not finish the individuality of human beings and it is not necessary that man should finish his self and amalgamate into the zaat of God.

### **Shah Wali Ullah (1703-1762 AD)**

- Mentioned about two forces:
  - I. Beastly Force or Baheemi
  - II. Ar-Rabbani or Devine.
- Both are contradictory forces and are always struggling. This struggle is called “TAJAZUB”.
- When there is no struggle between these forces, then the individual’s condition is called “ISTALLAH”(mentally healthy and well balanced).
- But when they are struggling and have conflict, then it is called “ALLAHIE TAJAZUB (tendency towards mental illness).

### **Developments since 17th Century A.D.**

**Rapid developments: The 17<sup>th</sup> century was a century in which modern concepts and development were taking place in many fields like Physiology, Astronomy, Physics etc, and displaced the old concepts of Aristotle, Plato etc. These developments brought about changes in the philosophical approach towards the understanding of human nature as well.**

### **Rene Descartes (1596-1650 Ad)**

- His most important work was his attempt to resolve the mind- body problem, an issue that had been controversial for centuries.
- He saw human body as a piece of machinery; intricate and complicated. He believed that body is a machine whose operation can be adequately explained by the mechanical laws of the movement of objects in space. He recognized no difference between the hydraulically operated figures and the body, and he explained every aspect of physical functioning (digestion, circulation, sensation, motion and so on) in mechanical terms
- Mind-Body “Interactive Dualism”: mind and body are separate entities influencing each other. However, he argued that the mind can exert a greater influence on body than was previously thought.
- Nerves are hollow tubes through which “Animal Spirits” conduct “Impulses” he claimed that the heart was filled with a kind of innate heat. In his book “On Man” he went on describing how the pineal gland is moved and shaken by incoming animal spirits. He also added that the animal spirits are carried down the nerves to muscles; as  
Spirits run into the muscles, they are inflated, thus causing contraction of the body region. According to him, messages are transferred to the brain via the animal spirits in the nerves, where the pineal gland pushes them into those pores leading most

### **Franz Joseph Gall (1758-1828 Ad)**

- Known for his work on phrenology
- He postulated the idea that particular psychic functions are represented by particular areas of the brain.
- Intelligence, moral character and other personality characteristics can be discerned by the shape of, and the number of bumps on, a person's skull.

**John Locke (1632-1704 Ad)**

His major contribution to psychology was an essay concerning human understanding, which appeared in 1690 and was the culmination of some 20 years of study and thought; it was later considered as the formal beginning of English/British Empiricism.

**His primary question was how the mind acquires knowledge?**

Locke, first denied the existence of innate ideas, arguing that humans are not equipped at birth with any knowledge. He admitted that certain ideas may seem to adults to be innate (such as the idea of God) because adults have been constantly taught the ideas since childhood and cannot remember any time when they were unaware of them. So, he explained the innate ideas in terms of habit and learning. He gave the concept of “Tabula Rasa”; People are born in this world with empty minds i.e. “Tabula Rasa” or a blank slate. The ideas and memories are imprinted on our minds as a result of experience.

**Later influences**

The physiological research that directly stimulated and guided the new psychology was a product of the late 19th century. These developments supported the scientific approach to the psychological investigation of the mind. Early developments in physiology led to the development of experimental and research oriented psychology. In 19th century, great changes occurred in terms of scientific research and developments. Besides developments in other fields, discoveries in **Physiology also took place**. A number of great thinkers made contributions in this regard and all of them are worth mentioning. However, since this is not a course in the history of psychology, we will restrict our discussion to the major contributors alone.

**Emergence of Schools of Thought**

Wilhelm Wundt in Germany established the foundations of psychology by founding the first psychological laboratory in Germany in 1879. By that time psychologists were working in different nations, on different lines. Many of them were trained at Wundt’s laboratory. Later on, psychologists began to be associated with different approaches for understanding and explaining human thought and behavior. The following early approaches or conceptual models guided the work of psychologists:

**Structuralism**

It focused on the fundamental elements that form the foundations of thinking, consciousness, emotions and other kinds of mental states and activities. Structuralism entailed early concepts of psychology and primarily used the procedure called

**introspection** (in which the subjects were asked to describe in detail what they were experiencing when they were exposed to a stimulus) in order to study the mind.

**Functionalism**

It is an approach that concentrated on what the mind does; the functions of mental  
Introduction to Psychology –

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activity, and the role of behavior in allowing people to adapt to their environments. This school founded by the American psychologist William James, became prominent in the 1900s.

**Gestalt Psychology**

An approach that focuses on the organization of perception and thinking in a “whole” sense rather than on the individual elements of perception. Instead of considering the individual parts that make up thinking, gestalt psychologists took the opposite track.

They concentrated on how people consider individual elements as units or wholes. Their contribution in understanding the perceptual phenomena is very significant.

### **Prevalent Models**

The early roots of psychology are complex and varied, and consequently it is not surprising that the field is so diverse in nature today. Today, one can see that different approaches or models prevail. All of these models describe, explain, understand, and

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predict behavior and mental processes from a different perspective. These are not entirely contradictory  
in nature, but are different in terms of their emphasis and focal point. There is no single model that can be

called right or wrong. In fact most modern psychologists believe in different ideas from different theories, at the same time.

**Biological model**

The psychological model that views behavior from the perspective of biological functioning. The role of brain, genes, neurotransmitters, endocrine glands etc

**Psychodynamic model**

The approach that concentrates on the belief that behavior is motivated by the inner forces over which individuals have little control. It was founded by the Viennese physician Sigmund Freud in early 1900s.

**Cognitive model**

The psychological model that focuses on how people know, understands, and think about the world. Main emphasis of this approach is, besides on people's understanding and thinking, on describing the patterns and regularities of the operation of our minds.

**Behavioral model**

This psychological model focuses on the overt observable behavior. The model grew out of the rejection of psychology's early emphasis on the inner working of the mind, suggesting instead that observable behavior should be the focus of attention. John B. Watson was the first person to advocate the behavioral approach.

**Humanistic model**

The psychological model that suggests that people are in control of their lives. It is considered as one of the newest and major approaches to psychology. This approach rejected the view that behavior is determined by automatic, biological forces, unconscious processes or by the environment; it suggests instead that people are in control of their lives. People are naturally inclined to develop towards higher levels of maturity and fulfillment and that, if given the opportunity will strive to reach their full potential.

## SCHOOLS OF THOUGHT

Wilhelm Wundt, in Germany, established the foundations of modern psychology in 1879. He wanted to study, experimentally, the conscious experience of individuals. As discussed earlier, the different schools of thought gradually emerged after psychology took this scientific turn. These schools were basically different ways of observation, description, understanding, and prediction of psychological phenomena; in the present context, mental processes and behavior

### Earlier Schools Of Thought

The earlier schools that paved the way for further developments in modern psychology were

- Structuralism:** • focused on studying the conscious experience by looking into its individual parts or elements.
- **Functionalism:** focused on what the mind does and how it does.
- **Gestalt psychology:** focused on studying the whole experience of a person rather than breaking it into individual components.
- **Psychodynamic School:** focuses on the unconscious forces that drive/ motivate human behavior.
- **Behaviorist / Behavioral School:** focuses on studying the behavior that is observable and overt.

#### Prevalent Approaches / Models / Perspectives

At present some of the earlier approaches still exist. Psychologists belonging to these sets of theories have contributed a lot to the body of psychological knowledge and practice.

Today, we can see at least six approaches or models of dealing with the psychological phenomena.

#### Biological Approach

The psychological model that views behavior from the perspective of biological functioning. The role of brain, genes, neurotransmitters, endocrine glands etc. How the individual nerve cells are joined together,

how the inheritance of certain characteristics from parents and other ancestors influences behavior, how the functioning of the body affects hopes and fears, what behaviors are due to instincts, and so on. Psychologists using the biological model view even more complex kinds of behaviors such as emotional responses e.g. anxiety, as having critical biological components.

#### Psychodynamic Approach

The approach that concentrates on the belief that behavior is motivated by the inner forces, over which individuals have little control. Founded by the Viennese physician Sigmund Freud in early 1900s, proponents of psychodynamic perspective give importance to the inner unconscious experiences and the forces that led that behavior. Freud believed that unconscious determinants of behavior had a revolutionary effect on 20<sup>th</sup> century thinking, not just in psychology but also in related fields as well. Although many of the basic principles of psychodynamic thinking have been highly criticized, the model grown out of Freud's work has provided a way not only for treating mental disorders but also for understanding everyday phenomena such as prejudice and aggression.

#### Behaviorist / Behavioral Approach

The psychological model that focuses on the overt observable behavior. The model emerged as a reaction to the earlier approaches that emphasized the significance of hidden, underlying, predetermined forces. The behaviorists suggest that observable behavior alone should be the main area of interest to psychology.

#### Humanistic Approach

The psychological model, that suggests that people are in control of their lives. It is considered as one of the most recent approaches to psychology. This approach rejected the view, that predetermined,

automatic, biological forces, unconscious processes or the environment determines behavior. On the contrary, it proposes that people themselves decide about their lives. A failure in being capable of doing so leads to psychological problems. It also stresses the idea that people, by nature, tend to move towards higher levels of maturity and maximum potential.

## Cognitive Approach

The psychological model that focuses on how people know, understands, and thinks about the world. Main emphasis is on how people understand of the world, and their thinking, affects their responses; how it may lead to positive or negative psychological consequences, and even health-related outcomes. Earlier Schools of Thought

### Structuralism

- The school of thought that focused upon the study of mind and conscious experience: consciousness, thinking, and emotions. They used introspection as their method of study.
- Focused upon the structure and operations of the mind rather than studying whole things and phenomenon. Hence named as Structuralism.
- The first well formed system of psychology that laid the foundations for the scientific and experimentally oriented study of mind and mental processes.
- Emerged from the work of Wilhelm Wundt who set up the first psychology laboratory at Leipzig, Germany, in 1879 to study the “building blocks of the mind”, and is generally known as the founder of “scientific psychology”. He proposed materialism because he did not think a science could be operated solely through physical investigations of the brain. He felt that the study of mind must be a science of experience. He supported the existence of the science of psychology quite independent of biology and physiology. He believed that psychology must have an experimental side.

### Subject matter of psychology

According to Wundt, the subject matter of psychology is to be immediate experience, as contrasted to mediate experience. By mediate experience Wundt meant experiences used as a way to find out about something other than the experience itself. This is the way in which we use experience in gaining knowledge about the world.

Immediate experience is the experience as such, and the task of psychology is to study this immediate experience. The physicists are, on the other hand, interested in studying only the mediate experience, but the Wundtian psychologists study immediate experience.

#### *Main Presumption*

- All human mental experience could be understood as the combination of simple events or elements. By analyzing the basic elements of sensations and other mental experiences, the underlying structure of the mind could be unveiled
- Task of psychology is to identify the basic elements of consciousness just like physicists could break down the basic particles of matter

#### *At Wundt's Laboratory*

- Studies and experiments were conducted on the fundamental elements that form the foundation of thinking, consciousness, emotions and other mental states
- Systematic, organized and objective procedures were used so that replication was possible
- The procedure used for studying the “structure of mind” was called “**Introspection**”; a method used to study the structure of the mind, in which subjects were asked to describe in detail what they were experiencing when exposed to a stimulus.

*Introspection* o The subjects gave detailed reports of what they experienced when they were exposed to a stimulus

### The Impact of Wundt's Lab

Attracted leading scientists and students from Europe and U.S.A.

**James McKeen Cattell**

Known for his work on individual differences and “Mental Tests”.

**Emil Kraepelin**

Postulated a physical cause of mental illness

In 1883, he gave the first classification system of mental disorders

**Hugo Munsterberg**

First to apply psychology to industry and law

**Edward B. Titchener**

Known as the formal founder of Structuralism

**Edward Bradford Titchener**

- American psychologist, who was English by birth, but German in professional and personal temperament, who spent his most productive years in Cornell University, New York.
- He was solely concerned with studying the brain, and the unconscious, and for this he believed, we should break it down into basic elements. After that, we can construct the separate elements into a whole and understand what it does.
- He believed that we can study perception, emotions and ideas through introspection, by reducing them to their elementary parts
- There are four elements in the sensation of taste: sweet, sour, salty and bitter
- Ideas and images are related: ideas were always accompanied by images
- The underlying process in emotions was affection Criticism

**This school of thought has been criticized on various grounds i.e.**

*It was Reductionist*

**It reduced all complex human experience to simple sensations It was Elementalistic**

The structuralists sought to look at individual elements first, and then combine parts into a whole, rather than study the variety of behavior directly.

**It was Mentalistic**

Structuralism studied only verbal reports of human conscious experience and awareness, ignoring the study of subjects who could not report their introspection.

*Functionalism*

**An approach that concentrated on what the mind does, in other words the functions of mental activity, and the role of behavior in allowing people to adapt to their environments. The functionalist psychologists start with the fact that objects are perceived and “how” they are perceived. They asked “why” as well. This school became prominent in the 1900s. It emerged as a reaction to Structuralism.**

- Founded by William James, also known as the founder of American Psychology.
- Emphasized “function” rather than “Structure” of human consciousness

i.e., what the mind does

- Focused upon the way humans adapt to their environment; what roles behavior played in allowing people to better adapt to their environment

- Examined the ways in which behavior allows people to satisfy their needs
- Functionalists were especially interested in education and applied psychology

## Method of

### Investigation

Longitudinal

Research

Observation, interviews, and testing of a person over a long period of time: made possible to observe and record the subject's development and his reaction to different circumstance.

William James

**He was the leading precursor of functionalist psychology. James was a Harvard University professor, primarily trained in physiology and medicine. Psychology and philosophy fascinated him, and he treated psychology as a natural science. In 1875 he offered his first course in psychology. In 1890 he published "Principles of Psychology", a two-volume book, which became a leading psychology text in the U.S.**

James wrote about the stream of consciousness, emotions, the self, habit formation, mind-body link and much more. He was also interested in will, values, religious and mystical experiences. James said: "We should study consciousness but should not reduce it into elements, content and structure". Acts and functions of mental processes need to be focused upon, rather than contents of the mind. Consciousness was an ongoing stream, and was in continual interaction with the environment. Careful observation is important; Wundt's rigorous laboratory methods are of little value. James believed that each individual has a uniqueness that could not be reduced to formulas or numbers

### John Dewey

- **Famous American educator**
- **One of the key founders of "Functionalism"**
- Stimulus– Response phenomenon is not an automatic behavior, the goal of the person performing it has the main role in it; the stimulus and the response determine each other
- It is the function, or the goal, of the whole action that elicits response
- Dewey developed the field of 'School Psychology' and recommended ways for meeting student's needs
- Teachers are strongly influenced by their psychological assumptions about children and the educational process

### Teachers need to understand two issues

- Children and adults are different; teaching/education should be in accordance with children's developmental readiness
- Children are similar to adults in the sense that they perform better when they have some control over what they are to accomplish; the curriculum should be designed accordingly

Applied psychology flourished following the emergence of functionalism

- James McKeen Cattell began studying ways to measure intelligence
- Psychology entered the world of business; Frederick Taylor developed 'scientific management'

**James Rowland Angell**

- Founded the psychology department in Chicago, the most influential of its time.
- Believed that the function of consciousness is to improve the adaptive abilities of the organism and that psychology must study how mind did these kinds of adjustments with respect to the environment.

**Harvey A. Carr**

- Defined the subject matter of psychology as mental activity, whose function is to acquire, fixate, retain, organize and evaluate experiences and use these experiences in some kind of action.
- Carr believed that the study of cultural products such as literature, art, language or social and political institutions could provide information on the kind of activities that produced the actions and behaviors.

**Gestalt Psychology**

- An approach that focuses on the organization of perception and thinking in a “whole” sense rather than on the individual elements of perception. Instead of considering the individual parts that make up thinking, gestalt psychologists concentrated on how people consider individual elements as units or wholes. They made great contributions to the understanding of the perceptual phenomena.
- This school developed as a reaction to structuralism in the early 1900s
- In contrast to the structuralist approach of breaking down conscious experience into elements, or focusing upon the structure, the Gestalt school emphasized the significance of studying any phenomenon in its overall form.
- The word gestalt means “Configuration”
- The main concept that the Gestaltists posed was that the “WHOLE” is more than the sum of its parts, and it is different from it too.
- They concentrated on how people consider individual elements together as units or wholes
- The concept of Gestalt applies to everything, objects, ideas, thinking processes and human relationships
- Any phenomenon in its entirety may be much greater than when it is seen in a disintegrated form
- Three German psychologists Max Wertheimer, Kurt Koffka and Wolfgang Kohler were regarded as the founders of gestalt school as each one of them had done significant work in his respective field.

**Max Wertheimer**

- The founder of Gestalt Psychology, born in Prague in 1880
- Studying at the University of Frankfurt he became aware of a form of apparent motion that was

**Phi phenomenon** = when two lights are in close proximity to each other, flashing alternately they appear to be one light moving back and forth; called “**Phi phenomenon**”

- 

therefore the whole was different from the separate parts; movement perceived whereas it never occurred

- We perceive experiences in a way that calls for the simplest explanation, even though reality may be entirely different; this is Gestalt **Law of Minimum Principle**. We tend to organize our experience so that it is as simple as possible.
- Explanation of phi phenomenon led to a separate school of thought i.e., Gestalt school, that had deep rooted impact on learning, ethics, and social psychology

**Gestalt Laws of Organization**

We organize our experiences according to certain rules, in a simple way:

**Proximity:** Close or nearer objects are perceived as coherent and related. **Similarity:** Tendency to perceive objects, patterns or stimuli as groups, which are similar in appearance parts of the visual field that are similar in color, lightness,

3

3

texture, shape, or any other quality

**Good Continuation:** Tendency to group the stimuli into smooth and continuous patterns or parts

**Closure:** It is the perceptual tendency to fill in the gaps and completing the contours; enables us to perceive the disconnected parts as the whole object.

**Figure and Ground:** Our perceptual tendency to see objects with the foreground as well as the background the object is being recognized with respect to its background. e.g. black board and chalk. (These will be discussed in detail in the section of perception).

**Kurt Koffka**

- **Wrote the famous “Principles of Gestalt Psychology” (1935)**
- Talked about geographical versus behavioral environment: people’s behavior is determined by how they perceive the environment rather than by the nature of the environment.

**Wolfgang Kohler**

- Gave the concept of “insight” and “transposition”, as a result of his observations of a caged chimpanzee and experiments with chickens
- **Insight** = spontaneous restructuring of the situation
- **Transposition** = generalization of knowledge from one situation to another
- Kohler also talked about Isomorphism; changes in the brain structure yield changes in experiences

*Other major contributions*

- **Gestalt approach to ethics:** Truth is truth when it is complete and corresponds fully to the facts of the situation
- **Zeigarnik’s Effect:** Bluma Zeigarnik’s experiments; we remember interrupted tasks better.  
The tension caused by unfinished tasks helps us in remembering
- **Group Dynamics:** Instead of focusing on people’s individual attributes we should see them as whole persons

**PERSPECTIVE/MODEL/APPROACH**

- **A paradigm in psychology is a distinct way of describing, observing, understanding, and predicting any given psychological phenomena. The professionals, as well as students, in order to conceptualize and organize the available information, need a model or paradigm. Also, it is required because it is used to test hypotheses and for conducting research work in order to testify the validity of assumptions.**
- Includes assumptions about what drives human behavior, how disorders develop, and treatment prescriptions

**Biological /Medical Perspective**

Based on the assumption of **Materialism** i.e., all behavior has a physiological basis

- An understanding of biochemical processes will give an understanding of psychological and social phenomena
- Physical structures and hereditary processes determine behavior or behavior potential
- Physical/physiological interventions can alter mental processes and behavior
- Root cause of abnormalities and disorders lies in biology and requires medical intervention

**Historical Background**

The historical roots of biological model are very old, dating back to at least the time of *Hippocrates*. There are a number of great names that contributed to this approach, of which the more important ones will be discussed.

**Hippocrates (460-377 B.C)**

- Greek physician/philosopher
- Regarded as the “Father of Medicine”
- Talked about basis for medical problems
- Believed that rational knowledge could serve a path for understanding psychological problems.

**Galen (129-199 A.D)**

- Born to Greek parents in Asia Minor
- Great physician with an empirical approach who rejected the old doctrine and relied on his observation and research.
- Correctly identified various parts of the nervous system and had an accurate grasp of how nervous system functions.
- Known for anatomical studies on animals and observations of human body functions

**Julien Offroy De La Mettrie (1709-1751 Ad)**

- French priest turned physician
- Noticed that his fever and the resulting physical condition affected his mental state as well as his physical state
- Body is like a machine and the soul is no different from mind
- Mind was a part of the body

**Cabanis**

- French physician
- Consciousness was a function of brain and was proved by the fact that guillotine victims were not conscious after beheading

**Philippe Pinel (1745-1826 Ad)**

- French physician

- Believed that abnormal behavior is caused by some hereditary defects or nervous system defects.

**Wilhelm Griesinger (1817 – 1868 Ad)**

- German psychiatrist
- Believed that the best way to understand mental disorders is to assume that they are caused by brain pathology

**Paul Broca (1824-1880)**

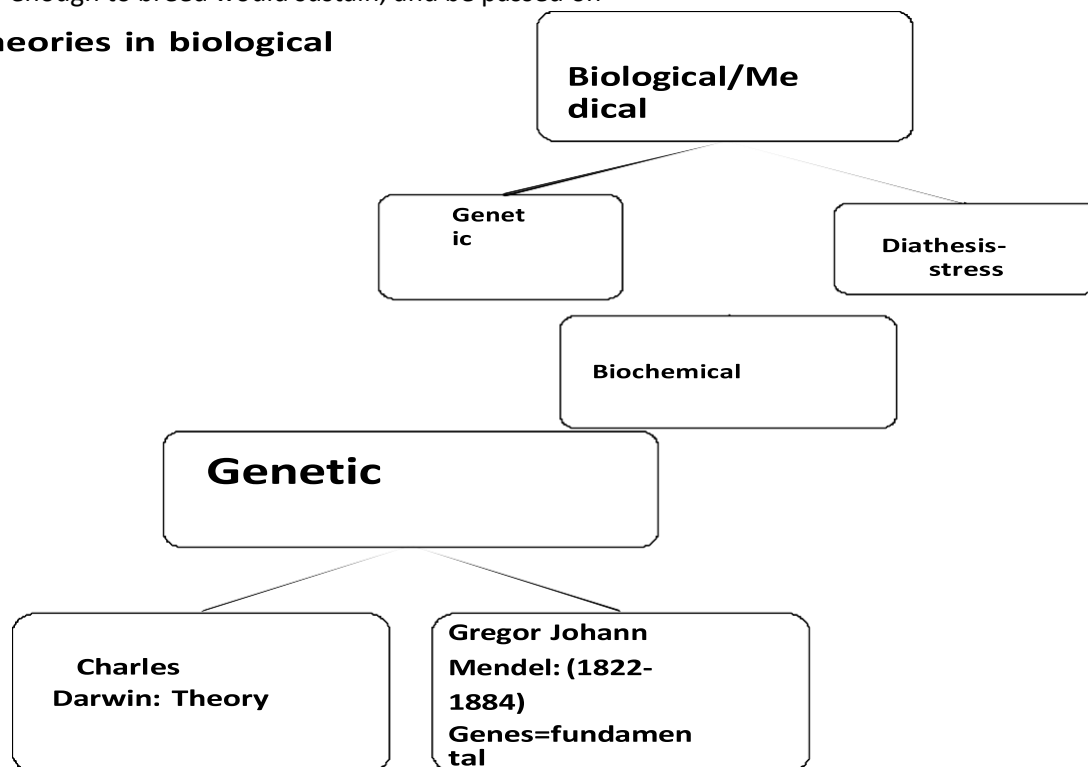
- French surgeon and anthropologist
- His main contribution is with reference to the localization of function; specific areas of brains are responsible for specific functions
- Discovered speech center in brain

**Emil Kraepelin (1856-1926 Ad)**

- German psychiatrist
- Stressed the likely physical cause of mental illness, and gave the first classification system of mental disorders

**Charles Darwin: (1809-1882 Ad)**

- British scientist
- Author of the revolutionary “The Origin of Species” (1859)
- According to Darwin, variations among individuals of a species would occur by chance, but could in turn be passed on to the future generations
- Gave the concept of “Survival of the Fittest” ;only those variations which helped the individuals survive long enough to breed would sustain, and be passed on

**Theories in biological***Biochemical Theory*

Very small amounts of certain chemicals in the body can cause profound changes in behavior as proved by researches.



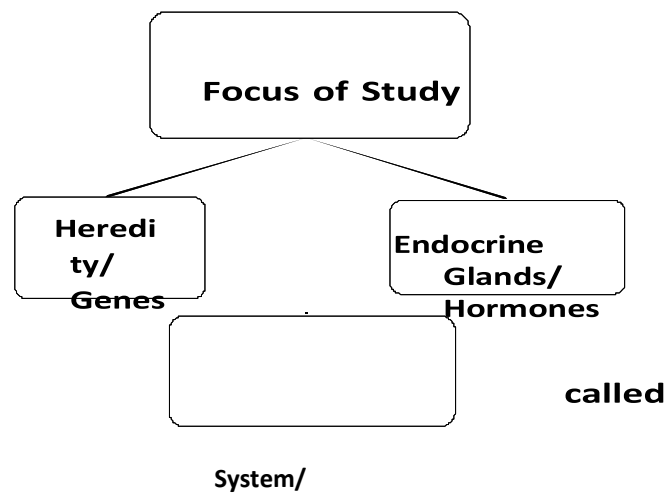
*Diathesis-Stress Theory*

Predisposition i.e., diathesis (including genes) and stressful environment combine together to cause abnormal behavior

Traits are influenced by genes and by

environment

Focus of  
Study

**Neurotransmitters**

The synapse of the neuron releases

special chemicals “neurotransmitters” Nervous

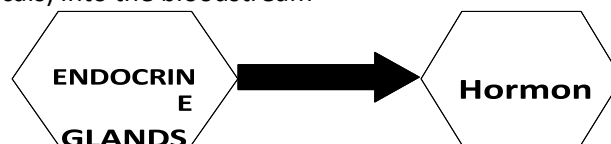
- Existence of neurotransmitters has been known since 1920's; but the evidence of their relationship with psychological disorders has been found and known since 1950s
- More than 50 neurotransmitters exist in human body

**Neurotransmitters and Their Role**

- **Acetylcholine:** Learning, Memory and Muscle control
- **Dopamine:** Motor activity, Coordination, Emotion and Memory
- **Epinephrine:** Emotion, Stress
- **GABA (Gamma-Amino Butyric Acid):** Anxiety, Arousal, Learning
- **Serotonin:** Sensory Processing, Sleep, Arousal
- **Glutamate:** Anxiety, Mood

**Endocrine Glands**

These glands form the body's “slow” chemical communication system; a set of ductless glands that secrete hormones (special chemicals) into the bloodstream”

*Endocrine Glands and Abnormality*

- Low secretions of the thyroid produce anxiety like symptoms such as irritability and tension
- Low level of pituitary secretions produces depression like symptoms—Fatigue, apathy etc.
- Abnormal secretions of hormones may cause major depression

**Assumptions of Biological/Medical Model**

- Abnormality is caused by some the “Central Nervous System”(C.N.S).
- Disease in the C.N.S.has some or physical origin.

I

N BIOLOGICAL

**MODEL**

diseases of the C.N.S.

**L TREATMENT/**

- Diseases in the C.N.S. are not currently specific.

**THERAPUTIC TECHNIQUES**

- Physicians are best able to treat

disease in

biological

University of

PHARMACHOLOGICA

NON-PHARMACHOLOGICAL/

PSYCHOTROPI

SOMATIC

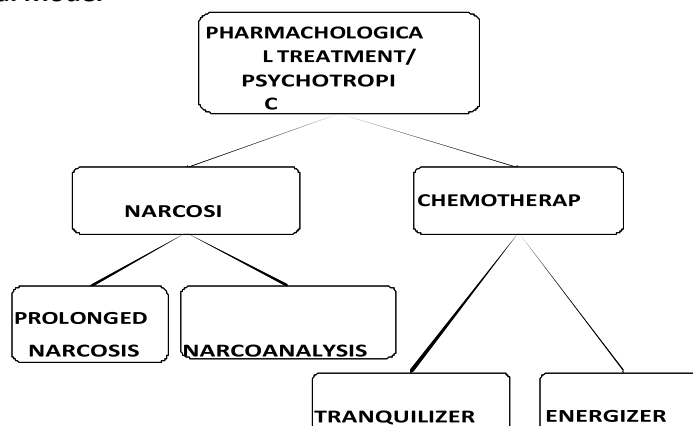
C MEDICATION

TREATMENT

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**Therapeutic Techniques in Biological Model****Pharmacological Treatment**

“Pharmacology is the science of the study of drugs to treat a wide range of less severe psychological disorders”.

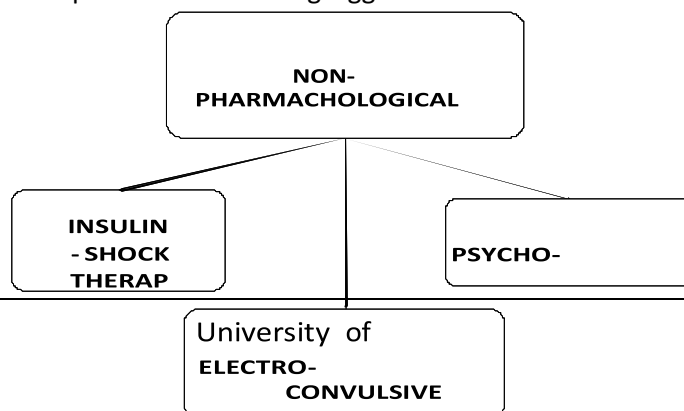
I. **Narcosis:** The word “Narcosis” is derived from the Greek word meaning “be numb”.

**a. Prolonged Narcosis**

- Person is made to sleep for 15-24 hours a day and is kept under constant observation
- Prolonged narcosis is difficult and dangerous to administer, because a number of physiological complications develop under prolonged sleep
- Seldom used today

**b. Narcoanalysis**

- Drugs are given in amounts that produce a state of “grogginess” large doses



## II. Chemotherapy

It is the type of therapy that treats mental and behavioral disorders with drugs and chemicals

### a. Tranquilizers

- Drugs that produce soothing and calming effects

### b. Energizers

- 

They are used with the sufferers of depression s who are not helped by sedatives

## Types of Drugs

- 

**Stimulants:** Caffeine, nicotine, cocaine

- 

**Depressants:** Alcohol, barbiturates

- 

**Anti-anxiety drugs:** Benzodiazepines: diazepam (Valium), lorazepam (Ativan)

- 

**Antidepressants:** phenazine (Nardil), paroxetine (Paxil)

- 

**Hallucinogens:** lysergic acid (LSD), MDMA (Ecstasy)-in large doses, cannabis (marijuana)-in

In 1930's, several therapies were developed which draw considerable attention

### Insulin-Shock Therapy

- 

Developed by Manfred Sakel to cure psychological disorders by administering insulin to produce a state of coma

Comma is caused because of a reduction in blood sugar level

- 

- 

cells; Found to be Effective with schizophrenics, addicts etc., if used with psychotherapy.

- 

### Depression of metabolic processes tissues and

Now rarely used as a method of treatment

### Electro-Convulsive Therapy (ECT)

- 

A biochemical therapy for severely depressed patients in which a brief electric current is sent through the brain of the anesthetized patient

- 

This controversial therapy is applied to severely depressed patients

### Psycho-Surgery

- 

It involves brain surgery which is used in the treatment of severe psychotic patients who have resisted all other forms of treatments

### Merits of Biological Approach

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Although psychological causes are significant, biological causes are worthy of examination and study too

- 

Research work is rapid, producing valuable new information

### Demerits of Biological Approach

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Explains human behavior in biological terms, treats with the help of biological methods, and ignores psychological factors

- 

Mental life is an inter play of both biological and non-biological (environmental) factors; biological has been emphasized at the cost of ignoring the non biological, or psychological

### Criticism Against Medical/ Biological Model

- 

No independent means of verifying/ identifying the existence of the disease; both factors and symptoms are often assessed.

- 

There exist alleged differences between the symptoms of physical illness and the symptoms of mental illness

- Symptoms of mental illness are subjective, whereas those of physical illnesses are objective.

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**Lesson 5****THE PSYCHODYNAMIC APPROACH/ MODEL**

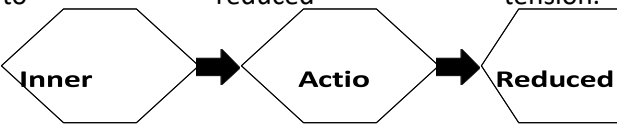
The approach that concentrated on the unconscious forces that drive our behavior; belief that the inner forces over which individuals have little control motivate behavior.

- Founded by Sigmund Freud, the most influential figure in the history of psychology.
- The basis of motivation and behavior lies in inner forces; forces that are predetermined, and forces over which humans have little control, which the person is not aware of i.e., unconscious determinants of behavior
- It maintained that instincts are the driving force behind individual's personality; there are life instincts as well as death instincts that play a role in human life.

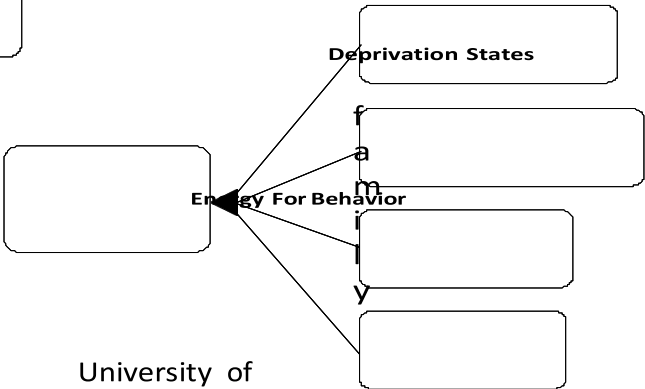
**Significance of Psychodynamic Approach**

- The most influential theory of the 20th century, that affected psychology and related disciplines in a revolutionary manner
- Gave an entirely new perspective to the understanding of behavior and mental processes as well as mental illness
- The first theory to raise the awareness that not all behavior is rational
- Gave an impressive, broad based, therapeutic approach
- Provided a basis to understand everyday life phenomena e.g. interpersonal relationships, aggression, prejudice
- Many other, later, approaches built their paradigms on this approach - some by refining it, some by deviating from it

One of the main ideas is that there is an inner tension for the fulfillment of instincts, the tension leads to action for fulfillment, the fulfillment leads to reduced tension.



Roots Of Human Action



Sigmund Freud: 1856-1939

University of  
Founder of psychoanalysis  
Austrian physician, neurologist, psychologist  
Born in Moravia (Czech

- - 
  -
- Republic) in a middle class

Physiological Arousal

- Studied at Vienna University where he became interested in

Conflicts  
Frustration

2  
8

neurological research

- 
- 
- 

Spent three years at General Hospital Vienna and worked in nervous diseases, psychiatry, and dermatology  
1885: Became professor of neuropathology at Vienna University  
1885: Following a government grant went to Paris as a student of French neurologist Jean Charcot, who was treating nervous diseases through hypnotic suggestion

- Freud's interest in psychopathology was heightened as a result of his studies of hysteria, under Charcot
- 1886: Established private practice in Vienna specializing in nervous disease. His interest shifted from physiological to psychological explanation of psychopathology
- Started collaborative work with Josef Breuer
- main emphasis was that uncharged emotional energy associated with forgotten psychic traumas resulted into hysterical symptoms
- Therapy, at that stage, involved putting the patient in a hypnotic state, where he recalled and reenacted the traumatic experience = Catharsis
- Hence the formal beginning of Psychoanalysis

#### *Foundations of Psychodynamic Approach*

#### **Psychic Determinism**

All behavior is determined i.e., has a cause that lies in the mind/psyche

#### **Role of Consciousness**

A significant part of our behavior is generated by unconscious forces

#### **Continuity of Normal and Abnormal Behavior**

Normal and abnormal behavior are different only in terms of degree and not in kind

#### **Emphasis on Clinical Observation**

Clinical observation/ case studies were the main source of data

#### **Structure of Consciousness**

##### **Conscious**

Contains thoughts and feelings of which one is immediately aware

##### **Subconscious**

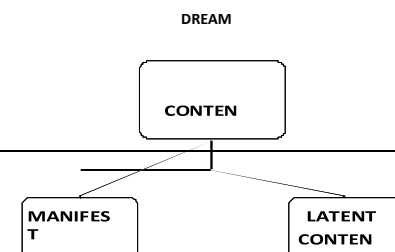
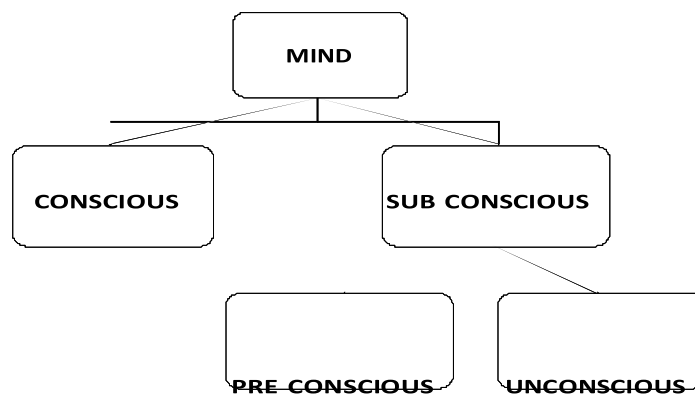
Mind level below the level of conscious awareness

##### **Preconscious**

Part of the sub conscious that can be accessed by deliberate choice

##### **Unconscious**

Part of the sub conscious that cannot be accessed directly although impulses, ideas, and feelings may permeate out through other sources e.g. dreams, slips of tongue etc.



*Dreams in Freudian Approach*

- Dreams reflect unconscious needs, desires, and impulses.
- Dreams have two levels of dream content: manifest and latent.



**The obvious, apparent part: what a dream appears to be to the dreamer.**

Latent content

**The dream's true meaning, which is usually disguised or distorted by dream work.**

Symbolism

- The manifest content is in a symbolic form
- The latent content is converted into this form by the 'dream censor, a mechanism that ensures that sleep is not disturbed by unconscious desires, and those desires are presented in a socially acceptable form. The manifest content is in the symbolic form of the latent content. Only the psychoanalyst can interpret it.

**Sources of motivation**

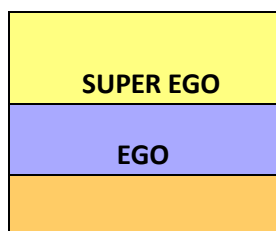
Psychodynamic Model of Personality

**Id**

At birth, the entire mind consists of only id. It consists of pure, unadulterated, instinctual energy and

**Is a three-part structure of the mind; containing id, ego and super ego.**

entirely on the unconscious level. It is the source of basic drives; operates under the 'pleasure principle' i.e., it wants immediate gratification of needs. The id has two means of satisfying bodily needs,



Life affirming force  
expressed in creative  
activities  
including procreation

Destructive

energy  
expressed in  
self destructive  
activities as well as  
aggression  
towards others

**Motivating Forces**

**EROS**

**THANATOS**

refle ID x action

and wish fulfillment.

**Reflex action** is responding automatically to a source of irritation .e.g. an infant may sneeze in response to an irritant in the nose or reflexively move a confined limb, thereby freeing it. In both cases, reflex action is effective in reducing tension. Coughing and blinking are other examples of reflex action.

**Wish- fulfillment** is more complicated. It is the conjuring up of an image of an object or event that is capable of satisfying a biological need e.g. a hungry person thinks of food- related objects.

**Ego**

Mediates the link of the self with the outside world, “Real World”, as well as between the id and superego; operates under the demands of the environment. It operates under the reality principle and operates in the services of id. In other words, the ego

comes into existence in order to bring the person into contact with experiences that will truly satisfy his/ her needs. When the person is hungry, the ego finds food; when the person is sexually aroused, the person finds an appropriate sex object; and when the person is thirsty, the ego finds liquid. **The ego goes through reality testing to find appropriate objects.**

### Super Ego

Conscious

s

Unconscious

There is a third component of personality that makes things much more complicated, i.e. super

ego. It is governed by the moral constraints. It develops from the internalized patterns of reward and punishment that the young child experiences i.e.

Id

Depending on the values of the parents, certain things the child

does or says are rewarded and encouraged and others not liked  
are punished or discouraged.

Opposes the id and represents the moral demands of the family and society; **it is the ‘moral self’ or the ‘conscience’ of the person**

#### *Development of Personality: A Stage Approach*

Psychodynamic approach proposed a stage- theory of the development of personality:

|                      |                              |                                                                                            |
|----------------------|------------------------------|--------------------------------------------------------------------------------------------|
| <b>Oral Stage</b>    | <b>Birth - 1 ½ Years</b>     | Ego formation begins, weaning begins, delayed gratification is learnt; body image develops |
| <b>Anal Stage</b>    | <b>1 ½ - 3 Years</b>         | Continuation of ego development; toilet training; formation of super ego                   |
| <b>Phallic Stage</b> | <b>3 - 5 Years</b>           | Bodily and genital awareness                                                               |
| <b>Genital Stage</b> | <b>Puberty - end of life</b> | Symbolic gratification of drives; secondary process thinking                               |

#### **Oral stage**

occurs during the first year of life and the erogenous zone during this stage is the mouth. At this stage, pleasures mainly come from mouth. According to Freud, an adult who is fixated at the early oral stage will engage in abundance of oral activities such as eating, drinking, or smoking. This person also will engage in activities that are symbolically equivalent to those oral activities such as collecting things, being a good listener etc.

#### **Anal stage**

starts during the second year of life, and the erogenous zone is the anus- buttocks region. It is the stage when the child has to gain control over his physiological processes so that they function in accordance with the demands of the society.i.e the child must be toilet trained. Fixation at this stage may result in physical problems.

#### **Phallic stage**

starts from the third year of life to about fifth year, and the erogenous area are the genital area. This is one of the most complicated and controversial of Freud’s stages. It is the stage of Oedipus and Electra complexes, the resolution of which has profound influence on an adult’s life. The male child experiences the Oedipus complex, which is named after an ancient play by Sophocles, entitled Oedipus Tyrannus, in which King Oedipus killed his father and married his mother. The male child resents the father, because he is regarded as a rival for the mother’s attention and affection. The female counter part of the Oedipus complex is Electra complex, named after another play by Sophocles entitled “ Electra”, in which Electra causes her brother to kill her mother who had killed Electra’s father.

#### **Latency stage**

it lasts from about sixth year to about twelfth year. Here the sexual interests are displaced to substitute activities such as learning, athletics, and peer group activities.



**Genital stage**

it is the final stage of development that occurs following puberty. It is the time at which the person emerges from pre genital stages as the adults as he/ she destined to become. Now the child has become a socialized adult with heterosexual interests leading to marriage and child-rearing. If, however, the experiences during the pregenital stages cause fixation, they will manifest themselves throughout one's adult life.

*Anxiety*

- An emotional state experienced as a result of felt threat to the self
- Anxiety arises when ego cannot cope too much of:
  - i. **Demands of the id**
  - ii. **Demands of the ego**
  - iii. **External danger**
  - In order to protect itself against anxiety and threat, ego uses defense mechanism

*Defense Mechanisms*

Ego defense system, that may be distorting reality

- i. **Repression:** Blocking unpleasant/ unacceptable thoughts by pushing them into the unconscious e.g. forgetting events of the painful childhood.
- ii. **Regression:** Reverting back to a stage that was satisfying e.g. a boss showing temper tantrums like a child; or acting like a baby.
- iii. **Displacement:** Redirecting the expression of unwanted desires or impulses to a substitute rather than the actual target e.g. beating children when a wife cannot express anger toward husband.
- iv. **Rationalization:** In order to justify one's behavior, one develops a socially acceptable explanation or reasoning e.g. going for a second marriage saying that the first wife was quarrelsome.
- v. **Denial:** Refusing to acknowledge or accept anxiety provoking thoughts or impulses e.g. being a heavy smoker but saying 'I am an occasional smoker'.
- vi. **Projection:** Attributing unwanted thoughts and impulses to others e.g. a person takes bribe and blames the organization for paying him not enough salary.
- vii. **Sublimation:** Converting unwanted impulses into socially approved thoughts, feelings and actions e.g. disliking the in-laws but behaving in a very friendly manner, or becoming a stamp collector to overcome the impulse to steal

Psychotherapy: Psychoanalysis

- An intensive, long-term psychotherapeutic procedure.
- Requires long sessions over extended periods may be years.
- Better suited to intelligent individuals.
- Involves a special relationship between the therapist and the patient.
- **Target:** To explore unconscious motivation, conflicts, desires.
- **Goal:** Establishing intra psychic harmony by developing awareness of the role of the id, reducing over compliance with super ego, and by strengthening the ego.
- **Understanding of 'repression':** The therapy gives central importance to the understanding of the manner in which the person uses repression for handling conflict.

Interventions used in Psychotherapy

### 1. Free association

- Kept in a comfortable position, the patient is asked to talk aloud and say whatever comes to his mind without considering whether or not it is relevant, rational, or sensible.
- The patient is asked to reveal even the most undesirable and strong thoughts that have been repressed. This leads to emotional release, called 'catharsis'.

### 2. Analysis of Resistance

At times patient feels inhibitions, and is unable or unwilling to express some thought or feeling i.e., barriers between conscious and unconscious. The psychoanalyst aims to break down such resistances so that the patient is enabled to face the unpleasant thoughts, impulses, events.

### 3. Dream Analysis

The therapist tries to uncover the latent content of dreams and decipher the symbolism involved.

### 4. Analysis of Transference & Counter Transference

- Transference: The patient's emotional response toward the therapist is often an indication of the patient's relationship with a person who had been the center of the conflict. It may be negative or positive.
- Counter Transference: The therapists' emotional reaction toward the patient is also important. He may also start having positive or negative feelings for the patient.
- Transference is analyzed and understood as part of the therapeutic process.

### Criticism against Freudian Psychodynamic Theory

- There is no scientific proof that many psychodynamic constructs, e.g. unconscious, exist
- Psychic Determinism: Freudian approach is deterministic and leaves not much room for conscious, rational, decision making or personal will to act
- It ignores the external variables and the environment
- It emphasizes the early childhood experiences too much
- Mostly criticized for its interpretation of the relationship between the genders
- The therapy is too time consuming and therefore expensive

### The Psychoanalytic Approach after Freud

#### The Neo Freudian

- The theorists who belonged to the Freudian school and supported it, but later digressed on some issues and differed from Freud
- They emphasized, more than Freud, the following:
  - i. Current social environment play an important role in one's life.
  - ii. Life experiences have a continuing influence and childhood alone should not be of prime importance.
  - iii. Positive interpersonal relations of love and social motivation have a significant role.
  - iv. Ego functioning is significant rather than id.
  - v. Development of self-concept is important.
  - vi. Self-esteem is important.

#### 1. Alfred Adler (1870-1937)

His theory is known as "individual psychology" which in many ways is the opposite of Freud's theory. For Freud, individuals are constantly in conflict with one another and with society; Adler saw them seeking relationships and harmony, he looked upon mind as an integrated whole working to help to attain the future goals.

- Initially he was Freud's closest friend.
- 1911: Diverted and launched his version of psychoanalytic approach.

#### • Differed from Freud in:

- i. Freud's negativity (e.g. Thanatos instincts)
- ii. Freud's idea that libido is the prime impulse

#### Adler's Approach

**Main concepts:** Esteem, inferiority complex, birth order, will to power and style of life

- i. We are a product of the social influences on our personality
  - ii. Goals and incentives drive us more than drives and instincts
  - iii. Our goal in life is to achieve success and superiority
- Inferiority complex:** the feeling of being less able

than others. It affects one's relationship with others and his achievement in many ways.

### Motivating Forces of Human Life

i. Feeling of inferiority

ii. People are primarily motivated to overcome inherent feelings of inferiority **Birth Order:** has effect on personality. The first- born is different from the last one, and so is the middle- born different from others. **Sibling Rivalry:** Siblings feel a kind of rivalry toward each other.

**Psychopathology:** Compensation: i.e., Compensatory defense mechanism combined with conscious or unconscious feelings of inferiority is the main cause of psychopathological behavior.

**Function of the Psychoanalyst:** To discover and rationalize such feelings and break down the compensatory, neurotic will for power.

### 2. Carl Gustav Jung (1875-1961)

A Swiss psychiatrist, founder of the analytical school of psychology, Jung presented a complex theory of personality.

- 1913: left the inner circle of Freud's students and colleagues, although he had chosen Jung as his successor.
- Was mystical in his understanding and description of personality.
- Had a positive approach toward one's ability to control one's destiny.
- His view of human nature is among the most complex ever portrayed. The human psyche is embedded in past, present, and future; it consists of conscious and unconscious elements, rational and irrational impulses, masculine and feminine tendencies, and a tendency to bring all these contradictory tendencies into harmony with each other. Self- actualization is achieved when such harmony exists, but self-actualization must be sought; it does not occur automatically.
- Believed that the spiritual side must be satisfied, which usually happens in middle age when many of the components of psyche have been discovered.
- Religion to him is the major vehicle in the journey towards self- actualization.

Jung's disagreements with Freud

- The understanding and description of the genders.
- The nature of unconscious.

The main Jungian concepts

**Major goal of life:** Unification of all aspect of our personality:

- Conscious And Unconscious
- Introversion (Inner Directed), Extroverted (Outer Directed)

### Libido

- Energy for personal growth and development

### Types of Unconscious

- **Personal unconscious:** Similar to Freudian view
- **Collective unconscious:** ideas beyond personal experience, inherited from ancestors' all generations, and common to all of humanity.

### Archetypes

- **Part of collected unconscious, universal forms and patterns of thought:** These include themes that can be seen in myths e.g. masculinity, femininity, good, evil opposites, motherhood.

### 3. Karen Horney (1885-1952)

- German- American psychologist.
- Trained as a psychoanalyst in Germany who later shifted to the US.

- She agreed with Freud on the levels of unconscious, anxiety, and repression.
- She emphasized childhood experiences, social interaction and personal growth.

#### *Disagreement with Freud*

- Differed from Freud on primary impulses; impulses are not the main motivating force.
- Disagreed on Freudian position regarding the biological basis of differences between genders.

#### *Main Concepts in Horney's Theory:*

##### *Basic Anxiety*

- **A Major Concept:** If The Environment Is Hostile And The Child Feels Lonely And Isolated, Then This Anxiety Develops. It Can Be Overcome By **Proper Parental Nurturing**

##### *Basic Hostility*

- Children develop such hostility if parents are over strict, punishing, indifferent, or inconsistent.
- Children feel very aggressive and hostile but cannot express it. Repressed hostility leads to anxiety.

#### *Social Interaction and Interpersonal Styles*

She talked about the ways in which people interact with each other, and these were thought to have an impact upon the personality of an individual:

- **Moving away from others:** seeking self sufficiency and independence
- **Moving toward others:** being compliant and dependant
- **Moving against others:** trying to gain control, power, and independence

### **Neuroses**

Arise from emotional conflicts that arise from childhood experiences, and disturbances in interpersonal relationships in later life

#### **Relationship with the real self and the ideal self**

Horney maintained that the real self includes those things that are true about us at any particular time. The ideal self reflects what we would like to become. For normal people, the ideal self is the goal that they would like to reach in the future; it is something around which they can organize their lives and to which they can aspire. For the neurotic person, according to her, the relationship between the real and the ideal self is a problem. In the first place, the neurotic's impression of the real self is distorted. For him, the ideal self is a wish instead of reality and idealized self is an unrealistic, immutable dream

#### **Goal of the therapy**

For her, the goal is to create a realistic relationship between the real self and the ideal self. Horney was optimistic about human nature and the ability to change. Human interactions caused problem and human interactions solved problems also.

### **Lesson 6**

#### **BEHAVIORAL APPROACH**

The psychological model that focuses on the overt, observable, behavior. The model grew out of the rejection of psychology's early emphasis on the inner working of the mind, suggesting instead that observable behavior should be the focus of the field. John B. Watson was the first person that advocated the behavioral approach. This is a psychological approach that considers the relationship between behavior and environmental stimuli as the focus of study; observable behavior is what psychology should be studying, understanding, and explaining.

This approach dominated psychology for most of the 20th century *What do the*

*Behaviorists Study?*

**They specifically study:**

- Observable/ overt behavior
- Specific measurable responses
- How particular types of behaviors are controlled by particular types of environmental stimuli **Method of investigation:** Data are typically collected under controlled laboratory conditions, employing technological assistance

*What the Behaviorists Are Not Interested in:*

**They are not interested in:**

- Unconscious
- Inner motivation
- Biochemical processes
- These and all other states, which are not being observed with the naked eye or cannot be evaluated.

**Behaviorist Analysis**

**Behaviorist Analysis is done for seeing and establishing the relationship between the stimulus and response/ behavior.**

**Three step approach**

- **The antecedent environmental conditions:** are analyzed. i.e., the conditions preceding the action/ response/ behavior, and that lay a ground for it.
- **The behavioral response is studied:** study of the action or behavior that is to be understood, described, predicted, and controlled.
- Observable consequences are explored: **the impact resulting from the target behavior i.e. how it affects the environment or other people.**

**Basic Terminology**

- **Stimulus:** A physical energy source that has an effect on a sense organ, thus producing a response.
- **Response:** The action, behavior, or reaction triggered by a stimulus.
- **Environment:** External factors, variables, conditions, influences, or circumstance affecting one's development or behavior.
- **Variable:** A behavior, factor, setting, or event that can change / vary in amount or kind.
- **Learning:** A relatively permanent change in behavior that takes place as a result of practice and/ or experience.

**Edwin L.Thorndike, was an American psychologist, who's thinking is thoroughly associationistic. He was a functionalist in his emphasis on the utilitarian aspect of psychology. According to him, psychology is about the stimulus- response connections. He was of the view that behavior can be analyzed into associations. He said that the behavioral processes are quantifiable. Believed that behavior was explicable on the basis of nothing but stimulus- response connections inherited and acquired.**

*Initial work:* **in1898 (published dissertation) studied problem solving in animals. Tried to analyze the conditions under which animals learn.**

*Focus of the study:* **the relationship between the animals' response and their consequences.**

**Main finding:** The consequence of any response determines if the response will be repeated in future or not: **"The Law of Effect"**

*The Law of Effect:* **Any response that leads to an outcome that is satisfying for the organism is likely to be repeated; a response leading to an outcome that is not satisfying is not likely to be repeated**

*Association by Contiguity*

- **The organism forms an association or connection between the response and its consequences. For it to be effective, the response and the outcome have to be closely linked -- both in time and space**
- **The theory drew attention towards the significance of reward and punishment in learning new behaviors**

*Criticism against Thorndike's Approach*

**It was not clear about what exactly 'Satisfying' meant.**

*Early Behaviorism*

**John.B.Watson: (1878- 1958):** The founder of the behavioristic school of thought.

- American psychologist with a remarkable career.
- Initially trained in introspection at the University of Chicago but found it extremely vague and mentalistic.
- He became interested in experimental research with animals.
- He completed his Ph.D. on that in three years, being the youngest such graduate.
- Taught at the University of Chicago for four years, joined John Hopkins as full professor and soon became chairperson of the psychology department.
- Gave a revolutionary, pragmatic approach often known as 'Radical Behaviorism'.
- He and his followers believed and advocated that psychology should depart from the study of unconscious and the mind because they could not be verified or tested scientifically.
- Observable behavior is all that psychology should be looking at.
- Environment and external world (environmental stimuli) is what shapes and determines behavior.
- Learning is what matters in what a person is, and not the inborn instincts, impulses, drive, id, or unconscious motivation. An understanding of learning will encompass all aspects of personality.
- Mentalist concepts, not grounded in reality, should be rejected.

*Impact of Learning Experience*

**"Give me a dozen healthy infants, well formed, and my own specified world to bring them up in, and I'll guarantee to take any one at random and train him to become any type of specialist I might select -**

- doctor, lawyer, artist, merchant-chief, and yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations and race of his ancestors". (Watson, 1924)

*Learned Fear: The Case of "Little Albert"*

**1920: Developing Fear; Watson and Rosalie Rayne Eleven month old Albert**

who enjoyed playing with a cute white rat was made afraid of it by linking a loud frightening sound with the appearance of the rat. The experiment was further expanded and Watson and Rayner demonstrated that the fear of the rat could be generalized to all sorts of stimuli: a dog, a cotton ball and a Santa Clause. Watson and Rayner could not get a chance to undo the learning as the child's mother removed him from the hospital.

*Issues stemming from Little Albert's Experiment*

- **Unethical treatment of Albert, that too without the advised consent of his mother.**
- **Watson contradicted his own earlier assertion that early childhood emotional experiences can affect a person for a lifetime.**

*Classical Conditioning*

**Why are children scared of darkness?**

**Why some children jump with joy at the sight of a bear and some start screaming in fright?**

**Why does one coming from abroad start feeling happy at the very sight of his parents' home?**

**Why does one start feeling bad at the thought of going to a dentist?**

**The answers to all these questions can be found in the classical conditioning approach**

**Classical Conditioning: The History**

- **Ivan Pavlov 1849-1936: Russian physiologist and pioneer of classical conditioning.**
- **In the later years of the 19<sup>th</sup> century studied the basic process of digestion and won Nobel Prize for that in 1904.**
- **The focal point was the salivation reflex in dogs.**
- It was already known that the dogs would salivate if food powder were led into their mouths, as it was a 'reflex'.
- The dogs salivated every time the food powder was presented.
- He observed that after some time, the dogs at times salivated just before food was put into their mouths. They also salivated at the sight of the food, and even at the sight of the lab assistant who brought food for them.
- This is where the concept of classical conditioning emerged.

**Classical Conditioning: The Theory**

**Is a type of learning in which a previously neutral stimulus starts eliciting a response that**

**was originally attached to a natural stimulus, because the neutral stimulus has been closely associated with the other stimulus.**

**Basic Terminology in Classical Conditioning**

- *Reflex*

**An automatic, unlearned response resulting from a specific stimulus.**

- *Un-Conditioned Stimulus (UCS)*

**A stimulus that elicits a response reflexively and reliably.**

- *Un-Conditioned Response (UCR)*

**A natural, reflexive, reliable, response of the UCS.**

- *Conditioned Stimulus (CS)*

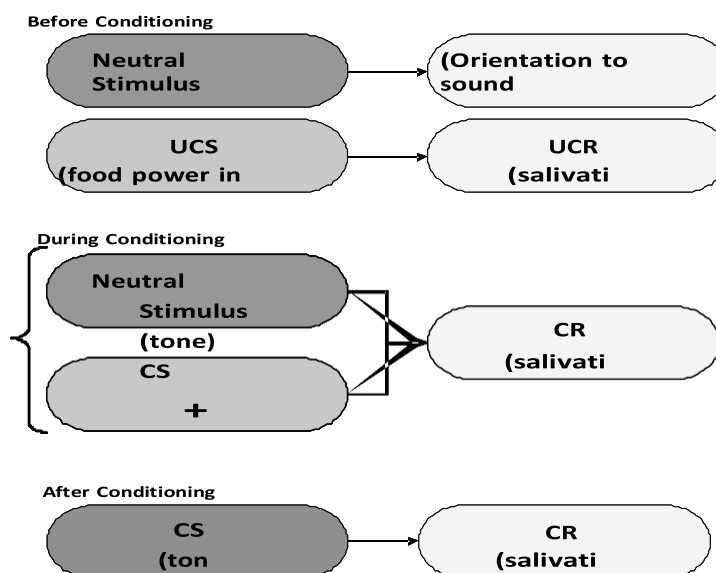
**A primarily neutral stimulus which, when paired with the UCS, starts evoking a response (different from its natural response) and the same as UCR.**

- *Conditioned Response (CR)*

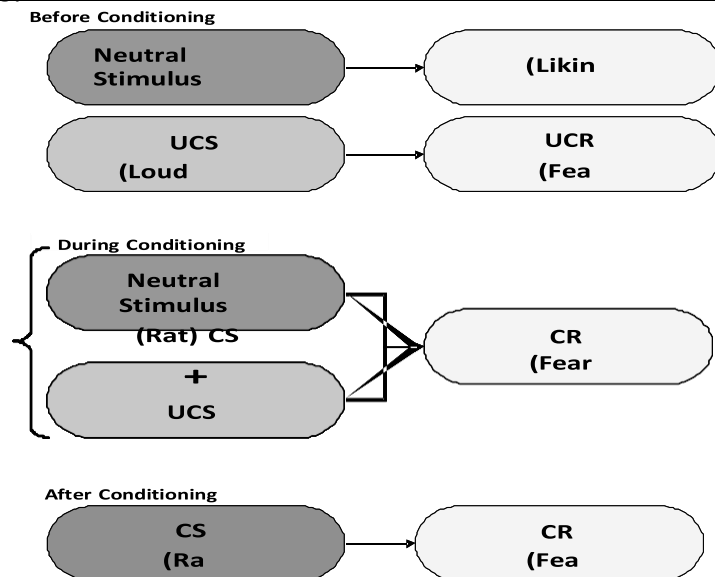
**After conditioning, the CS begins to elicit a new, learned response. i.e. CR.**

### Pavlovian Classical Conditioning

The following diagram explains the classical conditioning model:



### Little Albert's Case



### Extensions of the Main Classical Conditioning Model

There are a number of other variations and extensions of this model, which will be discussed in detail in the section on learning. Here, we will just name them:

- Extinction
- Spontaneous recovery
- Stimulus generalization
- Stimulus discrimination

### Applications of Classical Conditioning in Everyday Life

- *Negative emotional responses:* **fears, phobias**      **fear of lizards, dark places, school phobia**
- *Positive emotional responses:* **Feelings of relaxation, and happiness** **thinking of going on a holiday**
- *Advertising:* **Associating model with the product**
- *Psychotherapy:* **Systematic desensitization, aversive therapy**

### Operant Conditioning

- Why do teachers give stars on children's workbooks?
- Why do parents clap happily when their child utters the first words that nobody else can decipher?
- Why do manufacturers of products announce prize schemes for the consumers of their products?

**The answers to all these questions can be found in the "Operant Conditioning" approach.**

### Operant Conditioning

- **Type of learning in which a voluntary response becomes stronger or weaker, depending on its positive or negative consequences**
- **The organism plays an active role and "Operates" on environment to produce the desired outcome**

### Burrhus Frederic Skinner (1904-1990)

- **American Psychologist and the founder of Operant Conditioning.**
- **1931: Received his Ph.D. from Harvard.**
- **During World War II, he conducted research on teaching pigeons to direct missiles to targets while flying in nose- cone. However the idea did not materialize.**
- **1947: Went back to Harvard to deliver 'William James' lectures.**
- **1948: Appointed as full professor at Harvard.**
- **While a graduate student at Harvard he started thinking on Operant Conditioning lines.**

- **His theory is somewhat similar to Thorndike's, but it was actually Watson who impressed him.**

The Typical Skinnerian procedure

- **A special apparatus usually known as skinner's box is used.**
- **Laboratory animals learn to press a lever so that food is delivered to them.**
- **The environment is controlled.**
- **The animal operates on the environment and as a result of its behavior it may be rewarded or punished. Food is the reward**
- **The consequence determines if the response will be repeated or not.**

Shaping: **Successive approximations of a required / desired response are reinforced until that response is fully learnt:**

- In the beginning each and every success is reinforced with a reward, no matter how small the success.
- Once the desired response is learnt the reinforcer immediately follows it, every time it happens.
- Once learnt the behavior, in many cases, the organism may not need reinforcement any more, since many behaviors are self-reinforcing e.g. learning to play a musical instrument.

**Acquisition:** Initially the response rate following reinforcement may be slow but at one stage it increases to the maximum. This is acquisition.

**Extinction:** If reinforcement is withheld the response rate decreases and finally no response is shown. This is extinction.

Reinforcement

- 4. Reinforcement:** Increasing the probability that preceding behavior will be repeated through a stimulus.
- 5. Positive Reinforcer:** A stimulus whose introduction brings about an increase in the preceding response.
- 6. Negative Reinforcer:** A stimulus whose removal reinforces and leads to a higher likelihood that the response bringing about this removal will be repeated.
- 7. Punishment:** An unpleasant or painful stimulus whose introduction following a certain behavior decreases likelihood that the behavior will occur again.

### Applications of Operant Conditioning in Everyday Life

- Child rearing
- Classroom management
- Teaching of skills
- Animal taming
- Advertising
- Psychological intervention and Psycho- therapy: behavior modification, assertiveness training, token economy

#### *Cognitive Approaches to Learning*

The approaches that focus upon the thought processes underlying learning. Latent Learning and cognitive maps (Edward Tolman); Tolman talked about the 'cognitive maps'; it is not necessary to have an association between stimulus and response, a person can learn without showing any apparent response; in other words learning and performance are not the same

Social learning / Observational learning and Modeling (Albert Bandura): a major portion of our learning is based upon learning by observation.

## Lesson 7

### THE HUMANISTIC APPROACH AND THE COGNITIVE APPROACH

#### *The Humanistic Approach*

Faced with a choice between psychoanalysis and behaviorism, many psychologists in the 1950s and 1960s sensed a void in psychology's conception of human nature. Freud had drawn attention to the darker forces of the unconscious, and Skinner was interested only in the effects of reinforcement on observable behavior.

*Humanistic psychology* emerged out of a desire to understand the conscious mind, free will, human dignity, and

the capacity for self-reflection and growth. An alternative to psychoanalysis and behaviorism, humanistic psychology became known as “the third force.”

It is the approach that focused on:

- **The idea that people are in control of their life.**
- **The person or the self and personal growth and development are to be emphasized.**

The humanistic approach includes a number of other theories with the same or similar orientation e.g., ‘existential’ and ‘phenomenological’ psychology.

*Basic Assumptions of the Humanistic Approach*

- In order to understand behavior we must consider the subjective experience of the person.**
- Neither past experience nor current circumstances constrain the behavior of the person.**

**Humanistic Vs Psychodynamic & behaviorist Approaches**

- **Humanistic approach emphasizes the person, the psychodynamic stresses unconscious determinants, and the behaviorists focus upon external determinants.**
- **Humanistic approach is more optimistic than the other two in the sense that it believes in the person’s ability and will.**
- According to the humanistic thinkers, limiting ourselves to observable behavior and external stimuli alone is ignoring the thinking-feeling person, and that is dehumanizing.

**Free will:** Humans possess the ability to make decisions about their life

*Central Themes of Humanistic Approach*

- **Human beings are capable of shaping their own destiny.**
- **They can think and design their course of action and can follow it in the way they like.**
- **People can overcome or minimize the environmental, and intrinsic influences**
- **“Here and now” is important.**
- **“Wholeness” or “completeness” of the personality is important rather than its separate, disintegrated, structural parts.**

**Humanistic approach emphasizes:**

- **Individual’s freedom in directing his future**
- **Capacity for personal growth**
- **Intrinsic worth**
- **Potential for self-fulfillment**

*Emergence of the Humanistic Approach*

**Emerged in reaction to the perceived limitations of psychodynamic theories, especially psychoanalysis, as well as the staunch behaviorist way of understanding and interpreting behavior**  
**Individuals like Carl Rogers and Abraham Maslow strongly felt that the approaches prevalent at that time could not adequately address issues like the meaning of behavior, and the nature of healthy**



**growth. The founders of humanistic psychology asserted that people need a value system-----a system of understanding, or frame of orientation due to which life gets a meaning and purpose**

Carl Rogers: (1902 – 1987)

- **Born in 1902 in Oak Park, Illinois, a suburb of Chicago, he underwent a strict upbringing as a child who later turned out to be rather isolated, independent, and self-disciplined.**
- **Initially went to the University of Wisconsin for Agriculture major but later became interested in the study of religion. From there he switched on to the clinical psychology program of Columbia University, and received his Ph.D. in 1931.**
- One of the founders of the humanistic approach, Rogers was one of the most influential therapists in the 20th century.
- Research, even that conducted after his death, revealed that Rogers was cited by more therapists as a major influence on their thinking and clinical practice than any other person in psychology including Freud.

#### *Rogers' Approach*

- **Primarily a clinical theory, based on years of Rogers' experience dealing with his clients**
- **In its richness and maturity his theory matches that of Freud; a theory well thought-out and logical having broad application.**
- **The theory emphasizes on a single factor “force of life” which he calls the actualizing tendency i.e. built-in motivation present in every life form to develop its potentials to the fullest extent possible.**
- Rogers had the person-centered approach since the ‘person’ was the main figure of importance,
- He believed that the most powerful human drive is the one to become “fully functioning”,
- Fully functioning = a person becomes all that he or she is capable of

#### **To be fully functioning means experiencing:**

- Optimal psychological adjustment
- Optimal psychological maturity
- Complete congruence (a feeling of integration when the self and the ideal self match; incongruence is a feeling of conflict or unease experienced in case of a mismatch between the two)
- Complete openness to experience

#### *Main Concepts*

- Self:** a fluid perceptual structure based on one's experience of one's own being,
- Ideal self:** an Individual's goals and aspirations,
- Phenomenal field:** an Individual's unique perception of the world,
- Actualizing tendency:** an innate drive reflecting the desire to grow, to develop, and to enhance one's capacities,
- Need for positive regard:** a need for positive social contacts like love,
- Conditions of worth:** restrictions imposed on self-expression in order to earn positive regard,

**Defenses:** In case of an incongruity between one's the ideal and the real self-defenses develop. Rogers talks about only two defenses: **Denial** and **Perceptual Distortion**

- DENIAL:** Blocking out the threatening situation altogether. Denial also includes what Freud called repression.
- Perceptual distortion:** Reinterpreting the situation so that it appears less threatening, just like Freud's rationalization

**Neurotics:** are apart from the real and the ideal. Becoming more incongruous, they find themselves in more and more threatening situations, levels of anxiety become greater, and they use more and more defenses. It becomes a vicious cycle that the person eventually is unable to get out of, at least on his own

**Psychosis:** Psychosis occurs when a person's defenses are overwhelmed, and their sense of self becomes "shattered" into little disconnected pieces. His behavior lacks consistency.

### Carl Roger's Psychotherapy

- Carl Rogers is best known for his contributions to therapy known as “person- centered/ Client-centered therapy/ Non- directive therapy. Also known as the Rogerian Therapy”.
- His main technique is “Reflection” \_\_ mirroring of emotional experiences.
- Aim of the therapy: to help a person grow and self-actualize.
- Rogers maintained that the therapist must possess the following qualities:
  - i. **Congruence** -- genuineness, honesty, with the client
  - ii. **Empathy** -- the ability to feel what the client feels.
  - iii. **Respect** -- acceptance, ~~unconditional~~ positive regard towards the client.

Abraham Harold Maslow (1908-1970)

- American psychologist, and leading exponent of humanistic approach.
- Gave comprehensive theory of motivation.
- Found the prevalent psychology to be too pessimistic and negatively oriented.

Key Points of Maslow's Theory

- Psychology and the psychologist should look at the positive side of the human beings.
- There must be more to living than just being battered by a hostile environment, or by deprived instincts which may actually be leading to self-destruction.
- People's needs are not low level and base. We have positive needs that may become neutral in the worst cases, but will not turn negative or base.
- Human behavior does respond to needs but we will be wrong in saying that all our needs are only physiological in nature
- Needs motivate human action; such needs are very few in number.

Maslow's Hierarchy of Needs

- Basically a stage theory.
- The needs at one level have to be met in order for one to move on to higher order.
- The needs at the lowest/primary/base level are the physiological needs, whereas the highest order needs are the self-actualization needs.

**Self-Actualization:** Most advanced human need based on the desire to grow and utilize one's potential up to the optimal level.

Self-Actualization  
Needs

Esteem Needs

Love And

**Belongingness Needs**

**Safety Needs**

**Physiological Needs**

### Categories of Needs

| Meta-needs                                                                                                   | Deficiency needs                                                                                                      |
|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Based on a desire to grow rather than for meeting a deficiency: expressed in the need for self actualization | The absence of the underlying requirements triggers these needs e.g. physiological needs, love needs, or esteem needs |

### Interactions and needs of Behavior

- *Physiological needs:* **Fulfilled through = hunger/food; Pathology associated = Overeating, Anorexia.**
- *Safety needs:* **Fulfilled through = profession, job; Pathology associated = Phobias.**
- *Love and belongingness:* **Fulfilled through = Marriage, Friendship; Pathology associated = Antisocial personality.**
- **Esteem needs:** Fulfilled through = Awards, Honors, Scholarships; Pathology associated = Depression.
- **Self-actualization needs:** Fulfilled through = Painting, writing, singing; ~~Pathology associated~~ = Isolation, Alienation, Cynicism.

#### Criticism against Maslow's theory

- Although a comprehensive and well formed theory, it has been criticized at some points
- Can we actually, for all case, distribute and neatly order these needs? There is little empirical evidence to support Maslow's way of ranking needs

#### Extensions of Humanistic Approach

- Existential Psychology (Jean Paul Sartre, Rollo May)
- Frankl's Logotherapy
- Positive Psychology (Martin Seligman)

### Cognitive Approach

From the 1920s through the 1960s, behaviorism dominated psychology in the United States. Eventually, however, psychologists began to move away from strict behaviorism. Many became increasingly interested in [cognition](#), a term used to describe all the mental processes involved in acquiring, storing, and using knowledge. Such processes include perception, memory, thinking, problem solving, imagining, and language. This shift in emphasis toward cognition had such a profound influence on psychology that it has often been called the cognitive revolution. The psychological study of cognition became known as [cognitive psychology](#).

### Cognitive processes vs. computer

One reason for psychologists' renewed interest in mental processes was the invention of the computer, which provided an intriguing metaphor for the human mind. The hardware of the computer was likened to the brain, and computer programs provided a step-by-step model of how information from the environment is put in, stored, and retrieved to produce a response. Based on the computer metaphor, psychologists began to formulate information-processing models of human thought and behavior.

The pioneering work of Swiss psychologist [Jean Piaget](#) also inspired psychologists to study cognition. During the 1920s, while administering intelligence tests in schools, Piaget became interested in how children think. He designed various tasks and interview questions to reveal how children of different ages reason about time, nature, numbers, causality, morality, and other concepts. Based on his many studies, Piaget theorized that from infancy to adolescence, children advance through a predictable series of cognitive stages.

The cognitive revolution also gained momentum from developments in the study of language.

Behaviorist

B. F. Skinner had claimed that language is acquired according to the laws of operant conditioning, in much the same way that rats learn to press a bar for food pellets. In 1959, however, American linguist [Noam Chomsky](#) charged that Skinner's account of language development was wrong. Chomsky noted that children all over the world start to speak at roughly the same age and proceed through roughly the same stages without being explicitly taught or rewarded for the effort. According to Chomsky, the human capacity for learning language is innate. He theorized that the human brain is “hardwired” for language as a product of evolution. By pointing to the primary importance of biological dispositions in the development of language, Chomsky's theory dealt a serious blow to the behaviorist assumption that all human behaviors are formed and maintained by reinforcement.

**Cognition means “the known”, “knowledge”, or “the process of knowing”**

**Cognitive approach emphasizes on:**

- Thoughts
- Feelings
- Thinking
- Values
- Expectations etc; factors that determine the personality of the individual

*Main Emphasis*

- **For a proper understanding of behavior, the cognitive approach emphasizes the role of mediating processes in human behavior i.e., the processes that lie between the Environmental stimuli and the behavioral response**
- **Focused on how we ‘remember’, how information processing takes place, how decision making appraisals are done**
- **Unlike the behavioristic approach, this theory gives same importance to both the internal state of the person as well as the environmental events**
- **Internal events are referred as “Mediators” or “Meditational Processes”**

*Areas of Special Interest*

**Cognitive approach mainly focuses on:**

- Emotions
- Social behavior
- Behavior modification

**Cognitive approach includes the elements of psychology, linguistics, computer science and physiology-- thus called a ‘hybrid science’.**

**Elements of Cognitive Model**

**Experiments on apes by German scientist**

*Wolfgang Kohler*, discovered the use of

**insight by them in problem situations.**

- Tolman talked about the 'cognitive maps' (relationship between stimulus) \_\_it is not necessary to have an association between stimulus and response, a person can learn without showing any apparent response
- Both Kohler and Tolman played a vital role in laying the foundation of cognitive approach

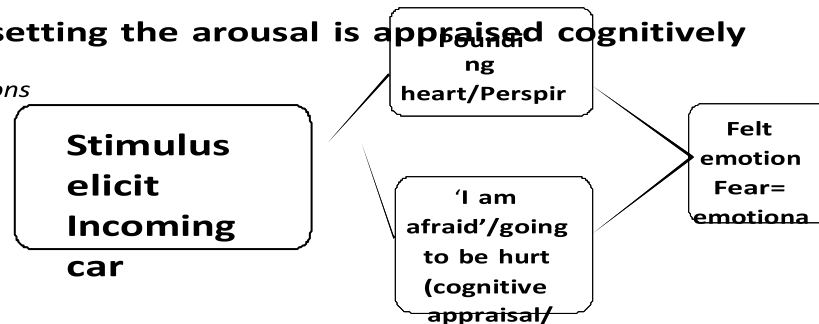
Internal  
processes  
= essential  
in  
understandin

Mediators=  
Work in a  
systematic and  
organized way  
not  
in terms of trial

- **Pioneer: Stanley Schacter (1971)**
- According to him, emotions result from the physiological arousal as well as the cognitive appraisal (evaluation) of the situation
- Arousal comes first and is general in nature
- In order to understand what one is feeling i.e., the title/label of the emotion, and the meaning of one's reaction in a

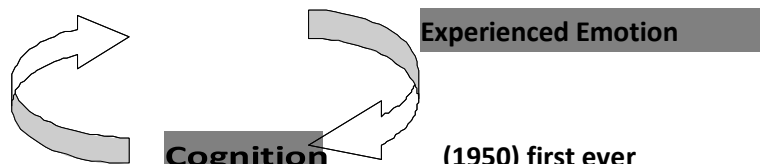
**particular setting the arousal is appraised cognitively**

*Schacter's Theory of Emotions*



Richard Lazarus (1984) maintains that emotional experience cannot be understood unless we understand how what goes on in the environment is evaluated. Emotion leads to cognition and cognition in turn leads to emotional experience.

Cognitive Approach to Social Behavior



John Dollard and Neal Miller

**emphasized the importance of cognitive processes in determining behavior** (1950) first ever

**Personal Construct Theory**

- Developed by George Kelly (1955.)
- Emphasis on how a person cognitively constructs his world
- Persons develop their behavior cognitively towards their world and develop attitudes and opinions accordingly known as 'personal constructs'.
- The constructs then develop into a 'belief system' of a person.

**Mischel's Cognitive Social personality Theory**

- Walter Mischel was a student of George Kelly.
- According to him, how a person responds to the environmental stimulus depends on the following variables:

**i. Competencies**

- What the person knows
  - What the person can do
  - How well the person generate the cognitive/ behavioral outcome
- ii. Encoding Strategies:** Ways of processing information

**iii. Expectations:** Anticipating the likely outcome (mainly positive)

**iv. Personal Values:** Importance of one's belief, also stimulus, people, events etc

**v. Self regulatory system:** maintaining rules for better performance

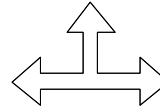
- Setting goals Person
- Evaluating performances

**Bandura's Cognitive-Social**

Behavioral Environmental events

**Learning Theory**

- **Given by Albert Bandura**
- **By combining the rules of complex human interactions in social settings.**

**(1986).****learning, it emphasizes the**

## Observational Learning

- **Main component of social-learning theory in which the person makes changes in his own behavior by watching/or imitating others i.e., a model/ a super star/favorite personality or cartoon character.**
- **Effective in acquiring skills, attitudes, beliefs simply by watching others.**

## Cantor's Social Intelligence Theory

- **Given by Nancy Cantor and her colleagues (1987).**
- **Refers to the expertise, which a person uses in different life situations/ tasks.**
- **The theory explains several types of individual differences.**
  - Choice of Life Goal:** Giving priority/ importance to the most important goal at a particular point of life. i.e., student -- 'Good grades'
  - Use of 'knowledge' in social interactions**  
Use of life experiences and expertise in problem solving.

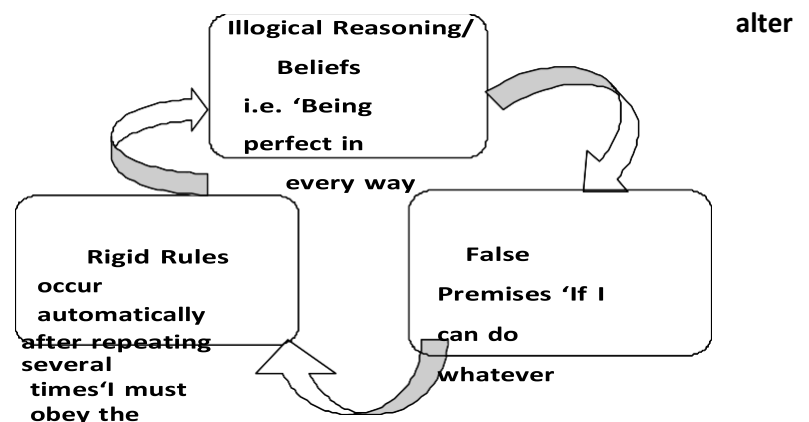
## Cognitive Approach in Behavior Modification

- **Negative and unacceptable behavior is modified through constructive strategies.**
- **According to this approach, person's beliefs and attitudes effect the motivation and behavior of a person**
- **In order to modify the behavior, reinforcement techniques are used.**
- **For attaining the desired goal, realistic strategies are used with continuous feedback.**

## Altering the Belief System

- **Psychologists are of the view that psychological problems arise due to the way people perceive themselves in relation with the people they interact with.**
- **Main focus of the therapist is to the irrational belief system of a person.**

## Cause of Psychological Illness



## Cognitive Theory for Depression

- **Aaron Beck formulated the therapy for depression** is required then I'll be **patients.** authority recognized by everyone
- **Therapist helps the depressive person to change the faulty patterns of thinking through problem-solving techniques**
- **Believed that depression reoccurs in depressive patients because the negative thoughts occur automatically of which they are not aware.**

## The therapist uses four tactics

- Challenging the patient's ill beliefs
- Evaluating the cause of depression
- Attributing the cause to the environmental situation/ event not to the person's in competencies
- Finding the alternative and effective solutions for the complex problems

- **Developed by Albert Ellis (1962, 1977).**
- **Focused on altering the irrational beliefs into more acceptable ways.**
- **Clients are forbidden to use “should”, “must”, “ought” etc.**
- **Confrontation techniques are used which focus on changing the attitudes through rational reasoning.**
- Task is to protect the self worth, potential to be self-actualized, by blocking the irrational thinking patterns.

**In short,** in the last few decades, researchers have made significant breakthroughs in understanding the brain, nervous system, mental processes such as the nature of consciousness, memory distortions, competence and rationality, genetic influences on behavior, infancy, the nature of intelligence, human motivation, prejudice and discrimination, the benefits of psychotherapy, and the psychological influences on the immune system.

## RESEARCH METHODS IN PSYCHOLOGY (I)

## Scientific method in psychology

The scientific method is an approach that practitioners of psychology are interested in for assessing, measuring, and predicting behavior. It is the process of appropriately framing and properly answering questions. It is used by psychologists and those engaged in other scientific disciplines, to come to an understanding about the world.

## Scientific Nature of Psychology

- Psychology is a science
- **Science:** An approach using the scientific method for the observation, description, understanding, and prediction of any phenomenon.
- **Scientific method:** The procedure employing a systematic, pre defined, series of steps for attaining optimal efficiency, accuracy, and objectivity in investigating the problem of interest
- **Systematic:** it follows a specified system, an organized ways of collecting and tabulating information.
- **Pre defined series of steps:** certain steps following a specific sequence that is not to be altered; disruption of the sequence will ruin the essence of the approach
- **Objectivity:** It is

## Steps of Scientific Method

unbiased; the researcher's likes and dislikes do not interfere with the study or its findings

**1. Identifying the research problem** The most important step while conducting research is identify and specify

the area of interest in which one is going to conduct a research. The research problem can be identified in many ways, including personal interest, brainstorming, scientific developments, knowledge etc.

**2. Review of the related literature** Drawing conclusions

Searching the research findings in relation with the research one is going to conduct, in order to see how others approached the same or similar issues. Also, it can give some idea as to what would be the probable outcome of one's research.

**3. Formulation of hypotheses**

A hypothesis is a speculative statement about the relationship between two or more variables. By reviewing the related literature, one is able to formulate the hypotheses pertaining to the variables of interest.

Identifying a research problem

Review of related literature

Formulation of a hypothesis

Designing & conducting the research

Analysis of data

---

Reviewing the related research articles helps one formulate various hypotheses.

**4. Designing and conducting the research**

After reviewing the related literature and making hypotheses, the research is conducted by using different strategies such as Questionnaires, mail interviews, telephonic interviews, face to face interviews etc. A variety of research designs is available to the researchers, who can choose the one that best suits their study.

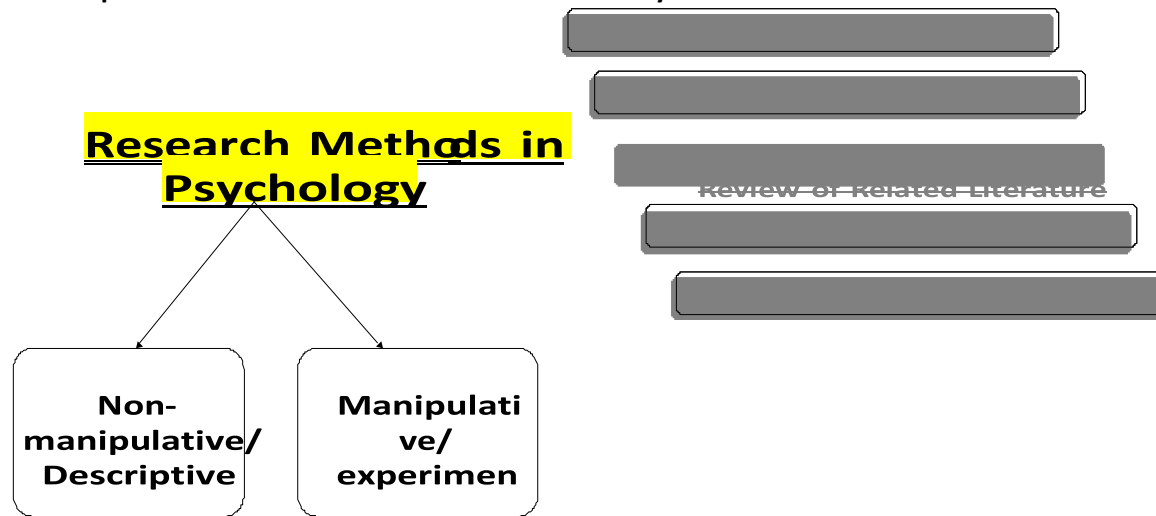
**5. Analysis of data**

After collecting information, the data will be tabulated with the help of statistical methods and computation in order to see whether the finding prove or disprove the hypotheses.

**6. Drawing conclusions**

Conclusions are drawn after the statistical analysis of data. On the basis of this, a decision is made about the rejection or acceptance of the hypothesis.

Research problems can be identified in a number of ways:



### Non-manipulative/descriptive Methods

The methods in which the phenomenon of interest is studied the way it exists in nature. The researcher does not interfere with the events, and acts as a passive recorder.

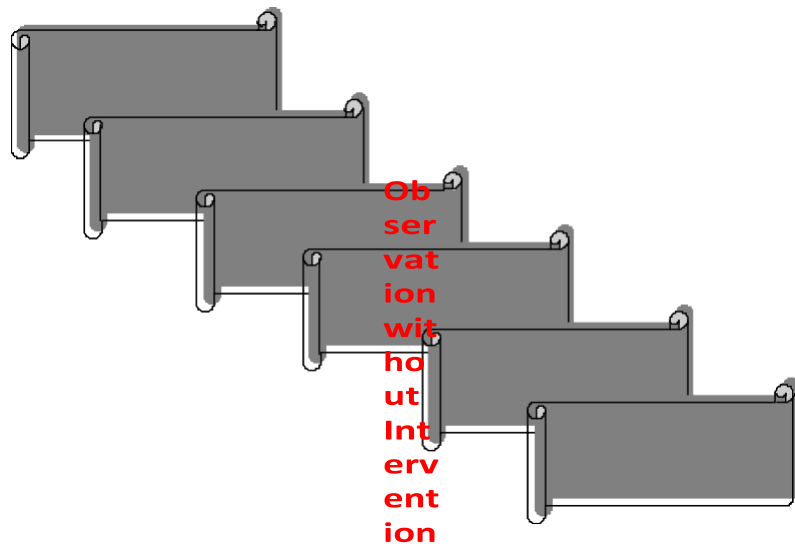
### Manipulative/Experimental Methods

The methods that is responsible for the scientific nature of psychology. In these methods the researcher exercises control over the variables and events. He may introduce variables of interest, or may withhold them. These methods are used for determining cause and effect relationships.

#### Descriptive Research Methods

##### a) Observation

- Systematic observation is used; one of the methods most frequently employed by anthropologists, sociologists and ethnologists.
- Phenomenon of interest is observed, studied, and the observations are recorded.
- The recorded observations are analyzed.
- Conclusions are drawn on the basis of analysis.



### Types of observation

1. Observation without Intervention
2. Observation with Intervention

S

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groups,

o analysis

u

**1. Naturalistic Observation**

Type of observation in which the phenomenon of interest is studied/observed in the natural setting without any interference by the observer; The observer may make narrative records, take field notes, use audio or video equipment, or may use a combination of some or all strategies.

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The observer intervenes, and manipulates the situation, events and/or variables in order to:

- Create a situation which does not occur frequently
- Test the impact of variables on behavior
- Gain access to a situation that is otherwise not accessible or open to observation

### Types of “Observation with Intervention”

1. Participant Observation
2. Structured Observation
3. Field experiments

#### 1. Participant Observation

The observer becomes a part of the situation and plays an active and significant role in the situation, event, or context under study. It can be of two types:

- Disguised Participant Observation
- Undisguised Participant Observation

#### 2. Structured Observation

- Employed when the researcher intends to study a situation, which occurs infrequently or is inaccessible otherwise.
- The observer may “create” a situation or initiate it.
- The control exercised by the observer is less than that in many other techniques.
- Mostly employed by clinical and developmental psychologists.

#### 3. Field Experiments

- Experiments in the natural setting; the degree of control is far less than that in laboratory experiments.
- One or more independent variables are manipulated in the natural setting in order to see their impact on behavior.
- **Confederate:** the researcher is assisted by one or more confederates who behave in a pre-planned manner so as to initiate an experimental condition.

*b) Correlation Research*

**A method used for identifying predictive relationships among naturally occurring variables**

*Correlation*

**Can be said to exist when two different measures of the same individuals, objects, or events vary together e.g. Relationship between I.Q. score & academic achievement or entry test marks & academic achievement. Correlation is a statistical concept.**

### Nature of Correlation

- Positive Correlation
- Negative Correlation
- Zero Correlation

*Measures in Correlation Research*

Introduction to Psychology –

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**Questionnaires:** can be used in- person, can be mailed, or used via Internet. **Interviews:** can be personal and face-to-face, or telephonic. **Official Record:** Official statistics, raw data, crime records etc. **Remember!!!**

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**Most frequently used method for obtaining information quickly and evaluating people's interest, liking, disliking and opinions without indulging in long- term procedures and techniques. It is also easily used because it is a cheap method and information is gathered without much difficulty.**

- Surveys consist of presenting a series of questions or statements to the participants, and asking them to respond.
- Surveys are used when quick information is required in limited time e.g. opinion polls, product preference.
- Also useful when information is required from a large number of people e.g. population census
- More suitable when the goal of the study is to find out about public opinion, attitudes, preferences, likes and dislikes etc

#### Sources of data/information in Surveys

- **Questionnaires:** in person, mailed, internet
- **Interviews:** personal, telephonic • **Newspaper Surveys**

#### Steps involve in conducting the research:

There are mainly five steps,

which are essential while conducting surveys i.e.,

- Conceiving the problem:** The purpose of the study must be carefully thought out and precisely defined. How is the information to be used? From whom it is obtained? What kind of information to be gathered etc.
- Designing the instrument:** There are numerous ways by which information can be gathered from the general public such as mailed questionnaires, telephonic interviews, through internet etc. It must be carefully thought that which procedure is most effective in obtaining the needed information.
- Sampling the population:** The problem of obtaining a representative sample of the population is one of the most difficult as well as significant in the field of measuring popular reactions. The sample to be studied must be drawn in such a manner the each individual has an equal chance of being selected, and that the drawing of one does not influence the chances of any other being drawn. With this procedure, each age, sex, income, religious and ethnic group in the population will be proportionately represented in the sample. Of course there are a number of ways of properly drawing a sample.
- Conducting interviews:** Even when the questions are carefully worded and carefully designed, a poor interviewer can bias the results. Experiments have shown that females are the best interviewers: at least 21 years of age, who like people, who are unbiased, who are good listeners, who have some college education, and who are fairly familiar with the section they are working in.
- Interpreting the results:** Even when all the findings are carried out properly, there is always a chance of misinterpreting the results. Errors in questionnaires, statistical methods, and investigator's own subjectivity can easily bias the results

#### d. Unobtrusive Measures of Behavior



- Indirect ways of data collection
- The person/s who are the focus of interest may not be present at the time of investigation
- May be used for supplementing information collected through observation
- May be used as a replacement of observation
- In situations where direct observation is not possible

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**Unobtrusive measures of behavior include:**

- i. Archival data
- ii. Physical Traces

**i. Archival data**

Already existing records, documents, different forms of literature, newspaper items, photographs, movies, documentaries, biographies, autobiographies etc are used as evidence/ information e.g. using newspaper records to study the rate of crime during the past 20 years. May be used to supplement data gathered through other sources

**ii. Physical Traces**

Remains, remnants, fragments, objects and products of past behavior are used as evidence; usually employed to supplement data from other sources.

**Physical traces can be of two types**

- i. Use traces
- ii. Products

**Use traces**

Cues to the use or nonuse of objects and items provide significant evidence e.g. wall chalking, graffiti on walls of public places, milk cartons or tissue boxes in the garbage bags

**Products**

Study of products, tools, weapons, sculpture etc used less frequently than physical traces

**RESEARCH METHODS IN PSYCHOLOGY (II)** *e.Content Analysis*

- Part of archival research: An approach for systematically categorizing and analyzing the content of the behavior or its related aspects/ variables being studied.
- The analysis may cover contents of live human behavior, books, journals, magazines, poetry, drama, movies, folktales, TV programs, school textbooks and curricula, advertisements etc.
- Inferences are made and conclusions are drawn after objective identification of specific characteristics of contents.
- Content analysis is done keeping specific goals, objectives, themes and constructs in mind.
- Example: Content analysis of textbooks with reference to gender equity and equality; analysis of TV programs with reference to portrayal of women.

*f.Focus Groups*

- A variety of interviews conducted in a group setting.
- The researcher talks to the participants in order to learn about their opinions, attitudes, preferences, likes/dislikes and tries to find out their reasons/cause.
- Used as a source of data collection in surveys but also used otherwise as well. *g.Meta Analysis*
- A statistics based method
- A way of reviewing existing research literature in the same field, about the same phenomena
- The analysis covers the results of several independent experiments within the same field
- Computer aided statistical analysis yields overall conclusions

*Experimental Research*

- Experimental method: the use of experimentation for studying a phenomenon.
- Experimental design: the plan/structure/lay out of an experiment.
- Experiment: the variable of interest (independent variable) is manipulated/ altered and the effect of this manipulation is studied.

*Why experiments are conducted?*

- For testing hypotheses
- To test the impact of a treatment or a program on behavior
- The main feature of experimentation is CONTROL; keeping all those variables and conditions under control, that can have an impact on the findings of the study i.e., variables that can interfere with the impact of the independent variable.

**Variables**

- i. Independent Variable
- ii. Dependent Variable
- iii. Control Variable

**Independent Variable (IV):** The variable whose impact is being studied; that is manipulated...in terms of kind or level

**Dependent Variable (DV):** The measure of behavior on which the impact of independent variable is being studied

**Control variable (CV):** A potential independent variable that can have an impact upon dependent variable; it has to be controlled

## Groups in a Typical Experiment

- i. Experimental Group: This is treated with the independent variable. ii. Control Group; the no-treatment group that is kept under controlled conditions.

## Classical Experiment Design

## Standard format:

|                                  |                                                  |
|----------------------------------|--------------------------------------------------|
| Ex. group<br>measure d<br>on DV  | Ex. group treated by IV<br>& then measured on DV |
| Cont. group<br>measured on<br>DV | Control. group<br>measured<br>on DV              |

## Example of impact of music on stress:

|                                                    |                                                                     |
|----------------------------------------------------|---------------------------------------------------------------------|
| Ex. group<br>measured on<br>Stress level(DV)       | Ex. group treated by soft<br>music<br>(IV)<br>& then measured on DV |
| Cont. group<br>measured on<br>Stress level<br>(DV) | Control.<br>group<br>measured<br>on DV                              |

## Experimental Designs

- i. Within- Subjects Design  
ii. Between- Subjects Design

## Within Subject Design

The experimental design in which the subjects' performance is compared with their own performance i.e., only one group of subjects is used. **Before-After No Control**

## Group Design:

Varieties of Before-after no control group designs:

|       |       |       |       |
|-------|-------|-------|-------|
| A: DV | B: IV | A: IV | B: DV |
|-------|-------|-------|-------|

## ABABA and ABABABBA designs

|       |       |       |       |    |
|-------|-------|-------|-------|----|
| A: DV | B: IV | A: DV | B: IV | A: |
|-------|-------|-------|-------|----|

## Between Subjects Experimental Design

The experimental design in which two or more groups of subjects are used and their performance is compared with each other:

- i. Classical Experimental Design  
ii. After- Only Experimental Design

|       |    |       |
|-------|----|-------|
| B: IV | B: | A: DV |
|-------|----|-------|

Problems associated with experimental research:

- **Artificiality of behavior is a possibility**
- Subjects may be under stress or pressure
- Time consuming and expensive
- Ethical issues: can we tell all about the nature of experiment to the subjects???

BUT...the very element of control gives edge to this approach, as this is what makes psychology a science.

- Kind of research that fits into the experimental framework, although it is not planned, initiated or controlled by the experimenter: it is “sort of

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experimentation”.

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- It is the experimentation in which the independent variable occurs, or has occurred, naturally and the researcher studies its impact the way it is done in a laboratory experiment

#### *Groups in a Quasi- Experiment*

- Exposure Group
- Comparison Group

#### *Quasi- experimental Design*

- Retrospective/Ex Post Facto Design:** Ex post facto means “after the fact”. There are two groups, the exposure group and the comparison group. The process of “constructing” comparable exposure and comparison groups is called “matching”. The subjects are already naturally divided like that. However, the experimenter selects the relevant subjects according to the nature of the research.
- Prospective Design:** This design is similar to the retrospective design, except that in a prospective design, variations in the independent variable are measured as they occur, rather than retrospectively. Researchers are equally careful in interpreting the prospective and retrospective quasi- experiments. In neither case, the subjects are randomly assigned to the exposure and the control groups. Generally, prospective designs are more persuasive than retrospective designs, especially when the independent variable occurred long ago
- Time series Design:** This design is mainly concerned with observing whether the values of the dependent variable change in apparent response to changes in an independent variable.

### Examples of Quasi Experimentation

#### **i. Twin Studies**

Twin studies investigate different aspects of behavior and mental processes of twins, whether identical or fraternal. The studies on identical twins reared apart have generated very significant results. They have shown amazing similarities as well as differences among such twins.

#### **ii. Adoption Studies**

Most people have one set of parents. However 1% of the infants born in western countries every year are adopted at or near by persons unrelated to them. Such children have two sets of parents: parents who rear them and those who give them their genes. Social scientists have used this to help determine, with fascinating results, how much influence genetic factors and family environment have over behavior. Like twin studies, adoption studies suggested that many human behaviors are genetically influenced. That is why the nature- nurture issue is always remaining controversial.

#### *Applied Research: Single- Case Research Designs*

- A type of research in which a single case is focused upon and studied.
- This approach is employed in rarely occurring cases.

Introduction to Psychology –

### PHYSICAL DEVELOPMENT AND NATURE NURTURE

#### Develop ment ISSUE

“The process of growth and differentiation”

**Development refers to the progressive changes in size, shape, and function during the life of an organism by which its genetic potentials (genotype) are translated into functioning mature systems (phenotype). Most modern philosophical outlooks would consider that development of some kind or other characterizes all things, in both the physical and biological worlds.**

### **Developmental Psychology**

**The branch of psychology that studies how growth and physiological/ psychological/ social changes take place over the life span**

Also called Life-span Psychology, it is concerned with the changes in cognitive, motivational, psycho-physiological, and social functioning that occur throughout the human life span. During the 19th and early 20th centuries, developmental psychologists were concerned primarily with child psychology.

### **Human Development**

- **Biological sense:** progressive change in size, shape, and function, of the body during the life span; the genetic potentials are translated into functioning adult systems
- **Psychological sense:** the ways by which physical, cognitive and psychosocial characteristics change over life span; such development is complex, systematic, and age- related
- Developmental changes can be quantitative and easy to measure such as height and weight and the expansion of vocabulary
- Developmental changes can be qualitative i.e., changes in kinds that are more complex and involve “leaps” in functioning. these distinguish a crawling baby from a walking child, a non- verbal child from a talking child, self- absorbed adolescent from a mature adult

### **Psychological changes include the growth of:**

- Learning
- Cognition
- Intelligence
- Emotional maturity
- Creativity
- Sociability
- Morality...and much more

These small leaps are based upon small series of steps that we continue to take throughout our life span

*Issues of Interest to Developmental Psychologists*

### **Is development continuous or discontinuous?**

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Some psychologists believed that human functioning does not undergo fundamental changes but instead changes gradually in its efficiency and working capacity; initially a child spoke a few words but gradually these words become longer and more complicated, increasing the child's ability to remember and use them in sentences. Other psychologists maintain that changes in development reflect psychological processes that mediate human functioning. These are qualitatively unique stages, in which the evolution of one stage may depend on the traits of the preceding stages. e.g. Roger Brown, psychologist, maintains that in the process of language acquisition, a child progresses systematically in five steps or stages. Each stage has its own set of rules and skills from which a higher level of language acquisition takes place.

Jean Piaget maintained that cognitive development occurs in a series of steps in which the child acquires and uses unique sets of cognitive processes that allow the child to think in identifiable ways.

#### Is development general or specific?

- Many aspects of functioning show simultaneous changes; a co-occurrence of change in different situations.
- Changes occur in specific areas of functioning that do not occur in other level of functioning.
- Development may remain isolated in specific domains.e.g. Video game mastery in young boys

#### Is development stable or changing?

In some respects development is stable and stays there for very long, whereas in some ways it keeps moving.

**Temporal aspect:** degree of stability or change across the lifespan **Situational aspect:** degree of stability or change across a wide variety of

experiences.e.g. Aggressive behavior in children **Humans active or passive beings?**

Psychologists maintain that humans are active recipients as well as participants in their course of development. Man seeks to understand the strategies that he can adopt in order to influence development Jean Piaget emphasized the active participation of the child in acquiring cognitive skills acquisition of knowledge and ability to use it effectively.

Some philosophers believed that humans are passive beings whose development is entirely dependent on the environmental stimuli/ forces. These conditions may be internal i.e. food, water, companionship etc or external i.e. previously experienced reward or punishment

These psychologists tend to view differences in the patterns of development in which an individual is exposed to different environmental situations

#### Nature versus Nurture

- **Nature** means hereditary influences.
- **Nurture** refers to environmental influences, in child development.
- Once, it was assumed that these were significant forces that operated independently of each other.
- In the 17th century the French philosopher René Descartes set out views which held that people possess certain inborn ideas that are long lasting and color people's approach to the world.
- The British philosophers Thomas Hobbes and John Locke, on the other hand, took a more empirical approach and emphasized the role of experience as fully contributing to behavioral development.
- Since the days of Descartes, Hobbes, and Locke, the empirical "nature" approach has led to a lot of debate; many followers and many opponents.
- Mid to late 1800's, through to the early 1900's the nature approach was the sole standpoint; consistent with the scientific discoveries of the role of inheritance and natural selection by Mendel and Darwin
- The psychological argument developed later; Francis Galton "Hereditary Genius" (1869); "gifted individuals" tended to come from families, which had other gifted individuals. He went on to analyze biographical dictionaries and encyclopedias, and became convinced that talent in science, professions, and the arts, ran in families.
- Galton went even further arguing that it would be "quite practicable to produce a high gifted race of men by judicious marriages during several consecutive generations".

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- Eugenics: "the study of the agencies under social control that may improve or repair the racial qualities of future generations, either physically or mentally."

*For Galton*

- "What Nature does blindly, slowly, and ruthlessly, man may do providently, quickly, and kindly"
- "Intelligence must be bred, not trained".

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- Such arguments have had massive social consequences and have been used to support apartheid policies, sterilization programs, and other acts of withholding basic human rights from minority groups

The later scientists, especially the behaviorists contested such an approach and advocated the role and significance of environmental influences

#### *Prevalent Approach*

- Both influences are essential and are mutually influential. The role of interaction between heredity and environment together is important.  
e.g., how a child responds to parenting—an environmental influence—is partly determined by the child's temperament and other inherited characteristics.
- The environment influences how hereditary characteristics develop and are expressed e.g.  
increase in average height during the last century because of improved nutrition and medical care.
- Even though many features of personality are based on inherited temperament, the family environment is an important influence on a child's personality development.
- A child with a difficult or unpredictable temperament can develop positively in a warm and loving family environment.
- Intelligence is an inherited feature but the way it is utilized largely depends on the environmental conditions.

#### **Characteristics with Strong Genetic Components**

- Physical Characteristics
- Intellectual Characteristics
- Emotional Characteristics and Disorders

#### **Physical Characteristics (Development)**

- Height
- Weight
- Obesity
- Tone of voice
- Blood Pressure
- Tooth decay
- Athletic ability
- Firmness of hand shake
- Age of death
- Activity level

#### **Intellectual Characteristics**

- Memory
- Ability as measured on intelligence test
- Age of language acquisition
- Reading disability
- Mental retardation

#### **Emotional Characteristics and Disorders**

- Shyness
- Extraversion
- Emotionality

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- Neuroticism
- Schizophrenia

- Anxiety
- Alcoholism

#### Prenatal Environmental Influences

- Mother's nutrition and emotional state
- Illness of mother
- Mother's use of drugs
- Birth complications

#### Studies to Determine the Relative Importance of Nature or Nurture

##### i. Twin Studies

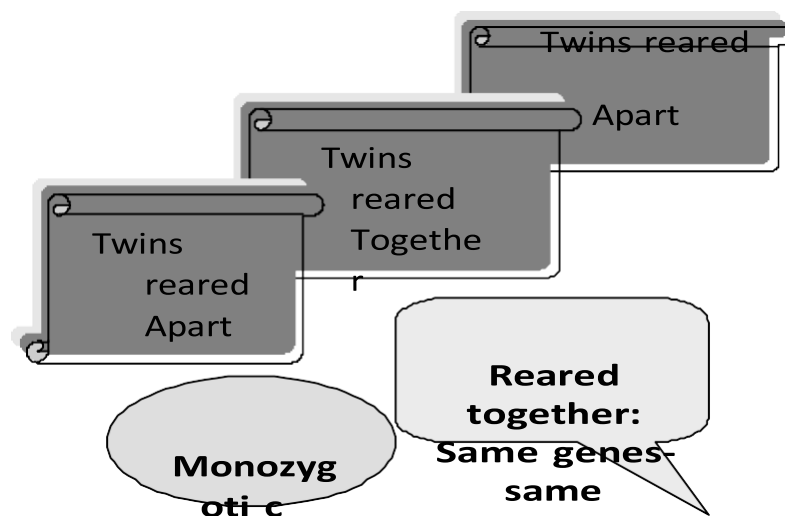
- Studies making use of twins, identical or fraternal...reared apart and reared together
- The case of Gerald Levey and Mark Newman, twins reared apart, who had not seen each other before: When method, both were bald, 6 and a half feet tall, volunteer fire fighters, 250 pounds in weight, had droopy moustaches, wearing key rings on right side of their belts, liked to wear aviator style dark glasses; both had interest in similar subjects, had jobs in the supermarket, and liked tall, slender women with long hair; had similar hobbies, liked Chinese food and same drinks; showed similar mannerism, laugh similarly, and loved to fight fire

#### Twin Studies with Monozygotic Twins

- Twins reared apart: **Same genes-different environment**
- Twins reared together: **Same genes-same environment**

Twin  
Twins

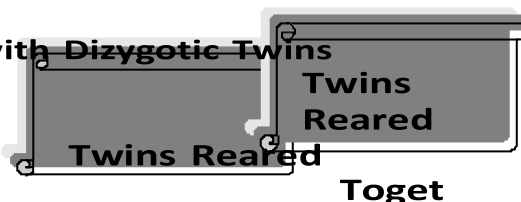
Studies with



Monozygotic

#### Twin Studies with Dizygotic Twins

#### environment Twin Studies with Dizygotic Twins



Toget

genes-same environment

Reared  
together:  
Different

**environment Twins**

- a. Twins reared apart: **Different genes-different environment**
- b. Twins reared together: **Different genes-same**

red apart:

R Different genes- e different a environment

Fraternal/  
Dizygotic Twins

### i. Adoption Studies

Children with different sets of genes, brought up by same parents...in same environment.

### ii. Consanguinity Studies

Study of as many blood relatives as possible of a particular family; these study the extent to which certain features/ characteristics are shared.

### iii. Selective Breeding of Traits in Animals

Certain characteristics are cultivated in animals (running in a maze, aggression, obesity etc) and if it is transmitted on to the next generation then that trait is partly inherited. These findings are then generalized to humans.... although its validity is doubtful

*Research on Nature- Nurture, Focusing on Environmental Issues*

- Research looking for possible environmental causes for certain traits/ behaviors
- These include prenatal studies, and studies involving manipulation of the environmental factors e.g. nutrition, exercise, drugs, pollution etc
- These involve comparing actual history: surveys etc.
- 

*Limitations of Nature-Nurture Research*

- o Ethical considerations in research with humans
- o Not all animal research can be applied to humans

**The best solution probably is the ex-post facto/ retrospective studies**

### Heredity and Physical Development

Researchers believe that although environment exerts an important influence on human development, physical traits are the ones more evidently influenced by heredity. Personality and intellectual characteristics are also affected by it

*Mechanism of Heredity: Transmission of Genetic Characteristics*

**The process begins from the moment of conception; a sperm from the father unites with the ovum/ egg of the mother to form zygote, a single-cell/one-celled product, containing the complete genetic package for the one to be born much later**

**The zygote contains 23 pairs of chromosomes**

### Chromosomes

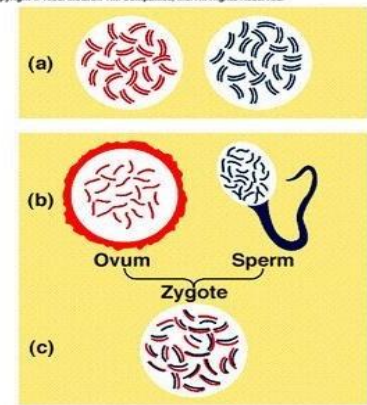
- Each sperm and ovum contains 23 chromosomes that are tiny rod- shaped particles containing genetic/ heredity information.
- Genetic/ heredity information is packed in the genes.
- **Genes:** parts of chromosome that are the transmitters of inheritance.
- Genes produce particular characteristics of the new being, either individually or in combination **Genes may be dominant or recessive;**

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a dominant gene means that its characteristics will dominate those of the recessive one e.g. if father has brown eyes and mother has black eyes, and if the father's genes dominate then the baby will have brown eyes.

- o Each zygote's 46 chromosomes contain about 30,000 segments strung along its

### Heredity Composition of the Zygote





beads i.e., “genes”

**Genes**, made up of **Deoxyribonucleic Acid (DNA)**, determine all our heredity

### Prenatal Stages

**EMBRYO:** A developed zygote with a heart, a brain and other organs. **Fetus:** A developing child; 9 weeks after conception till birth.

#### *Determination of the Sex of the Embryo*

- A combination of chromosomes from the parents determines sex.
- An XX pair means a female will be born An XY pair means a male will be born.
- The mother's sex chromosome is always 'X' but the father may be either 'X' or 'Y'. If X chromosome is being contributed by the father's side then the new being has to be a female; and if the father is contributing a 'Y' chromosome then the new being is going to be a male

### Genotype and Phenotype

- **Genotype:** genetic composition of a person.
- **Phenotype:** observable characteristics.
- The characteristics that can be observed and seen, make up our “phenotype”. They may not always be the same e.g. person may have brown eyes (phenotype) but carry genes for both brown and blue eyes (genotype)\_ dominant gene is brown

### Alleles

- o This difference in color is due to the fact that genes come in alternative forms called “Alleles” (alternative forms of a gene). When alleles are identical, a person is homozygous for a trait; when alleles are dissimilar the person is heterozygous

### Patterns of Transmission of Characteristics

#### i. Homozygous and Heterozygous

When the person inherits identical alleles he is said to be “homozygous” (possessing two identical alleles for a trait). When he inherits two different alleles then the person is “heterozygous” (possessing two different alleles for a trait). **Example:** when a person is homozygous for brown eyes then he will transmit only genes for brown eyes to his offspring and if heterozygous for blue and brown eyes then although dominant one is brown, but he will transfer his both alleles to his offspring.

##### a. Autosomal Dominant Inheritance

- Patterns of inheritance in which a specific gene is dominant; if it is inherited; it manifests itself in the person.

##### b. Autosomal Recessive Inheritance

- Patterns of inheritance in which trait appears only if a person inherits two genes for it, one from each parent. If the person inherits only one gene for a trait, it will not appear in a person but may be passed on to his children.

#### ii. Multi- Factorial Inheritance

- Patterns of inheritance in which a trait is expressed either by a combination of several genes or through the interaction of genes with environmental factors.

- More complicated combination of genes or an interaction between genetic predispositions and environmental factors that bring them out.
- Some characteristics follows one of these patterns, other genes another.

## Examples

**Hair type** (curly or straight) is either autosomal dominant or autosomal recessive, baldness is sex- linked; height and weight are probably multi- factorial.

Some diseases and birth defect are inherited according to these patterns. Most prominent examples are:

**Achondroplasia:** a kind of dwarfism that is inherited by autosomal dominance.

**Tay- Sachs disease:** body's inability to break down fat; results into death by 3-4 years of age

**Huntington's disease:** 99.9% correlation between having the identified gene and the disease.

The blood- clotting disorder **hemophilia** is a sex-

linked condition.

**Spina bifida:** a defect in the closure of the vertebral canal, that is believed to be the condition transmitted by sex- linked inheritance

## The process of development continues throughout the life span

While considering aspects of development, individuality and interactions are the key terms in understanding it. All beings bring their unique genetic package into this world and have unique sets of experiences too.

An individual's strengths, abilities, and predispositions are affected by the influence of environment. These influences make a person act in ways that elicit new experiences

## Lesson 11

### COGNITIVE DEVELOPMENT

**Cognitive development is the process of the development of children understanding of the world as a function of age and experience.**

### Development of Cognition and Cognitive Ability

Cognition is the process of knowing as well as what is known. It includes "knowledge" which is innate/ inborn and present in the form of brain structures and functions. We 'remember' the physical environment in which we were brought up and develop perceptual constructs or knowledge accordingly (seeing, hearing, sounds etc

Disciplines Interested in the Study and Use of Cognition

**The interest in human cognition and its development has been developed and applied in a variety of scientific disciplines:**

- **Anthropologists** focus on, and measure, how cognition develops in different cultures.
- **Sociologists** study how cognitions are acquired and used in various groups and institutional settings.
- **Computer scientists** target to create 'artificial intelligence'.

**Psychologists are interested in a better understanding of the human cognitive ability and potentials, how it is utilized in different situations and at different stages.**

### Nature of Cognition

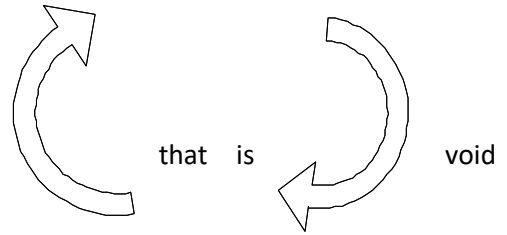
The very word cognitive refers to the process of knowing as well as the known. Cognition thus, has at least two main aspects/ features i.e.,

- i. Cognition means 'mental processes' that people use to gather/ acquire knowledge, and
- ii. Cognition refers to the knowledge that has been gathered/ acquired subsequently used in mental processes

#### Cognition and Knowledge

- There is probably no aspect of human life and behavior of all sorts of cognition...not even sleep **Known**
- All human intellectual activities and potentials, **ge** i.e. thinking, communicating, problem solving, and learning require mental processes and knowledge

**Mental  
processes**



#### Factors Influencing the Cognitive Development

- Long term memory and information processing or working memory are traits of the human infant which exist and operate much earlier than when one is aware of it; these are intact even before birth but these contents of memory are unknown to consciousness.
- The ability to control 'mental processes' and 'innate/ inborn knowledge' develops after birth and this may occur largely due to the interaction of the child with the physical environment
- The child's interaction and bonding with the people around has a deep impact. Most often parents especially the mother, also including the

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caregivers/caretakers, are the most significant connections for the development of cognition.

Significant Influences on Cognition

**Socio- Cultural Factor**

- Given and debated in the early 1900s socio-cultural approach has now regained interest among cognitive scientists

- It states that cognitive ability does not start with the anatomy/ biology of the individual or only with the environment: the culture and society into which the individual is born provide the most important resources/ clues for human cognitive development.
- They provide the context into which the individual begins his experience of the world.
- Social groups help in person's cognitive development by placing value/ importance on learning certain skills, thereby providing all important motivation that the person needs and requires in order to learn and exhibit those skills or behaviors. This results in cognitive development
- One perspective about cognitive ability suggest that there is some sort of innate potential existing within an individual

Another suggests that there is potential within the socio- cultural context for development of the individual. The individual is born into a society of potential intellect. Knowledge will develop largely based on the evolution of intellect within the society and culture.

### **Social Nature of Mind**

- Beside other psychological functions, the most important and influential is the interaction between individuals.
- In the beginning, the child has no means of understanding/ expressing or communicating his experiences. But as time passes, the teachings of parents and other family members enable a child to understand the world in which he lives. Knowledge is considered to be the experiences and the values that parents/ caregivers pass on to their off springs. It reflects their particular social and cultural norms and standards, which are incorporated in their understanding of their culture.

### **Language and Cognitive Ability**

- The main and most important tool in acquiring cognitions in any culture is its language through which an organized body of knowledge is transmitted as “cognitive abilities”. By learning the language, the child is able to share knowledge and experiences with the people he interacts with.
- Early learning takes place through internalizing and interpreting the world.
- Afterwards, the child is able to use those internalized skills such as language that have been taught to him by his parents, culture, or society. It further on helps him to think and function independently
- Language, including its written form, is the unifying tool for any culture. As language starts to develops, so do the social norms, cultural beliefs, and values

### **Motivation, Cognition and Learning**

- It is believed that cognitive ability alone cannot account for achievement; motivation is also important in acquiring/ attaining cognitive skills and abilities.
- People learn information that corresponds to, and is in accordance with, their view of the world. They learn skills that are meaningful to them. e.g. children who are born in a poor family may not give any attention or importance to the formal education and as adults, they may pass on similar beliefs and attitudes to their off springs.
- Motivation determines whether or not one is capable of learning. Whether one learns well or not, depends on one's own view and that affects the ability to learn. The motivational condition largely depends on the way the culture responds to achievements and failures. There are culturally developed attitudes about the probability of learning successfully after one has initially failed to learn. These attitudes can greatly affect future learning.

### **The Individual and the Group**

- These factors also influence the extent or direction of development.
- The culture of the individual, the community, the neighborhood, social organizations, and the family, all influence the experience of the individual. But these experiences have a certain uniqueness of their own and they may be perceived and viewed differently by different people.

## **Cognitive Development**

- Cognitive development is the development of the 'thinking' and 'organizing systems' of the brain. It involves

- Language,
- Mental imagery,
- Thinking,
- Reasoning,
- Problem solving and
- Memory development

### Jean Piaget's (1896-1980) Theory of Cognitive Development

- Piaget was a Swiss psychologist. He was a very keen observer from the very beginning; got published his first research paper at age 15.
- As a result of his study of philosophy and logic, he became interested in epistemology i.e., knowledge and knowing; the interest in observation and epistemology made a foundation of his theory of cognitive development.
- Piaget was influenced by Henri Bergson's Creative Evolution, unlike most of the other psychologists who were impressed by Darwin's theory of evolution. Bergson believed in divine agency instead of chance as the force behind evolution: life possesses an inherent creative impulse.
- Piaget did his doctorate in Biological Science, but later became interested in psychology especially abnormal psychology.
- He secured a position in Alfred Binet's laboratory In Paris where he got a chance to observe children's performance, their right and wrong answers.
- Piaget's work and observation generated an interest in children's mental processes.
- The real shift took place when he started observing his own children from birth onwards. He kept records of their behavior and used them to trace the origins of children's thoughts to their behavior as babies; later on he became interested in the thought of adolescents as well

### Piagetian Method of Investigation

- Known as the Clinical Approach; a form of a structured observation.
- Piaget used to present problems/tasks to children of different ages, asked them to explain their answers. Their explanations were further probed through carefully phrased question.

### Piaget's Theory of Cognitive Development

- Cognitive Development takes place in stages.
- The organization of behavior is qualitatively different in different Stages. Children throughout the world pass through a series of four stages of cognitive development in a fixed order.

### Essential Points of Piaget's Theory

1. The stages emerge in a sequence. There is a constant order of succession for their emergence.
2. The progressive development of mental structures can be explained by neither heredity nor environment by itself.

### Key Terms in Piaget's Theory

According to Piaget, children's thinking develops through two simultaneous processes: assimilation and accommodation

- **Assimilation** means the incorporation of new knowledge into existing schemes.
- **Accommodation** means the modification of the child's existing schemes

to incorporate new knowledge that does not fit in the scheme.

- **Schemes:** patterns of action that are involved in the acquisition and structuring of knowledge  
e.g. grasping, throwing, and rolling

## Piaget's Stages of Cognitive Development

- Sensorimotor stage
- Preoperational stage
- Concrete operational stage
- Formal operational stage

### Sensorimotor stage

**Age:** Infancy; Birth-2 years **Major**

#### Characteristic:

- Thought confined to action schemes.
- Development of object permanence.
- Development of motor skills.
- Little or no capacity for symbolic representation.

### Preoperational Stage Age:

Preschool; 2-7 years **Major**

#### characteristics:

- Representational thought.
- Thought is intuitive not logical.
- Development of language and symbolic thinking takes place.
- Thinking is egocentric.

### Concrete

**Operational Stage Age:**

Childhood; 7-11 years

#### Major

#### Characteristics

- Thought is systematic and logical, but only with regard to concrete objects.
- Development of conservation, and mastery of concept of reversibility.

### Formal Operational Stage

**Age:** Adolescence and adulthood; 11 years onward **Major**

#### Characteristics:

- Abstract and logical thought develops.
- The person can deal with the abstract and the absent.

### Erik Erikson's Theory of Psychosocial Development

- Student and follower of Sigmund Freud.
- Left his native land, Germany, in 1930's and immigrated to America, where he studied Native American traditions of human development, and continued his work as a psychoanalyst.
- Broke with his teacher over the fundamental view about what motivates/ drives human behavior. For Freud, it was 'biology' or more specifically the biological instincts of life and aggression (Eros and Thanatos). For Erikson, the most important force that drives human behavior and which helps in the development of personality was "social interaction".
- His developmental theory of the "Eight Stages of Man" (Erikson, 1950) was unique and different in the sense that it covered the entire lifespan rather than 'childhood' and 'adolescent development'.
- He believed that social environment combined with biological maturation results in a set of "crises" that must be resolved.

- The individual passes through the "sensitive period" and crisis at different stages, which has to be resolved successfully before a new crisis is presented. The results of the resolution, whether successful or not, are passed on to the next crisis and provide the foundation for its resolution

*Basic Trust vs. Mistrust (Oral-Sensory Stage): Birth –18months: Infancy* • The infant develops a sense of who and when to trust.

- He learns when to protect oneself and be cautious.

#### **Autonomy vs. Shame and Doubt: 18 months to 3 years: Early Childhood**

- The child develops a sense of independence and is able to understand and recognize his limitations. If independence is encouraged, he develops a sense of autonomy.
- If the child is overly restricted, over-protected, or criticized it may result into self-doubt and shame. Shame occurs when child is overly self-conscious when negatively exposed. Self-doubt occurs when parents overly shame the child, e.g. about elimination.

#### **Initiative vs. Guilt: 3 to 6 years: late Childhood**

- The child is able to tryout and explore various things.
- Indulges in various activities, both motor and intellectual.
- Guilt arises after doing the negative acts e.g. aggression.

**Industry vs. Inferiority: 6 to 11 years: School Age** o Child is busy in

- **Building,**
- **Creating, and**
- **Accomplishing**

o Receives systematic instruction as well as fundamentals of technology. o Learns norms and standards of the society in which he lives. o Socially decisive age. The child gains self-esteem.

**Identity vs. Role confusion: Adolescence**

- The person has a coherent sense of self.
- **Plans to actualize one's abilities or becomes confused when unable to accomplish task.**
- **Problems may result in impulsive attitude or extended immaturity.**
- **Indecisiveness may occur.**
- **In extreme cases there can be a possibility of antisocial behavior.**

**Intimacy vs. Isolation: 18 to 25 years: Young adulthood** (beginning in the early 20s and may extend to the 40s)

Young adults focus on

- **Maintaining one's individuality**
- **Making friends**
- **Relationships and intimacy**

**Adulthood Generativity vs. Stagnation: Middle adulthood (40-60 years)**

- o Age of;
  - **Creativity**
  - **Productivity**
  - **Concern about guiding and helping the next generation**
  - **Concern for others or self-indulgence**
  - **Impoverishment of self**

**Ego Integrity vs. despair: Old age**

- The person develops a sense of acceptance of life as it was lived.

- Importance of the people and relationships that individual developed over the lifespan.

- Comes to terms with approaching death.
- Some sort of despair is inevitable.

*Lawrence Kohlberg's theory of Moral development*

- A psychologist\_ born in Bronxville New York.
- Served as a professor at Harvard University.
- Started as a developmental psychologist in the early 1970s and became famous for his later work in moral education and moral reasoning.
- His theory emphasizes on how moral reasoning develops in stages similar with the theory of Piaget's cognitive development.
- Like Piaget, Kohlberg believed that development is flourished by social interaction.
- Moral education can be taught in formal education by confronting people with moral dilemmas that evoke/ arise cognitive conflicts.
- According to Kohlberg, discussion over these dilemmas promotes development, which further helps in higher stages of moral reasoning\_ showing benefits of the higher stages of reasoning. He and others formulated dilemmas for this purpose.

*Kohlberg's Stages of Moral Development*

Moral reasoning, which Kohlberg thought is the basis for ethical behavior, has developmental stages. There are six identifiable stages of moral development. These stages can be classified into three levels.

### Stages of Moral Development

#### Level 1

- Obedience and Punishment Orientation
- Self- interest orientation

#### Level 2

- Interpersonal accords
- Conformity (good boy/Good girl attitude)
- Authority iv. Social order orientation (law and order morality)

#### Level 3

- Social contract orientation
- Universal ethical principles (principled conscience)

### Levels of Moral Development

- Pre-Conventional o Common in children, although adults can also exhibit this level of reasoning. o Judging the morality of an action by its direct consequences. o Pre-conventional level is divided into two stages:
  - *Stage One: Obedience and punishment orientation*
  - *Stage two: self-interest orientation* o In stage one, individuals focus on the direct consequences that their actions will result into. They see and analyze as to what actions are morally wrong and, if the person commits them, gets punishment for it. o In stage two, right behavior is what is defined as, 'what is in one's own best interest'. Limited or little interest is shown about other's needs. o Concern for others is not based on loyalty or intrinsic respect.
- Conventional
  - o Can easily be seen in adults and older children.

- o Persons, who reason in a conventional way, judge the morality of actions by comparing these actions to social rules norms, standards, and expectations.
- o The conventional level is divided into two further stages:
  - *Stage three: **conformity orientation***
  - *Stage four: **law-and-order morality*** o Individual, whose moral reasoning is in stage three, seeks approval from others. Tries to be a 'good boy' or 'good girl', having learned that there is inherent value in doing so.
- o Judging the morality of an action by evaluating its consequences. o In stage four, individual thinks that it is important to obey the laws and social conventions because it is important in maintaining society and thus does not require approval which is important in stage three.

c. Post-Conventional o The post-conventional level is divided into two stages;

- *Stage five: **social contract orientation***
- *Stage six: **principled conscience*** o In stage five, people have certain principles or beliefs to which they may attach more value than laws e.g. human rights or social justice.
- o In the sixth and final stage, moral reasoning is based on the use of 'abstract reasoning' using 'universal ethical principles'.
- o Although Kohlberg insisted that sixth stage exists but he had difficulty finding people who used it. It appears that people rarely use it, if, ever they reach this sixth stage of Kohlberg's model

## NERVOUS SYSTEM (1)

### Central Nervous System (CNS) and Peripheral Nervous System (PNS)

The brain and its constituent parts are the most complex system ever known. With one trillion separate cells, each one in a continuous process of changing in response to chemical signals. From the moment of conception to the moment of death, the biology of the individual is changing. It is in this complexity that our species has found the capability to store the accumulated experience of thousands of generations – to create human culture. Our language, religions, governments, childrearing practices, technologies, economies are all man-made; yet all depend upon the remarkable capacity of the brain to make internal representations of the external world.

### Biological Bases of Behavior

- The Nervous System
- Endocrine Glands

### The Nervous system

- The system that controls and regulates the structure and function of the brain, spinal cord, nerves, and the nerve cells; it maintains coordination between the nervous system and the rest of the bodily systems.
- It is responsible for the internal communication system that ensures the integrated functioning of the various systems.

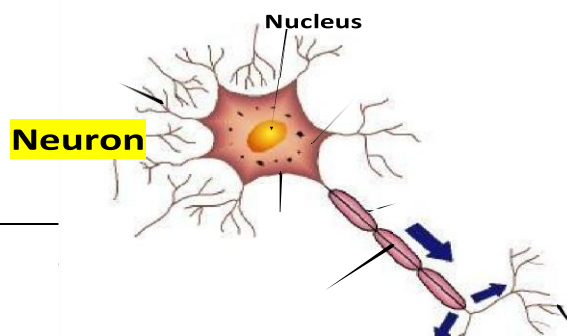
### Some Interesting Facts about the Nervous system

- The nervous system consists of billions of highly specialized nerve cells called neurons.
- Nerve impulse is an electrical impulse that travels along the nerves at a speed of around 400km/ hour.
- Every second, a number of these impulses can pass along nerves.
- Brain cells never re grow; once destroyed or dead, they can not be replaced.
- Nerve fibers are very thin and fine in size; a hundred of them lying side by side would fit into just 1mm.
- The brain is divided into two visible parts or hemispheres; the left hemisphere controls the right side of the body, and the right controls the left side.
- The total surface area of the cerebral cortex is approximately 2.5sq.ft. if you spread it flat.

### Neuron

A nervous system cell is constituted in such a way that it is specialized in receiving, processing, and/or transmitting information to other cells.

## The Nerve Cell



## Structure of a

Dendrites

Cytoplasm

- **Dendrites:** Receivers of

incoming  
signals;  
branch  
fibers  
extending  
outward  
from the  
cell body.

- **Soma:**

The cell  
body  
containing  
the  
cytoplasm  
and the  
nucleus of  
the cell; cytoplasm keeps it  
alive.

Myelin  
Sheath So

ma

Axo

n

(transmitting end)

Terminal Buttons

- **Axon:** The nerve impulses travel from the soma to the terminal buttons through the extended fiber of a neuron i.e., axon.



- **Terminal Buttons:** Swollen, bulblike structures at one end of the axon; the neuron stimulates the nearby glands, muscles, or other neurons

### Connection between nerve cells

- **Synapse:** the gap between one neuron and the other.
- **Synaptic Transmission:** the procedure through which information is relayed from one neuron to another across the synaptic gap.
- **Neurotransmitters:** The post synaptic neuron is stimulated by the chemical messages released from neurons; they cross the synapse from one neuron to another.

### The Chemical Messages

- The neurons follow an all-or-none law.... either a neuron will be firing or resting /off.
- **Excitatory Message:** The chemical message that makes it more likely that the receiving neuron will fire and the action potential will travel down its axon.
- **Inhibitory Message:** The chemical message that inhibits a receiving neuron from firing so that the action potential does not travel down its axon.

### Major Varieties of Neurons

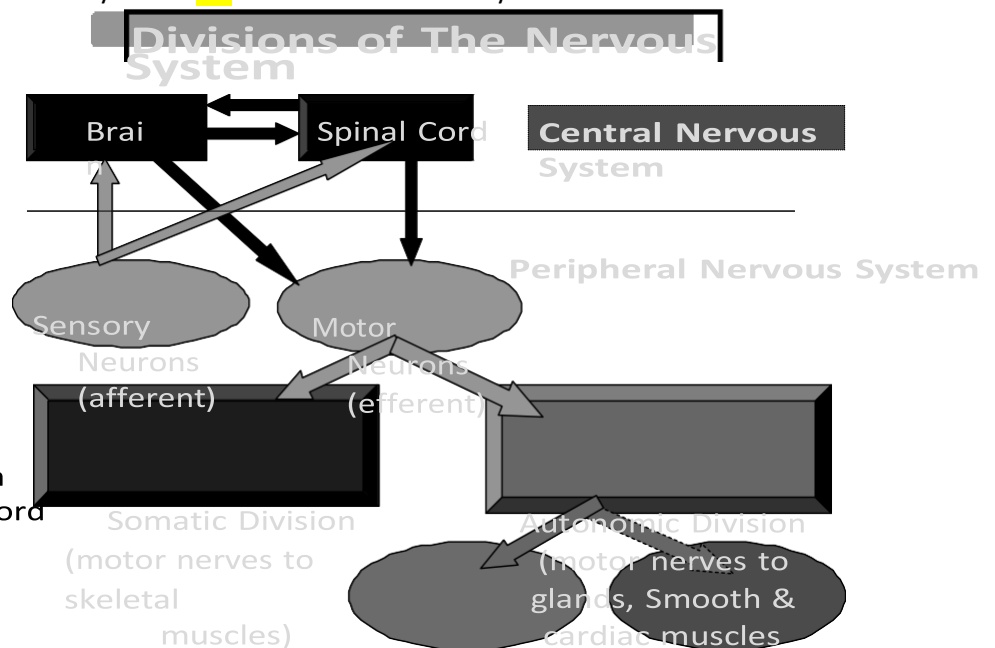
- **Sensory Neurons (afferent):** they carry messages toward the Central Nervous System from the sensory receptor cells.
- **Motor Neurons (efferent):** they carry messages away from the Central Nervous System toward the muscles and glands.
- **Inter-Neurons:** they relay messages from sensory neurons to other inter-neurons and/or to motor neurons.

### Main Parts of the Nervous System

- 1...The Peripheral Nervous System • 2...The Central Nervous System

#### 1) The Peripheral Nervous System (PNS)

- The part of the nervous system that includes all parts of the nervous system except the brain and the spinal cord
- Includes:
  - Somatic Division / Somatic division / Autonomic Nervous System/ ANS



Nervous System / Autonomic / SNS

Sympathetic

Parasympathetic

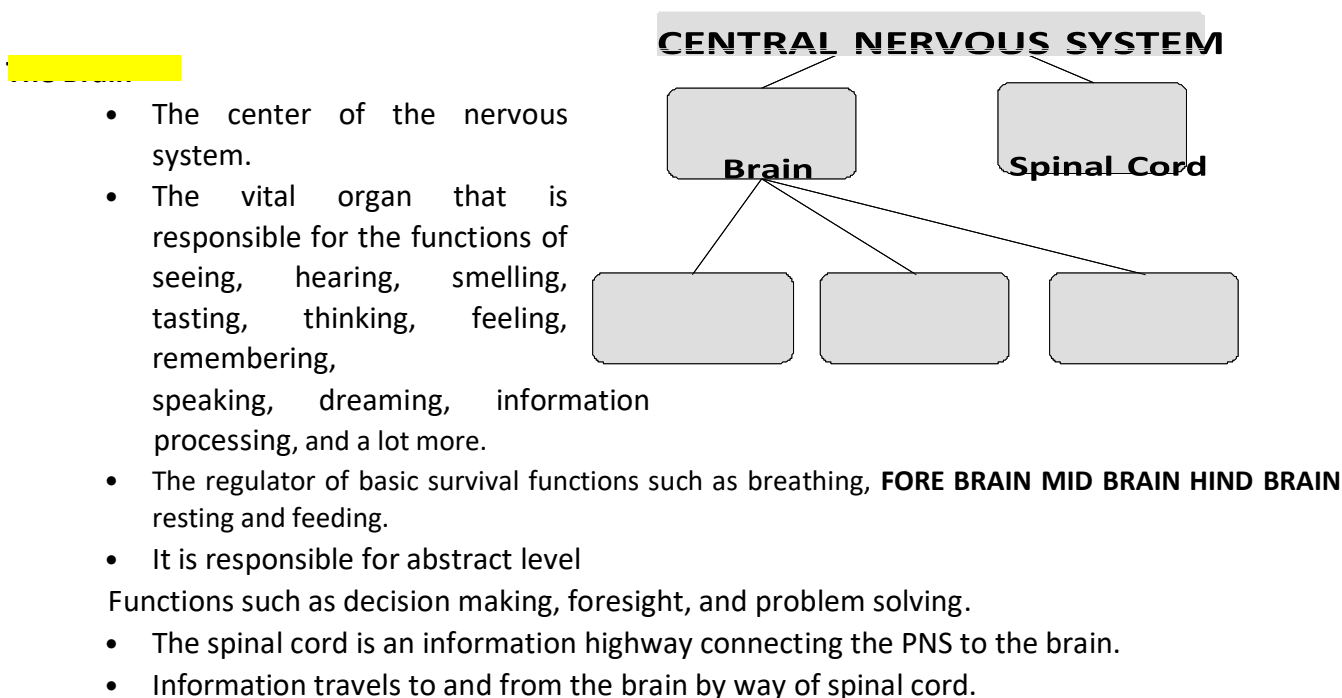
c Nervous  
System

etic Nervous  
System

**Somatic Division:** controls the voluntary movements of the skeletal muscles. **Autonomic division:** controls the involuntary movements all over the body; movements of the heart, lungs, stomach, glands and other organs.

## 2) Central Nervous System (CNS)

- Brain receives the information from all over the body (primarily in terms of stimulation via sensation), interprets it, and decides how to respond.
- The brain's function is similar to that of a computer; there is a central processing unit (CPU), the output comes in, and the CPU analyses it and responds to it.



### Functions of the Various Structures of the Brain

- Regulation of the internal systems
- Reproduction
- Sensation
- Motion
- Adaptation to the varying environmental demands

### Structure of Brain

- The deeply grooved structure lies safely and securely in our skull.
- The average adult human brain weighs 1.3 to 1.4 kg (approx. 3 pounds).
- If you look at it from the outside the brain is pinkish gray in color; soft, spongy, and mottled.
- The brain contains billions of nerve cells (neurons) and trillions of "support cells".

### Parts of the Brain

The brain is made of three main parts:

- Fore brain**
- Mid brain**
- Hind brain**

#### Fore Brain

- |               |      |
|---------------|------|
| i. Cerebrum   | ii.  |
| Thalamus      | iii. |
| Hypothalamus  | iv.  |
| Limbic system |      |

**Mid Brain**

- i. Tectum
- ii. Tegmentum
- iii. Reticular formationiv. Substantia nigra

## Hind Brain

- i. Cerebellum
- ii. Pons
- iii. Medulla oblongata

## **Brain Stem and Cerebellum**

Located underneath the limbic system the brain stem, containing four structures, is found in all vertebrates. It contains four structures:

1. Medulla
  2. Pons
  3. Reticular formation
  4. Thalamus
- o Responsible for basic survival functions such as breathing, heartbeat, and blood pressure.

### 1. Medulla/ Medulla Oblongata

- Located at the top of the spinal cord and continuous with it.
- Damage to Medulla can be fatal as it is the center responsible for vital functions i.e., respiration, heart beat, and blood pressure.
- Contains ascending & descending tracts that communicate between the spinal cord & Various parts of the brain.
- At medulla, nerves ascending from the body and descending from the brain cross over; hence the left side of the body is connected to the right side of the brain and vice versa.
- Contains 3 vital centers:
  - Cardio inhibitory center:** regulates heart rate.
  - Respiratory center:** regulates the basic rhythm of breathing. **Vasomotor center:** regulates the diameter of blood vessels.

### 2. Pons

**Pons = Latin word for bridge**

- Bridge connecting spinal cord with brain and parts of brain with each other.
- The pons seems to serve as a relay station carrying signals from various parts of the cerebral cortex to the cerebellum.
- Nerve impulses coming from the eyes, ears and touch receptors are sent on the cerebellum.
- The pons also participates in the reflexes that regulate breathing.
- It has parts that are important for the level of consciousness and for sleep.

### 3. Reticular Formation

- The reticular formation is a region running through the middle of the hindbrain and into the midbrain.
- A dense network of nerve cells.
- It keeps the brain alert even during sleep.
- It makes the cerebral cortex attend to new stimulation by arousing it.
- Long fibrous tracts of reticular formation run into the thalamus.
- Needed for arousal from sleep & to maintain consciousness.
- Serious damage to reticular formation may result into a coma.

### 4. Thalamus

The pair of egg-shaped structures located at the top of the brainstem.

- Incoming sensory information is channeled to the appropriate area of the cerebral cortex by thalamus, so that it is processed there.
- Thalamus acts like a relay station.... the brain's sensory switchboard; it directs messages to the sensory receiving areas in the cortex and transmits replies to the cerebellum and medulla.

- It receives information from the sensory neurons and routes it to the higher brain regions that deal with vision, audition, taste and touch.

### Cerebellum

- "Cerebellum" comes from the Latin word for "little brain". The cerebellum is located behind the brain stem.
- Cerebellum is somehow similar to the cerebral cortex: the cerebellum is divided into hemispheres and has a cortex that surrounds these hemispheres.
- It carries 10% of the weight of the brain.
- It contains as many neurons as in the rest of the brain.
- Its function is to coordinate body movements i.e. coordination, maintenance of posture & balance.
- Damage to cerebellum results into jerky and uncoordinated body movements.

### Limbic System

- Evolutionarily the structure of limbic system is rather old.
- The limbic system, often referred to as the "emotional brain", is found buried within the cerebrum.
- At the border of the brainstem and cerebral hemispheres it is a doughnutshaped system of neural structures; associated with emotions e.g. fear and aggression, and drives like hunger and sex; regulates body temperature, blood sugar level and blood pressure.

### Structures within the Limbic System

- i. Hippocampus
- ii. Amygdala
- iii. Hypothalamus

#### Amygdala

- Two almond-shaped neural clusters in the limbic system that are linked with emotions.
- They are related with aggression and fear.

#### Hippocampus

- The hippocampus is the part of the limbic system that is important for memory and learning.

#### Hypothalamus

- One of the smallest structures in the brain.
- The neural structure laying below (hypo) the thalamus; Composed of several nuclei. Small bundles of neurons that regulate physiological processes involved in motivated behavior e.g. hunger, thirst, regulation of body temperature.
- Hypothalamus acts as the body's Thermostat.
- Helps govern the endocrine system via the pituitary gland.
- Is linked to emotions.

#### Homeostasis

Hypothalamus maintains the body's internal equilibrium e.g. looking for food when energy levels are low, causing constriction of the blood vessels when body temperature falls.

### Cerebrum

- Largest part of the human brain, associated with higher brain functions such as thought and action..
- Occupies 2/3 of the brain's total mass
- Consists of two symmetrical halves or hemispheres; The right cerebral hemisphere controls the left side of the body and vice versa.
- The hemispheres are connected by Corpus Callosum, a thick mass of nerve fibers.
- Cerebrum regulates the brain's higher cognitive and emotional functions.

## Cerebral Cortex

- o Coming from the Latin word for "bark", cortex means covering, or sheath; the cortex is a sheet of tissue making up the outer layer of the brain.
- o About 1/10 of an inch in thickness, the cortex is composed of some 30 billion nerve cells and 300 trillion synaptic connections.
- o It is the body's ultimate control and information-processing center.

## Sulci and Gyrus

- o The cerebral cortex is greatly convoluted in humans. These convolutions include:
  1. **Sulci (singular Sulcus)** i.e. small grooves.
  2. **Gyri (singular Gyrus)** i.e. large grooves also called "Fissures".

### Grey

- matter**
  - Cerebral cortex mostly consists of glia (glial cells), cell bodies, dendrites and interconnecting neurons; they give the cerebral cortex a grayish brown appearance, commonly known as 'Grey Matter'.

### White

- Matter**
  - Beneath the cerebral cortex lie millions of axons that connect the neurons of the cerebral cortex to those located elsewhere in the brain.
  - The large myelin gives tissue an opaque white appearance known as "White Matter".

## Cerebral Lobes

- a. Frontal lobe
- b. Parietal lobe
- c. Temporal lobe
- d. Occipital lobe
  - Each lobe controls a different range of activities.
  - Each hemisphere is vertically divided by the **central sulcus**, a groove.
  - The lateral fissure, another groove divides each hemisphere horizontally.

### a. Frontal lobe

Associated with motor control and cognitive activities; reasoning, planning, decision making, problem solving, movement and speech (Broca's Area).

### b. Parietal lobe

Associated with controlling incoming sensory information; thus affecting movement, orientation, recognition, perception of stimuli.

### c. Temporal lobe

Associated with perception and recognition of auditory stimuli, memory & speech. Wernicke's area: concerned with the understanding of language is located here

### d. Occipital lobe

Associated with visual processing.

## Cranium

- o The brain is enclosed in the cavity of skull or cranium consisting of eight hard bones; One frontal bone, two parietal bones, two temporal bones, one occipital bone, one sphenoid bone, and one ethmoid bone.

Lesson 13

## NERVOUS SYSTEM (2)

## Membranes of the Brain

- Between the surfaces of the brain and the skull, there are three layers of membrane called the meninges, which completely cover the brain and spinal cord.
- These three membranes are:
  1. **Dura Matter**
  2. **Arachnoid**
  3. **Pia Matter**

### Cerebrospinal Fluid (CSF)

- The subarachnoid space contains a fluid called cerebrospinal fluid (CSF), a clear, colorless fluid covering the entire surface of central nervous system.
- The total volume of CSF is 125-150 ml.
- Total production of CSF is about 400-500 ml/day (about 0.36ml/min).

### Association Areas

- Areas in the cerebral cortex that are not involved in primary motor and sensory functions; rather they are involved in higher mental functions such as learning, remembering, thinking and speaking.
- Association areas in the Frontal Lobes are concerned with judging and planning; • Damage may lead to intact memory but inability to plan out something. Personality
- may also be affected.
- Association areas of other lobes are related to other mental functions; i.e. Temporal Lobe enables us to recognize faces; damage to this area causes inability to identify people (although facial features can be described), and gender and approximate age too.
- Association areas in the posterior lobes are involved in perception and memory. Damage leads to difficulty in perceiving speech.

### Spinal Cord

- Continuation of the Medulla Oblongata.
- The spinal cord is about 45 cm long in men and 43 cm long in women and weighs about 35-40 grams.
- The vertebral column (back bone), encapsulating the spinal cord, is about 70 cm long comprising vertebra in the vertebral column.
- The spinal cord is much shorter than the vertebral column.
- Signals arising in the motor areas of the brain travel back down the cord and leave in the motor neurons.
- The spinal cord also acts as a minor coordinating center responsible for some simple reflexes like the withdrawal reflex.

**Reflex** - rapid (and unconscious) response to changes in the internal or external environment, needed to maintain homeostasis

**Reflex arc:** the neural pathway over which impulses travel during a reflex.

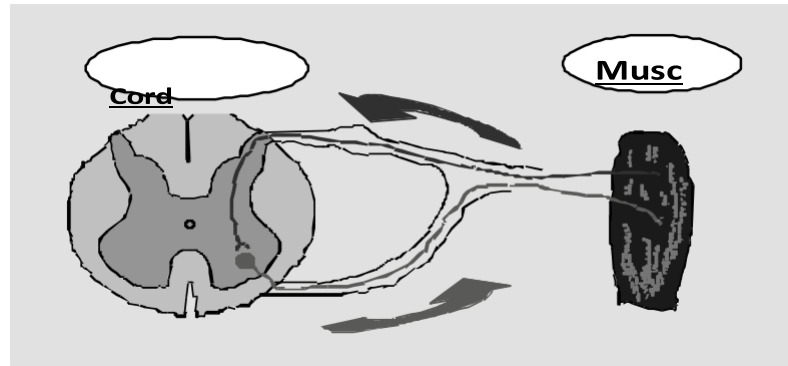
**components of a reflex arc include:**

1. **Receptor** - responds to the stimulus
2. **Afferent pathway** -- sensory neuron
3. **Central Nervous System**

## Peripheral Nervous System

Consists of the spinal and cranial nerves; these connect the CNS to the rest of the body. PNS connects the body's sensory receptors to the CNS, and the CNS to the muscles and glands.

### Parts of Peripheral Nervous System



(PNSSpinal)

PNS has two important parts

#### 1. Skeletal/Somatic Nervous System

- Controls the voluntary movements of our skeletal muscles.
- It reports the current state of skeletal muscles and carries instructions back.

#### 2. Autonomic Nervous System (ANS)

- Considered as the “self governing or self-regulatory mechanism” because of its involuntary operation.
- Controls the glands and muscles of internal organs e.g. heart, stomach, and glandular activity.
- A.N.S. has a dual function; i.e. both arousing and calming.
- Comprises two sub systems; Sympathetic and parasympathetic nervous systems.

##### a. Sympathetic Nervous System (SNS)

- This part of ANS arouses us for defensive action.... fight or flight.
- If something alarms, endangers, excites, or enrages a person, the sympathetic nervous system accelerates heart beat, slows digestion, raises the sugar level in blood, dilates the arteries and cools the body through perspiration; makes one alert and ready for action.

##### b. Parasympathetic Nervous System (PNS)

When the stressful situation subsides, parasympathetic nervous system begins its activity.

- It produces an effect opposite to that of sympathetic nervous system.
- It conserves energy by decreasing heart beat, lowering blood pressure, lowering blood sugar and so on.

In daily life situations, both sympathetic and parasympathetic systems work together to keep us in steady internal state maintaining the homeostasis.

### Studying the Structure and Function of the Brain

- **Electroencephalogram (EEG):** recording of the electrical signals being transmitted within the brain, through electrodes attached to the skull.
- **Computerized Axial Tomography (CAT):** a computer constructs an image of the brain by combining thousands of separate X-rays taken from slightly different angles.
- **Magnetic Resonance Imaging (MRI):** the scan produces a powerful magnetic field to provide a computer generated, detailed image of the structure of the brain.
- **Super Conducting Quantum Interference Device (SQUID):** a scan sensitive to minute changes in the magnetic field occurring when neurons are firing.

- **Positron Emission Tomography (PET):** a scan showing biochemical activity within the brain at any given moment.

## ENDOCRINE SYSTEM

Endocrine system is a collection of glands that produce hormones that regulate body's growth, metabolism, and sexual development and function. The hormones are released into the bloodstream and transported to tissues and organs throughout the body.

Although there are eight major endocrine glands scattered throughout the body, they are still considered to be one system because they have similar functions, similar mechanisms of influence, and many important interrelationships.

- Endocrine glands are known as the **“Managers of Human Body”**.
- Endocrine system is the system in which a number of glands secrete numerous hormones directly into the blood stream which regulate:

○Body's growth ○Metabolism

○Sexual development and functions, and ○Other vital functions of the body

- Endocrine glands are ductless glands that secrete their hormones directly into the bloodstream.
- Hormones act as chemical messenger controlling various functions, reaching to the tissues and other vital organs of the body.

### Pineal Gland

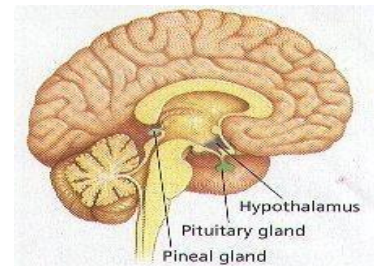
- The pineal gland, also known as pineal body, is found in the brain stem.
- It is small and cone-shaped in structure Main function:

○Affects reproductive development ○Daily physiologic/ biological cycles

### Pituitary Gland

Size and shape

It is a small gland\_ diameter of about 1 centimeter or size of a pea.



### Location

- It is connected with the hypothalamus by a slender stalk and also surrounded by bone.
- Secretes a number of different hormones that influence/affect various other endocrine glands.
- **There are two distinguishable regions in the gland that have different secretions and functions:**

**a. The anterior lobe**

**b. The posterior lobe**

### a. Hormones of Anterior Lobe

**Growth Hormone:** Protein that regulates and also stimulates the:

- growth of bones,
- muscles, and other organs of the body by promoting protein synthesis. The effect of this hormone is important and very much apparent because it affects height. **Growth Hormonal Problems**

### Dwarfism

If there is very little or no secretion of this hormone in a child, then the child may become a pituitary dwarf small in stature.

### Gigantism

- If there is too much secretion of this hormone in the body, then there is exaggerated bone growth in a person and the person become exceptionally tall or a giant.

- This rare condition is usually caused by a pituitary tumor and can be treated by removing the tumor.
- When the pituitary gland fails to produce adequate amounts of growth hormone, a child's growth in height is impaired/ disturbed.
- Hypoglycemia (low blood sugar) may also occur in children who have deficiency of this growth hormone affects particularly infants and young children with this condition.

**Thyroid-stimulating hormone:** Affects the glandular cells of the thyroid so that it secretes thyroid hormone. The thyroid gland become enlarged and secretes too much thyroid hormone if there is hyper secretion of thyroid- stimulating hormone.

**Adrenocorticotrophic hormone:** Cortical hormones especially cortisol are secreted when it reacts with the receptor cells in the cortex of the adrenal gland.

**Gonadotropic hormones:** Regulate the development, growth, and function of gonads and ovaries by reacting along with receptor cells present in these organs.

**Prolactin Hormone:** Helps in promoting the development of glandular tissues in the female breasts during pregnancy and as a result stimulates milk production after the birth of the infant.

### b. Hormones of the Posterior Lobe These

#### hormones

are:

#### i. **Antidiuretic hormone**

- Helps in the reabsorption of water by the kidney tubules as a result of which less amount of water is lost from the body as urine.
- This system/ mechanism conserves water for the body.

#### ii. **Oxytocin**

- Helps in the contraction of smooth muscles in the walls of the uterus.
- It also stimulates the ejection of milk from the lactating breast.

### 3. Hypothalamus

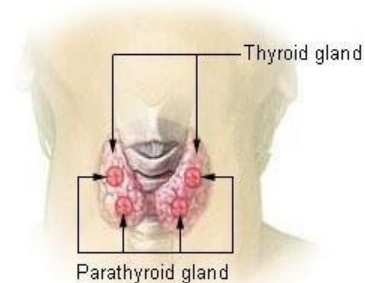
- Part of the central nervous system that is involved in controlling and activating involuntary functions of the body such as,
- Hormonal system
- Other body functions as well\_ regulating sleep and stimulating appetite

#### **Thyroid Gland**

Type, Location and Lobes

- Very vascular organ and is located in the neck.
- Consists of two parts/ lobes, one on each side of the trachea, just below the larynx or voice box.
- These two lobes are connected by a narrow band of tissue, the 'isthmus'.
- This gland consists of follicles, which produce thyroxine and triiodothyronine hormones.
- These hormones contain iodine--- about 95% of most functioning hormone is thyroxine and the remaining 5% is triiodothyronine\_ both require iodine for their synthesis.

#### **Thyroid and Parathyroid Glands**



called

- Secretion is regulated by a negative feedback mechanism. **Calcitonin**
- Secreted by Para follicular cells of the thyroid gland.

- Opposes the action of the parathyroid glands by reducing the calcium level in the blood.
- If calcium level in the blood becomes too high, calcitonin is secreted until calcium ion levels decrease to normal.

### Iodine Deficiency

- Thyroid enlargement is called “goiter” or “iodine deficiency goiter”.
- If there is a deficiency of iodine in the body, then the thyroid produces insufficient hormones required by the body, causing the thyroid-stimulating hormone of the pituitary gland (anterior lobe) to secrete its hormone. This results in the increase in size of the thyroid gland but it is unable to make enough hormones, because it is lacking the raw material for production i.e. iodine.

### Parathyroid Gland

Location, Type, Amount, Hormone

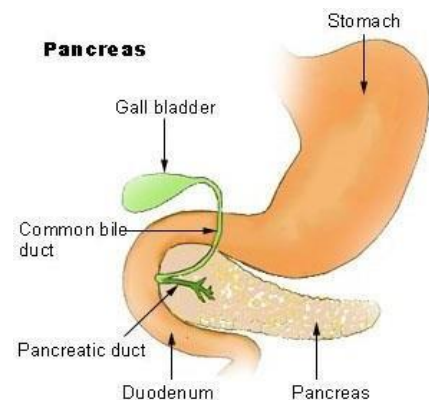
- Parathyroid gland consists of four small masses of epithelial tissue that are embedded in the connective tissue capsule, on the posterior side of the thyroid glands.
- Secretes ‘parathyroid hormone’ or ‘parathormone’.
- Most important regulator of blood calcium levels, secreted in response to low blood calcium levels, and its function is to increase calcium levels in the body.

### Deficiency/ insufficient secretion of parathyroid gland

- Insufficient secretion of parathyroid hormone ‘hypoparathyroidisms’, leads to increased nerve excitability.
- Low blood calcium level in the body triggers spontaneous and continuous nerve impulses, which in turn stimulate muscle contraction.

### Pancreas--- Islets of Langerhans

- A long, soft organ that lies transversely along the posterior abdominal wall, posterior to the stomach, and extends from the region of the duodenum to the spleen.
  - a. Exocrine portion of this hormone secretes digestive enzymes that are carried by a duct to the duodenum
  - b. The endocrine portion consists of the pancreatic islets, and
  - c. secretes glucagons and insulin.



### Pancreatic Islets

Secrete hormone called ‘glucagons’ when there is a low concentration of glucose in the blood.

### Beta Cells in the Pancreatic Islets

After the alpha cells, beta cells secrete hormone called ‘insulin’ as a result of high concentration of glucose in the blood.

### Adrenal Gland

Synthesis and Location

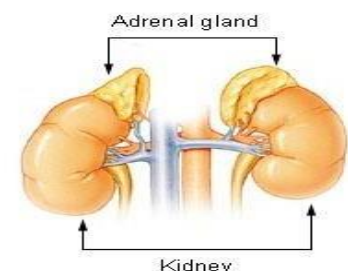
- Developed from different embryonic tissues, it secretes various hormones.
- The adrenal/ suprarenal is a paired gland and located near the upper portion of each kidney.

### Division of Adrenal Gland

Each gland is divided into two parts

- a. An outer cortex and
  - b. An inner medulla
- The cortex and medulla of the adrenal gland are just like the anterior and posterior lobes of the pituitary gland.

### Adrenal Gland



- The adrenal cortex is essential to life because it has very important functions to perform, but the medulla may be removed with no lifethreatening effects.
- Hypothalamus effects and influences both portions of the adrenal gland but it involves different mechanisms i.e. adrenal cortex is regulated by negative feedback which involves hypothalamus and adrenocorticotrophic hormone.
- Medulla is regulated by nerve impulses of hypothalamus.

### Hormones of the Adrenal Cortex

- The adrenal cortex consists of three different portions/ regions, each region produce different type of hormones.
- Chemically, all these cortical hormones are steroid.

#### a. Mineralocorticoids

- Secreted by the outermost region of the adrenal cortex.
- The main/ principal hormone of mineralocorticoid is aldosterone, which acts to store/ conserve sodium ions and water in the body.

#### b. Glucocorticoids

- Secreted by the middle region of the adrenal cortex.
- The main/ principal hormone of glucocorticoid is cortisol, which increases blood glucose/ sugar level in the body.

#### c. Gonadocorticoids

- Also known as the sex hormones.
- These are secreted by the innermost region of the adrenal cortex.
- Adrenal cortex hormones, androgens (male hormones) and estrogens (female hormones), are secreted in minimal amounts in both sexes, but their effect is usually influenced by the hormones from the testes and ovaries.
- In females, the masculinization effect may become more evident after menopause. This occurs because the estrogen levels from the ovaries decrease.

#### Hormones of Adrenal Medulla •

Develops from neural tissues.

- Secretes two types of hormones, **OE**pinephrine and **ONor** epinephrine
- These are secreted in response to stimulation by sympathetic nerve, especially during stressful situations.
- Lack of hormones from the adrenal medulla produces no significant effects,
- Hyper secretion, e.g., in case of a tumor, results in prolonged or continual sympathetic responses.

### Gonads

- Primary reproductive organs are testes in the male and the ovaries in the female.
- These organs are responsible for producing the sperm and ova, but they also secrete other hormones, and that is why they are considered to be endocrine glands.

### Testes

- Male sex hormones (as groups) are called androgens of which the most important and influential is 'testosterone'; secreted by the testes.
- Small amount is also produced by the adrenal cortex.
- Production of testosterone begins before birth. i.e. during fetal development that continues for a short time after birth, nearly ceases during childhood, and then resumes at puberty.

- This steroid hormone is responsible for:
  - The growth and development of the male reproductive organs.
  - Increase in the size of skeleton and muscular growth.
  - Larynx enlargement, accompanied by voice changes.
  - Growth and distribution of body hair.
  - Increased male sexual drive.
  - It's secretion is controlled and regulated by a negative feedback system and involves release of hormones from the hypothalamus and gonadotropins from the anterior pituitary.

## Ovaries

- Two groups of female sex hormones are produced in the ovaries i.e., **○ Estrogens** and **○ Progesterone**

Contribute to the development and function of the female reproductive organs and sex characteristics

### i. Estrogen

**Estrogen (on the onset of puberty) activates/ promotes:**

- Development of female bodily characteristics.
- Distribution of fats in the body.
- Maturation of reproductive organs .

### ii. Progesterone

Causes the uterine lining to become thick, preparing uterus for pregnancy.

- Together both progesterone and estrogen are responsible for a number of changes occurring in the uterus.

## Other Endocrine Glands

- In addition to the major endocrine glands and their system, there are various other organs, which are involved, in some hormonal activity or function.

These include:

- i. Thymus
- ii. Stomach
- iii. Small intestines
- iv. Heart, and
- v. Placenta

### i. Thymosin

Hormone produced by the thymus gland, which has an important role in the development of the body's immune system.

### ii. Gastrin

- Gastric mucosa (lining of the stomach) produces a hormone, called gastrin that is secreted when the food is present in the stomach.
- Stimulates the production of 'hydrochloric acid' and the enzyme 'pepsin', which are involved in the digestion of food.

**iii. Secretin and Cholecystokinin:** The mucosa of the small intestine secretes these hormones.

- Secretin stimulates the pancreas to produce a neutralizing agent bicarbonate-rich fluid that neutralizes the stomach acid.

## Cholecystokinin

- Stimulates contraction of the gallbladder, which result in the releases of bile.
- Also activate the pancreas to secrete digestive enzyme.
- Atrial Natriuretic Hormone, or Atriopeptin

- Heart also function as an endocrine organ

- In addition to its major role of pumping blood, has special cells in the wall of the upper chambers of the heart 'atria', secretes hormone called atrial natriuretic hormone, or atriopeptin.

### Placenta

Develops in the pregnant female

It is a source of nourishment and gaseous exchange for the developing fetus Also serves as a temporary endocrine gland

**Chorionic gonadotropin:** One hormone that placenta secretes in human beings.

### Diseases Resulting from Abnormal Secretion of Endocrine Glands

- Too much or too less secretions of endocrine glands can be harmful for the body.
- These secretions can be treated by controlling the over production, providing the essentials for production, or replacing hormones.
- Some of such abnormalities are:

#### 1. **Cretinism**

- Occurs due to the lack of thyroid gland secretions.
- Prevalent mostly in Southern France, Spain, Italy, and Switzerland.
- Its symptoms are:

##### **O Marked dwarfism and imbecility.**

O The adult who remains untreated remains about as large as a four-year-old child and has the mental level/ intelligence of that age.

O Hair becomes coarse.

O Feeling no or little emotion.

#### 2. **Hyperthyroidism**

- Occurs when thyroid becomes overactive **The major symptoms are:**
- Person becomes restless and thin
- Shows excessive emotionality
- Sleeplessness
- Rapid heart beat
- Tremors
- Thyroid becomes swollen (goiter)
- Nervousness
- Excessive sweating,
- Blood pressure
- Protruding eyes

In children and teens, **GRAVES' DISEASE** usually causes this condition, an autoimmune disorder in which specific antibodies produced by the child's immune system stimulate the thyroid gland to become overactive.

##### **Method of treatment**

- Removal of some of the gland surgically.
- Radiotherapy

In early times, the entire gland was also removed, but by doing this, the chances of myxoedema become probable.

- With the proper dosage of the gland substance i.e. iodine, the patient remains normal, but with low dosage the person becomes dull and stupid. When too much is given, become unstable and emotional.

### **3. Hypothyroidism**

Condition in which the levels of thyroid hormones in the blood are abnormally low. Symptoms are:

- Slows body processes that may lead to fatigue

- Slow heart rate
- Dry skin
- Weight gain
- Constipation
- In children, it may result in
- Slow growth and delayed puberty

**“Hashimoto thyroiditis”** results from an autoimmune process that damages the thyroid and blocks thyroid hormone production/ secretions. It is the most common cause of hypothyroidism in children.

- Infants can also be born with an absent or underdeveloped thyroid gland, resulting in hypothyroidism.
- The condition can be treated with oral thyroid hormone replacement.

#### **4. Myxoedema**

- Occurs particularly in women\_also due to a deficiency in the thyroid gland’s secretion.
- When it occurs, the patient, who was earlier a bright, capable, energetic person, full of the eager purposes and emotions of life, gradually becomes,

O Dull

O Stupid O Apathetic

O Without fear, anger, love, joy or sorrow O

Without purpose or

striving

O Hair becomes coarse and scanty

O Skin thick and swollen (hence the name of the disease) and

O Various changes take place in the sweat secretion, the heart action, etc

#### **5. Acromegaly**

Occurs due to an abnormality/ change in the pituitary gland. The major and apparent symptoms are: O

Melancholic tendencies O Loss of memory and

O Mental and physical torpor

O Profound effect on character and personality, exclusive of intelligence, and that of sex glands

#### **6. Adrenal insufficiency**

•Condition occurring due to the decreased function of the adrenal cortex, and consequently underproduction of adrenal corticosteroid hormones.

•The symptoms of adrenal insufficiency may include,

OWeakne ss O Fatigue OAbdominal pain ONausea

ODehydration OSkin changes

**Treatment** Doctors treat adrenal insufficiency by giving replacement corticosteroid hormones.

#### **7. Cushing syndrome**

- When excessive amounts of glucocorticoid hormones are secreted in the body, then it causes this syndrome.

- If this condition is due to a tumor in the pituitary gland that produces excessive amounts of corticotropin and stimulates the adrenals to overproduce corticosteroids, then it is known as Cushing disease.
- In children, it most often occurs when a child has been given large doses of synthetic corticosteroid drugs (such as prednisone) to treat autoimmune diseases such as lupus.

O Obesity • Symptoms that may take years to develop include: O Growth failure O Muscle weakness  
O Easy bruising of the skin O Acne  
O High blood pressure O And psychological changes

### **Treatment:**

Depending on the specific cause, doctors may treat this condition with:

O Surgery O Radiation therapy O Chemotherapy  
O Or drugs that block the production of hormones

## **8. Diabetes Diabetes**

### **Type 1 Diabetes**

- Develops when pancreas fails to produce enough insulin.
- **Symptoms include excessive:** O Thirst  
O Hunger  
O Urination, and  
O Weight loss
- In children and teens, the condition is usually an ‘autoimmune disorder’ specific immune system cells and antibodies produced by the child's immune system that attack and destroy the cells of the pancreas that produces insulin.
- Can cause long-term complications such as: O Kidney problems O Nerve damage O Blindness  
O And early coronary heart disease and stroke

### **Treatment**

In order to control blood sugar levels and reduce the risk of developing diabetes complications, children with this condition need regular injections of insulin

### **Type 2 diabetes**

In this, the body is unable to respond to insulin normally, like in type 1 diabetes

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- Children and teens with this condition are overweight.
  - It is also believed that excess body fat plays a role in the insulin resistance that characterizes the disease.
  - In recent years the rising prevalence of this type of diabetes in children played a crucial role in increasing rates of obesity among children and teens. The symptoms and possible complications of type 2 are the same as those of **type 1**.
  -

**Some children and teens can control their blood sugar level with:** O Dietary changes O  
Exercise  
O Oral medications  
O But many have need to take insulin injections like patients with type 1 diabetes.

Traditionally, **the five special senses have been defined as taste, smell, sight, hearing and feeling.** However, touch is now considered to reflect the activity of the general senses, and equilibrium, or balance, can be thought of as a new fifth special sense. In contrast to the general sensory receptors, most of which are modified dendrites of sensory neurons, the special sensory receptors are distinct receptor cells. They are either localized within complex sensory organs such as the eyes and ears, or within epithelial structures such as the taste buds and olfactory epithelium. **The principle function of the special sensory receptors is to** detect environmental stimuli and transfer their energy into electrical impulses. These are then conveyed along sensory neurons to the central nervous system, where they are integrated and processed, and a response is produced.

There is no firm agreement amongst neurologists as to exactly how many senses there are. The disagreements stems from a lack of consensus as to what the definition of a sense should be. Although it is still routinely taught that there are five senses (sight, hearing, touch, smell, taste; a classification **first devised by Aristotle**, it is generally agreed that there are at least nine different senses in humans, and a minimum of two more observed in other organisms.

**A broadly acceptable definition of a sense would be** "a system that consists of a sensory cell type (or group of cell types) that respond to a specific kind of physical energy, and that correspond to a defined region (or group of regions) within the brain where the signals are received and interpreted". Where disputes arise is with regard to the exact classification of the various cell types and their mapping to regions of the brain. **It can also be defined as:**

- Sensation is a process that makes possible, and facilitates our contact with reality
- 'To sense' means to become aware of something
- All living organisms have sense organs. Sensation is the process by which our sense organs respond to different stimuli
- It is the mechanism through which stimuli from outside or inside the body are received and felt by different faculties e.g., hearing, sight, smell, touch, taste, and equilibrium.

In the process of sensation the incoming (afferent) nerve impulse is registered in that part of the brain, which has a potential of such reception. The awareness of a stimulus results from the perception of the sensory receptors

### The five senses

- Vision
- Hearing/ Auditory sense or Audition; also associated with maintenance of bodily balance
- Smell/ Olfaction
- Taste
- The skin sensations/ Kinesthetic sense; touch, pressure, temperature, and pain **Vision/The visual Sensation**
- The sensation that takes place through the function of eyes; eyes receive the visual messages or stimulation, that is carried by nerves to the concerned part of the brain that processes the received information.

### The Human Eye

- The eye is a very complex, delicate, and vital structure, that is responsible for an organism's interaction with the external world. It is the most important and influential sense organ.
- It receives information from the outside world in the form of light, and sends loads of information to the brain all the time

- The human eye is a little less than one inch in diameter and almost spherical
- The eye has a very specific design or form, which captures and processes light coming from outside...light reflected by the stimuli

- Eyes function like a camera, which has its aperture, and a lens through which the light enters and cells present in it process the received light just as do the intricate internal parts of the camera.

### Anatomy/ Structure of the Eye:

The anatomy of the eye is broadly divided into three parts along with its chambers

#### i. The external structure of the eye

#### ii. The immediate structure of the eye

#### iii. The internal structure of the eye

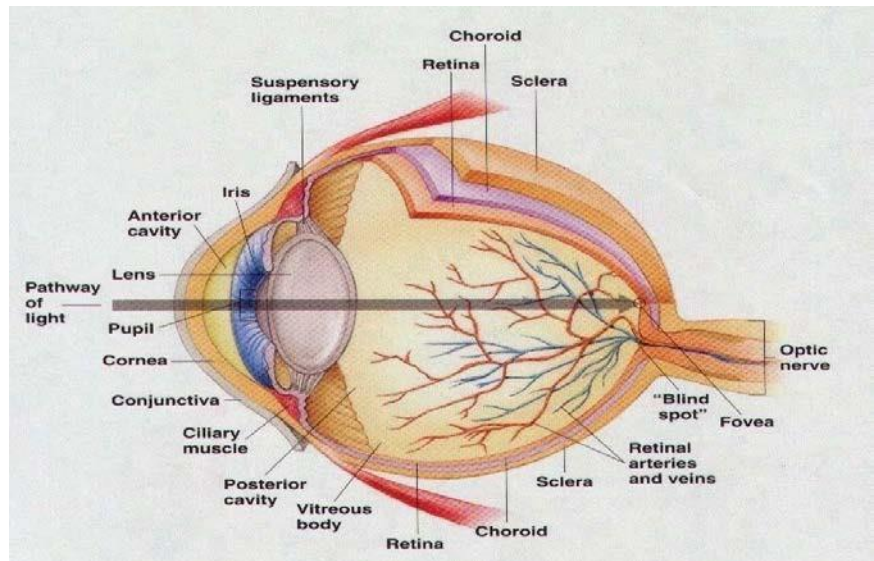
All structures are important in terms of their processing and functioning

#### i) The External Structure

The entire external structure of the eye is a "tight" box

##### Cornea

- A transparent external surface, a five-layered membrane that covers both the pupil and the iris.
- It is the first and most powerful lens or layer of the visual apparatus that helps to form the sharp image on the retinal photoreceptor cells, along with the crystalline lens



"light-

##### Sclera

- Outer walls of the eye are formed by a hard, white substance called 'sclera', hence sclerotic coat that covers 5/6th of the surface of the eye
- The outside of the eye is light-tight and its mechanism is designed in such a manner that only small amount of light can enter into a small opening that enables the production of a clearer vision, because a smaller opening also acting as the 'aperture', creates a sharper image



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#### ii) The Immediate Part

**Pupil**

- A dark, adjustable opening in the center of the eye through which the light enters. It changes its size as the amount of light entering the eye varies
- It looks dark and black in appearance, because of the absorbing pigments in the retina

**Iris**

- Around the pupil of the eye, there is a ring of muscle tissue that controls the size of the pupil opening, through its contraction and expansion
- It contains the color pigments and thus gives color to the eye\_\_ the color which the eyes possess such as brown, black, green, blue etc are due to the iris muscles

**Lens**

- The transparent part of the eye that is located behind the pupil that changes its shape in order to focus images on the retina

- The lens changes its own thickness in order to focus image properly on retina\_ this ability of the lens is called “ **accommodation**”
- The process of accommodation depends largely on the location of the object with respect to the

observer's body\_ distant objects require a relatively flat lens and the muscles that are controlling it are relaxing as compared to when focusing the nearer objects, when muscles contract, taking tensions off the lens thus making the lens more round shaped

### Fluids in the Chambers of the Eye:

- Eye has three important layers or chambers:

- i. **Anterior layer that lies between the cornea and iris**
- ii. **Posterior layer that lies between iris and lens**
- iii. **Vitreous layer that lies between the lens and the retina**

- **Anterior and posterior** chambers are filled with aqueous humor
- Whereas the **vitreous chamber** is filled with a more viscous fluid, the vitreous humor
- The eye is filled with these two liquids that are important because they help maintain the shape of the eye and provide nourishment to the cells present in the eye
- The function of these fluids is the same as that of blood in other parts of the body; the difference being that these liquids are nearly **Choro** transparent, so that they can nourish the cells of the eye without **id** interfering with the light that enters in the eye

It is the middle layer of the eye, and the lining of the 3/5th of the eyeball

- The choroid serves two important functions; i.e. nourishment and absorption
- The choroid carries blood to the retina and the humors in order to provide nourishment to the eye
- The other important function is that choroid absorbs any light that strikes on it\_\_ this is extremely important, because light that passes through the rods and cones does not reflect back. But, in any case, if it (light) reflects back, the photo-sensitive cells would receive the light message twice, and would percept wrong, that there was twice as much light as there really was. **iii) Internal Structure of the Eye:**
- Includes the most important structure; **"the retina"**.
- Retina is the light- sensitive inner surface or chamber of the eye that converts the electromagnetic energy of the light into useful information for the brain.
- It contains about 130 million nerve cells.
- It contains the receptors rods and cones plus the neurons; these cells are very important as they initiate the processing of visual information.
- The retina has an area of 5 square centimeters located at the back of the eye, which is a location where all light detection takes place.
- The retina is a network of nerve cells connected with over 100 million photosensitive rod and cones. The signals generated by these rods and cones are then sent, via the optic nerve, to the visual areas in the brain

### Plexiform Layer

- It is the top layer of the retina, which does not interpret the light striking this part
- A web of optical nerves that carry signals of rods and cones to the optic nerves • It is located between the photosensitive cells and the vitreous humor so that

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the web's cells can be nourished

- These cells are nearly transparent so only minimal interference takes place when light strikes on the photosensitive cells







## Rods and Cones

### a. Rods

- Retinal receptors which are long, cylindrical, and light sensitive; that can only detect black, white and gray; they functions well in dim light, and are largely insensitive to color and small details\_ functions when cones do not respond
- Rods are used for ‘peripheral vision’, i.e. the objects that are outside the main center of focus, and for night vision

### b. Cones

- Retinal receptors, cone- shaped and light sensitive, concentrated near the center of the retina that is concerned with sharp focusing, fine details and color sensation; they work well in well- lit conditions i.e., bright or sufficient light
- Rods and cones are distributed unevenly throughout the retina
- There are fewer cones i.e. about seven million than rods i.e., 125 million

## Important Regions of Retina; Fovea and Blind Spot

### a. Fovea

- The very sensitive and important part of the retina that aids in focusing; it is the area of best vision.
- The largest concentration of cones is present in fovea
- There are no rods present in fovea

### b. Blind Spot

- The area/ point where the optic nerve leaves the eye; no receptor cells are located here, thus creating a “ blind” spot

### Transfer of Visual Information from the Eye to the Brain

- As the light strikes and cones, receptor cells i.e.

events begin,

which Color  
sensitive Yes

No

transforms the

light impulses into the impulses, which are then sent to the brain via the optic nerve

- Before reaching the brain, some initial transformation in the visual information takes place

- Rods contain “**RHODOPSIN**” a reddish- purple substance, in which chemical reaction/ changes occur when activated by light

- Substance in the cones is different from that of rods\_ but their principles of functioning are similar
- Functioning of the neural impulses begins when stimulation of nerve cells in the eye takes place information is transmitted to the brain by

| Area of no vision<br><i>The Human Eye</i> | <i>Rods</i>        | <i>Cones</i>      |
|-------------------------------------------|--------------------|-------------------|
| Number                                    | <b>125-Million</b> | <b>6-7Million</b> |
| Location in the                           | <i>Center</i>      | Periphery         |
| rodsSensitivity in dim                    | <i>Low</i>         | <i>High</i>       |
|                                           |                    |                   |

the

- ~~cells”~~ **Bipolar cells** are the nerve cells leading to the brain\_ triggered by the nerve cells in the eye; they receive information directly from rods and cones and then that information is transferred to the ganglion cells
- **Ganglion cells** are the nerve cells that collect and summarize visual information from rods and cones and then transfer it to the brain; the visual information is moved out from the eyeball through the optic nerves

- **Optic nerve** contains bundled ganglion axons; located at the back of the eye, optic nerve carries information to the brain
- When optic nerve leaves the eyeball, it does not take the direct route to the brain, instead, the optic nerves of both eyes meet, or intersect, at a point **called “optic chiasm”** point where the optic nerves are reversed and ‘righted’ in the brain
- When the optic nerves split at this point, the nerve impulses from the right half of each retina go to the right side of the brain and those from the left half to the left side of the brain

### Processing of Visual Information

- When information reaches the brain, it passes through a number of stages
- At first, the ganglion cells are activated (summarize information from rods and cones)
- In some cases, ganglion cells are activated by light in the middle/ center, whereas, some ganglion cells are activated when there is darkness in the center and light in the surrounding areas; the ultimate function is to maximize the detection of variations in light and darkness
- The entire processing of visual information takes place in the visual cortex of the brain which is quite complex

**Feature detection** occurs when the neurons in the visual cortex are activated on seeing the particular shape/ pattern; discovered by the Nobel- prize winners David Hubel and Torsten Wiesel

- They found out that some cells are activated only on particular shape/ pattern, while only moving stimuli activates other cells

### Adaptation

- The process of the eye becoming used to a certain amount of light is called **adaptation**
- What will happen when you enter into the movie theatre/ a dark room and hardly see anything? The isle, other people, or your seat. And what happens after a few moments? It is an example of adaptation to darkness
- Dark Adaptation means a heightened sensitivity to light resulting from being in low level of light for some duration
- On the contrary, you can see quite well in light after coming from the adaptation darkness dark
- The speed of processing from dark to light and light to dark adaptation is largely dependent on the rate at which the chemical composition in the rods and cones takes place **Color Vision: Color, Effects and Uses Color**
- In reality, in the physical world, there exist no colors only light waves of different wavelengths are what we perceive as colors
- When our eyes look at an object, we actually see the reflection of light after striking some object
- The normal human eye has the ability to differentiate/ distinguish among hundreds of such bands of wavelengths as they are received by the cones (sensory cells) of the retina this ability makes it possible to perceive the world in color
- Human eye has the ability to distinguish among hundreds of wavelengths but our ability is quite limited, and the way we describe it is even more restricted

- A color name refers to attributing the colors of what we perceive in prototype of the range of different wavelengths e.g. "red" refers to colors that have more red attributes than orange/ yellow attributes, and the word "orange" refers to colors that have more orange attributes, so as the "yellow" as there really is no clear-cut distinction

**Perception of Color**

- Depends on subjective experience
- The wavelengths referred to by two people using the same color name almost always differ
- Also, due to the biological basis of our color vision, there is a high degree of universality in the use of color terms across cultures and languages

## Is There Any Psychological Effects of Color

- Do colors have any effect/ impact on our emotions and behavior? the answer is yes. But what kind of effect and how it affects our emotions and behavior is not yet conclusive
- Our reactions to colors are affected by a combination of biological, physiological, psychological, social and cultural factors
- Certain colors seem to be more universal in their effects on mood and behavior — they are known as "**warm**" and "**cool**" colors

**Warm colors:** include magenta, red, orange, yellow, and yellow-green mainly; these speed up our perception of time and produce feelings that are warm, cozy, and inviting.

These colors are the associated with excitement, happiness and comfort

**Cool Colors:** include violet, blue, light blue, and sea green generally Emotions associated with these colors range from soothing, calmness, and peacefulness to sadness, withdrawal and repression

Different cultures and societies use specific colors for particular occasions, which symbolize their culture and tradition. e.g. White color

## The Use of Color and in professional and everyday life

Color is one of the most effective tools in

- Fashion
  - Advertising
  - Presentations etc
- Psychologists believed that color impression could account for 60% or more of the acceptance or rejection of that product or service **Color Vision**
- Not only a exciting and pleasurable experience but it also helps in locating and identifying objects in the visual scene that would be hard to be identified if only in shades of gray
  - The ability to detect, differentiate and discern different colors (wavelengths) gives us more information for detecting and identifying objects than would be provided solely by black and white vision
  - Color vision is mediated by specialized nerve cells in the retina known as "cones" that function only in bright light
  - When light becomes dim, rods take over, and they provide neither color vision nor high acuity (ability to detect fine detail, such as that needed for reading)

## Color Vision Needs Several Different Pigments

- During the 1800's, visual pigments were discovered in the retina
- Both rods and cones possesses visual pigments
- This pigment molecule (embedded in the cell membrane of the photoreceptor), is a large protein called an '**opsin**', and is coupled with a small molecule called a '**chromophore**' (a form of Vitamin A) that absorbs light
- When the chromophore absorbs light, it changes its shape which, in turns, activates the large opsin molecule leads to a molecular event that culminates in an electrical change in the cell membrane
- The electrical signal is, then send to the retinal ganglion cells, whose axons take the information about light (electrical signals) to the brain
- Researches have shown that mainly three pigments (photoreceptor cells) with different combinations could produce vision that is capable of detecting all colors of the visible spectrum
- Scientists found that the human retina has three types of cones, each containing a different visual pigment. They are **red, green, and blue cones**, each containing a pigment similar to rhodopsin (pigment

found in rods)Cone cells detect primary colors, but our brain mixes these colors in seemingly infinite variable proportions due to which we are able to perceive a wide range of colors

- Red cones absorb 'longer wavelengths', green cones 'medium wavelengths', and blue cones 'shorter wavelengths'

## Theories of Color Vision

- A realistic and useful understanding about the structure and the function of the eye began in around 17<sup>th</sup> century when the gross anatomy of the eye was firmly established
- The two most prominent German and French researchers Johannes Kepler and Rene' Descartes made many discoveries/ advances in understanding vision
- Most of their work concentrated on the physical concepts of light rays and geometric optics in the visual process
- Kepler was the first to propose that the lens of the eye focuses images onto the retina Kepler's investigations were found correct when, after few decades, Descartes did experiments on this
- He postulated that the image was inverted as a result of being focused onto the retina by the eye's lens
- In his landmark experiment, Descartes surgically removed an eye from an ox and scraped the back of the eye to make it transparent. He then placed the eye on a window ledge as if the ox were looking out of the window. He looked at the back of the eye and saw an inverted image of the scenery outside\_ he, then, correctly postulated that the image was inverted as a result of being focused onto the retina by the eye's lens

## Goethe's Theory of Color

- Writer and scientist
- Wrote 1400-page treatise on color\_ published in 1810
- Goethe believed that the color sensations that reach our brain were shaped by our perception — by the mechanism of human vision and by the ways our brain processes information
- Therefore what we see of an object largely depends on the object, the lighting and our perception Studied after-images, colored shadows and complementary colors Sought to derive laws about
- Color harmony,
- Methods/ ways of characterizing physiological colors (how colors affect us) and
- Subjective visual phenomena

## Thomas Young

- Thomas Young introduced the original theory of color vision around 1790, prior to the discovery of the cone cells in the retina
- Young was the first to propose that the human eye sees only the three primary colors, red, blue and yellow and that all of the other visible colors are combinations of these
- It is now known that color vision is more complicated than this, but Young's work formed the foundation of color vision theory for the later scientists

## Three Main Theories of Color Vision

- There are a number of theories related to color vision and color blindness, but the three very important and famous theories are;

1. Parallel processing theory of vision
2. Trichromatic theory of color vision
3. Opponent- process theory of color vision

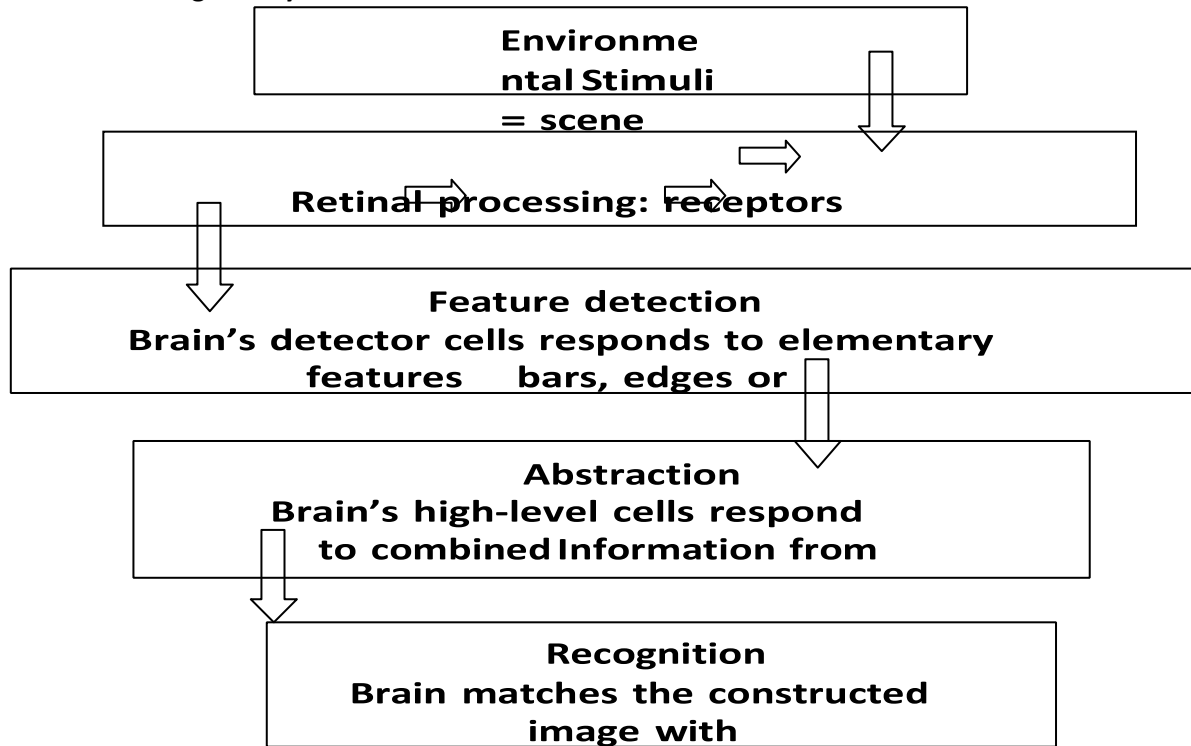
### I. Parallel Processing Theory of Vision

- The brain's distinctive and natural way of processing information in which various aspects of information are processed simultaneously\_ includes many brain functions such as vision; contrasts with the serial/ step- by- step processing of most computers and of conscious problem solving
- Unlike most computers, which work/ processes information instantly through step- by- step serial processing, humans do parallel processing means do several things at one time



- Our brain is capable of dividing visual information into various dimensions/ categories such as color, depth, movement etc and works on each aspect/ part simultaneously
- Visual information is processed in the following manner. i.e.
  - o One looks at someone/ something
  - o Information is sent to the brain
  - o The component features are reassembled and,
  - o In, still not a clearly and exactly known way, the scene is combined/ composed into the consciously perceived meaningful image

### Parallel Processing Theory of Vision



### Trichromatic Theory

- Initially by Sir Thomas Young, and later developed as Young-Helmholtz Trichromatic Theory of Color vision
- The retina contains three types of cones. Each type responds to specific range of wave length

### Hering's Opponent- Process Theory

- The receptor cells are linked in pairs and they work in opposition to each other
- There is a black- white pairing, a blue- yellow pairing, and a red- green pairing
- If an object reflects light containing more green than red, it will stimulates the firing of the cells sensitive to green, at the same time inhibiting the firing of red- sensitive cells; the object will thus appear green
- This theory explains the phenomenon of after- image very well

### Color Vision Deficiencies: Congenital And Acquired

## Color vision deficiencies are classified

- into congenital and acquired

- 
- 
- 

**Congenital deficiencies** are due to the inborn abnormality of cone photoreceptor cells

**Acquired deficiencies** results any time after birth occur due to the disorders that affect the eye or/ and the brain

In both of these deficiencies, people experience colors differently from those with normal trichromatic color vision

• **Three main congenital color deficiencies are;**

**I. Dichromacy II. Anomalous trichromacy III. Rod monochromacy**

**I. Dichromacy**

- Individuals with this deficiency are able to match all the colors using two primaries rather than three
- Dichromatic miss one of the three cone types

There are the following three main types of dichromacy, which are named on the basis of cone photo pigment that is missing. They are;

- 1. Protanopia**
- 2. Deutanopia**
- 3. Tritanopia**

- Both **protanopia** and deutanopia are sex-linked i.e. inherited recessively from a gene located on the X chromosome
- If this deficiency is inherited, males (XY) will manifest it because they have only one X chromosome\_females (XX) have two X chromosomes, so they will only be color deficient if the deficiency is carried on to both X chromosomes. They can pass this condition to their male offspring without being color deficient themselves

**Protanopia** Red photo pigment is absent and is replaced by the medium green photo pigment due to this; people with this deficiency confuse red and green color

- See shorter wavelengths such as blue

**Deutanopia** Also confuse red and green It is sex-linked deficiency and effect about

1% of males and .01% of females

**Tritanopia**

Basis of this deficiency is not yet clear\_ may occur due to the absence of short wavelengths such as blue People with this deficiency are insensitive to blues and yellows and see the world in red and green A very rare condition and occur

in .002% of males and .001% of females only

**Anomalous trichromacy**

- People with this deficiency mix the primaries in different proportions
- Like normal trichromats, these people also need three wave lengths but due to spectral sensitivities, they often mingled them up

**Rod monochromacy**

- Extremely rare hereditary condition which occurs due to the absence of cones in the eye
- As vision is dependent on the rods photoreceptors, the acuity is very weak because of the absence of cones
- Absence of cones are also responsible for poor fixation, erratic eye movements, visual fields defects and serious refractive error

**Color Blindness**

- Inability to see specific colors
- 25 of men and 2 out of 10,000 women are color blind
- Red- green color blindness; inability to distinguish red from green
- Yellow-blue; the person can not differentiate between yellow and blue
- Monochromatic color blindness; inability to perceive any color at all

- The Trichromatic theory explains this phenomenon very well

**Every Day Experiences and Color Vision Deficiencies**

- Our daily routine is highly dependent on the efficient ability to discriminate among colors such as selecting clothes, matching paint colors etc, that requires efficient color vision \_\_\_\_\_ inability/ deficiency can seriously effect individual's ability to learn, to work or to move freely from one place to another
- Colors play an influential role in child's initial/ primary education because it is used to categorize the educational materials
- Good color judgment is also important as far as the occupation of the person is concerned\_\_ essential for the painter, pilots, surgeons, military men, safety officer, dermatologists, pharmacists, chemist, buyer of textiles, food inspectors, electricians and marine navigator
- Extensively used for communicating safety information\_ color coded targets are easily noticed and quickly detected

Red stands out for fire,

danger, or stop Yellow for

amber

Blue indicates need for caution

Green to signal safety

Orange to communicate potential danger

and Purple to warn about for radiation hazards

**(AUDITION) AND BALANCE**

**Hearing or audition** is the sense of sound perception and results from tiny hair fibers in the inner ear

Detecting the motion of a membrane which vibrates in response to changes in the pressure exerted by Atmospheric particles within (at best) a range of 20 to 20000 Hz. Sound can also be detected as vibrations Conducted through the body by tactician. Lower and higher frequencies than can be heard are detected this way only. The main features regarding ear are:

- Ear is regarded as the organ of hearing.
- Like our other senses, our hearing or audition, is highly adaptive
- Sense of motion and balance is regarded as the main and important function of the ear
- Organisms have the ability to hear a wide range of sounds with different frequencies (ranging from higher to very low faint voice)\_ but more importantly we can easily detect different voices of people whom we know or met
- For this, the important question is how we do it? How the transformation of sound waves into neural messages takes place?

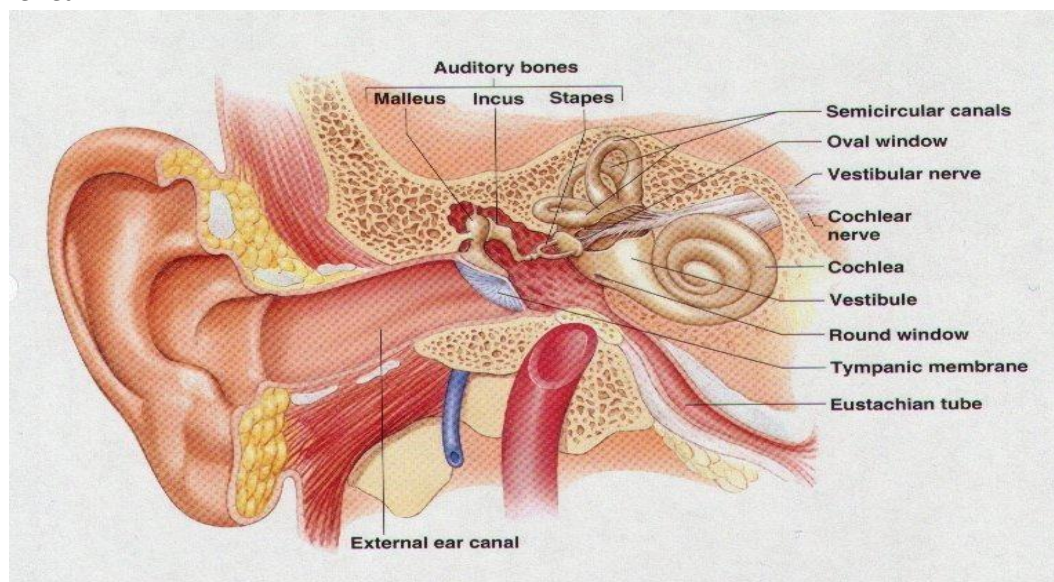
**Some Interesting Facts about Hearing**

- Animals have the capability of hearing more sounds than humans
- Dolphins have the best sense of hearing among all animals
- When people go up high in the mountains, the changes in pressure cause the ear to pop
- Babies can get ear aches because of the milk deposit in the eustachian tube, which helps the bacteria to grow there and may cause problems later in life
- Children can hear more noises than adults, as their ears are more sensitive than that of adults
- Ear aches result when too much fluid causes pressure in the eardrum\_ often occur due to allergies, virus or some sort of infection

**The Human Ear: Anatomy/ Structure**

The primary apparatus of hearing i.e., the ear is divided into three parts

1. The outer ear
2. The middle ear
3. The inner ear



1.

**The Outer Ear**

- The outer ear serves the function of collecting the sound waves from the environment to the internal portions of the ear. It is shaped like a reverse megaphone
- It also plays an important role in locating the sound direction from which it originates

### Auditory Canal

- When sound waves originate from the vibrating object, they then pass through the auditory canal, which is a tube like passage through which the sound travels to the inner part of the ear or “ the eardrum”.

### Eardrum

- The part of the ear that starts vibrating when sound waves strike/ hit it.
- Its intensity of vibration is dependent on how intense the sound waves are the more intense the sound, the more intensely it vibrates.
- These vibrations are then transmitted to the “ middle ear”.

### 2. Middle Ear

- A tiny chamber between the eardrum and cochlea containing three bones the hammer, the anvil, and the stirrup, which transmit vibrations to the oval window.
- These three bones have only one function, i.e. to convey/ transmit the message to the inner ear. These bones are also effective in the sense that they strengthen the stimulus

(vibration) so that it can be easily heard. Information (Vibration) Travels Through These

#### Three Bones

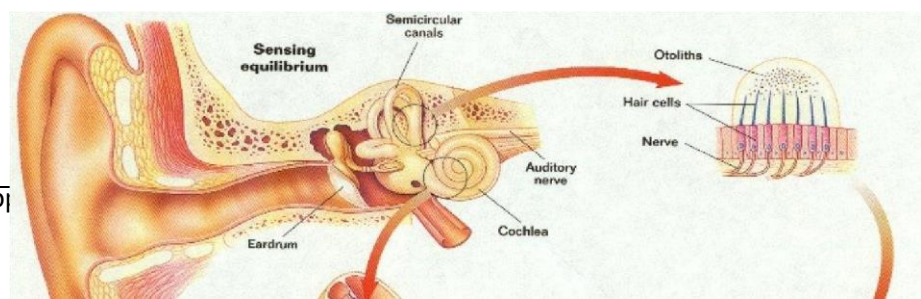


### Oval Window

- A membrane between the middle and the inner ear that increases the strength of the stimulus (vibration) while transmitting them.
- Serves as the amplifier so that tiny or hiss voices could be heard, which otherwise may remain unnoticed.

### 3. Inner Ear

- The innermost region/ part of the ear that contains important structures such as cochlea, semi circular canals and vestibular sacs, and that changes/ transforms the sound waves into the neural impulse.
- Organs that are present in it help us to determine in locating our position and how we are moving in space.
- In the inner ear, the sound enters into the cochlea a coiled, bony tube filled with the fluid that receives information (sound) from the oval window or through bone conduction. The sound waves that reach here help in triggering the nerve impulse. **Basal Membrane**
- Inside the cochlea is the basal membrane passing from the middle of cochlea – a structure that divides the cochlea into the upper and lower chambers/ parts.
- This basal membrane is covered/ surrounded by the tiny hair cells that are bent on the vibration, so that neural message reaches the brain without any hindrance or difficulty; helps to transmit information to the temporal lobe’s auditory region.
- Another means of hearing sound besides



cochlea is through bone conduction. As ear is directly connected with the skull's bones, the cochlea is then able to pickup subtle voices (such as one's own voice). This is largely due to

bone conduction. Why one’s own voice seems different to one’s self than to others is due to this phenomenon. This may also occur because voice reaches one’s self through the air and also through bone conduction.

Sound and Its Physical and Psychological Aspects and Impacts

- Sound is the primary stimulus for hearing.
- Sound actually refers to the physical movement of air molecules in regular and wave like pattern/ sequence.
- When an object creates/ produces sound, it results in the back and forth vibration of its surface, creating sound waves in the surrounding air. These dense and thin sound waves serve as the stimulus for the ear/ for hearing process.
- Sound waves that are being produced differ in their intensity, amplitude, frequency and complexity they afterwards produce corresponding dimensions of sound. i.e.

pitch, volume and timbre.

Frequency

- Frequency is the prominent feature/ characteristic of sound and refers to the number of complete wave lengths/ crests that occur or pass a point in each second.
- In low frequency of sounds, there are relatively fewer and slower up- and-down wave patterns per second\_ these low frequencies are then translated in what is called “ pitch”.

Pitch

- expressed in cycles per  
Primarily related with the frequency and refers to the quality of sound that is being produced by the frequency of the sound wave; second\_ the trait that makes the sound “high” or “ low”. 20
- The lowest and highest frequencies that humans can hear range from cycles per second to 20,000 cycles per second.

Volume/ Intensity/ Loudness

- Volume or loudness can be described as “ strong” or “ weak”\_ determined by the amount of pressure difference

- 

between the compressed part of the sound wave and the prominent part  
Waves that have low peaks create soft sound as compared to the waves with higher peaks

- 

- The range within which humans can hear is extensive measured in unit called **decibel (db)**.

If the sound exceeds 120 decibels then it become painful to human ear.

### Timbre

- 

When fundamental tones are combined with the weaker tones, they are then to be **known as over tones**.

- 

Partials and harmonic tones are the audible tones that help to make up timbre\_\_ quality of sound determined by the complexity of sound waves

- 

The difference in quality or timbre is determined by the complexity and arrangements of the overtones that any instrument/ object produces which largely depends on its design and material from which it is made.

### Theories of Hearing/ Theories of Pitch Perception

#### Place Theory of Hearing

- 

The most frequent question that comes to mind is that how can our brain sort out the sound waves of different frequencies and intensities without any hindrance or problem?

10

- 

The answer lies in the studies done in this regard. They show that the basal membrane (inner most

region of the ear near the cochlea) and its associated areas are most sensitive to high pitched frequency sounds, and the area near the cochlea is more sensitive to low- frequency sounds.







- The findings of these studies led to the formation of place theory of hearing, which says that different areas in the basal membrane respond to different frequencies of sound; pitch corresponds to the location of greatest stimulation along the basilar membrane.
- The most important shortcoming of this theory is that it is unable to explain the process of hearing, i.e. sounds of low frequencies also trigger the neurons in the basal membrane and its associated areas.
- Due to this incomplete explanation of auditory phenomena, an additional explanation came in the form of “ frequency theory of hearing”.

### Frequency Theory of Hearing

- This theory explains that the entire basal membrane acts as a microphone, vibrating in response to sound i.e. activation occurs in the whole area in response to the vibration.
- The theory tends to explain that the nerve impulses in that region are directly connected/ associated with the frequencies of sound to which they are exposed so the higher the pitch of the sound, the more the nerves trigger and send messages to the brain.
- Both theories are important and useful in the sense that they provide the accurate description of the whole auditory phenomena. Specifically, place theory gives a better explanation of processing the high- frequency sounds and frequency theory tells us that how the low- frequency sounds are encountered and dealt with.

### Auditory Information Processing

- After leaving the ear, the auditory message is directly transmitted to the auditory cortex of the brain with the complex series of neural interconnections

- Within the cortex, there are neurons that respond to selective sounds having specific features \_\_\_\_\_  
there are neurons also that respond only to specific pattern/ sort of sounds and not to the intermittent sounds.
- Auditory cortex provides us with the “map” of sound frequencies that furnishes our response to the environmental stimuli.**Auditory/ Hearing**

### Damage

• Auditory damage occurs largely due to the following three major reasons besides some others:

1. Prolonged exposure to loud noise
2. Severe/ hard blow to the ear sensitive regions
3. Old age

(Others include illness, or damage to the middle or inner ear)

#### 1. Prolonged Exposure to the Loud Noise

- It is also called stimulation deafness
- It includes various types of loud tones/ sounds such as speech, music, machinery, and other complex sounds
- The damage is irreversible as the receptors which are damaged do not regenerate
- Large amount of damage occurs between the frequency of

**1000 Hz to 2000 Hz**

#### 2. Severe/ Hard Blow to the Ear Sensitive Regions

- Tinnitus refers to a "ringing in the ears" it is usually a high-pitched tone.
- The origins of it may lie in either extreme stimulation (above 130 db) or in vascular blockage, or in muscle spasms i.e., in the tympanic muscles.

#### 3. Old Age

- As people progress towards their old age, their hearing capability weakens in higher frequency ranges. This is primarily due to an over all degeneration .
- Environmental factors also play role in causing auditory damage along with old age.

### Types of Hearing Impairment

**1. Conduction Deafness:** problem in conduction of air vibrations to the cochlea; the bones in the middle ear do not function properly.

Treatment: microsurgery for replacing the affected bone with an artificial one.

**2.Nerve Deafness:** deafness caused by a damage to the neural mechanism that creates nerve impulses or relays them to the auditory cortex; deafness may also be caused by a damage to the auditory cortex itself.

### **Balance and the Role of Ear**

- Several ear structures are related with the sense of balance of the person much more than playing their roles in hearing phenomena
- Three tubes or the semi circular canals (inner ear) contain the fluid that moves when the head moves; the rotational or angular movements are signaled to the brain.

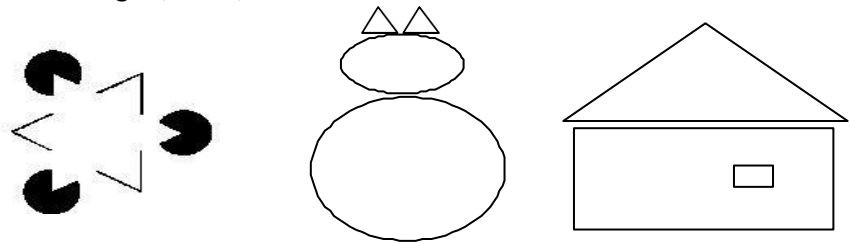
The semicircular canals contain otoliths that are tiny motion- sensitive crystals. The otoliths can sense the pull on our body exerted by gravity, as well as that by the acceleration of forward, backward, or up-and- down motion. When the person moves these crystals also move. Thus the system is familiar with the feeling in case of different moves, and constantly strives for a perfectly balanced position; the otoliths can sense immediately.

**“Perception** is not determined simply by stimulus patterns; rather it is a dynamic searching for the best interpretation of the available data.” Gregory (1966)

**The process of selecting, organizing, and interpreting stimuli; it includes identification, recognition, and images of the stimulus in question; previous experiences have a role to play in it.** Perception is holistic.

Perception is the mental organization and interpretation of sensory information. The Gestalt psychologists studied extensively the ways in which people organize and select from the vast array of stimuli that are presented to them, concentrating particularly on visual stimuli. Perception is influenced by a variety of factors, including the intensity and physical dimensions of the stimulus e.g. such activities of the sense organs as effects of preceding stimulation; the subject's past experience; attention factors such as readiness to respond to a stimulus; and motivation and emotional state of the subject. Stimulus elements in visual organization form perceived patterns according to their nearness to each other, their similarity, the tendency for the subject to perceive complete figures, and the ability of the subject to distinguish important figures from background.

If you look at the following figures you may see two overlapping triangles, a cat, and a hut. Why don't we see them as different separate triangles, ovals, and



rectangles???

**Different Connotations of the Word ‘Perception** OProcess, act, or faculty of perceiving. OEffect or product of perceiving. ORepresents what is being perceived.

OAwareness of something with the help of sense organs/ sensations.

OFeelings, attitudes, opinions, and images people possess about different places, people, and environment of various kinds.

OImmediate or intuitive cognition or comprehension\_\_ capacity to “analyze”/ “see” with the help of experience. OThe ability to process or use information coming/ received from the senses OProcess of classifying sensations.

**A Comprehensive Definition of Perception** would be that of a cognitive process involving:

- Acquisition,
- Interpretation,
- Selection, and
- Organization of sensory information, that involves past experiences as well as neurological processes that affect recognition and interpretation.

### **Gestalt Psychology**

The Gestaltists made an important and lasting contribution to our understanding of perceptual processes. They did show that certain, explicit, factors do affect the way in which incoming stimuli are organized into figures.

- It developed as a reaction to structuralism in the early 1900s.

- In contrast to the structuralist approach of breaking down conscious experience into elements, or focusing upon the structure of mind, the Gestalt school emphasized the significance of studying any phenomenon in its overall form.
- **Gestalt means “Configuration”.**
- Gestalt psychology emphasized that the **“WHOLE”** is more than the sum of its parts, and it is different from it too.
- Concentrated on how people consider individual elements together as units or wholes.
- The concept of Gestalt applies to everything, objects, ideas, thinking processes and human relationships.
- Any phenomenon in its entirety may be much greater than when seen in a disintegrated form.

### Max Wertheimer

- The founder of Gestalt psychology; Kurt Koffka and Wolfgang Kohler followed Wertheimer.
- Wertheimer became aware of a form of apparent motion that was called **“phi phenomenon”**. **Phi phenomenon** = when two lights are in close proximity to each other, flashing alternately, appear to be one light moving back and forth; therefore the whole was different from the separate parts.
- Movement is perceived whereas it never occurred.
- Explanation of phi phenomenon led to a separate school of thought that had deep rooted impact on learning, ethics, and social psychology.
- We perceive experiences in a way that calls for the simplest explanation, even though reality may be entirely different. We tend to organize our experience so that it is as simple as possible. = **Gestalt Law of Minimum Principle**.
- Gestalt Psychology maintained that the main task of psychology is to explain attitudes, events, behaviors etc as ‘complete’ or ‘whole’\_ not in terms of elements or disintegrated parts; the overall impact is what makes perception.

### Figure and Ground

- How do we perceive a figure against a background?
- Certain processes are involved in distinguishing a certain figure or object from a ground.
- We do not just passively receive what is reflected on to our retinas; we try to give a meaning to what we see, and therefore ‘understand’ our sensations



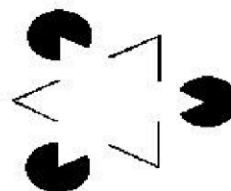
### Gestalt Laws of Perceptual Organization

Organizing raw sensory stimuli into meaningful experiences involve

“cognition”, a set of mental activities that includes thinking, knowing, and remembering. Knowledge and experiences are extremely important for perception, because they help us make sense of the input to our sensory systems.

- We organize our experiences according to certain rules, in a simple way:

- I. The Law of Closure.
- II. The Law of Proximity.
- III. The Law of Continuity.
- IV. The Law of Similarity.
- V. The Law of Simplicity.
- VI. The Law of Common Fate.
- VII. The Law of Enclosure/ Connectivity.



### I. Law of Closure

The perceptual tendency to fill in the gaps and complete the contours; perceiving the disconnected parts as the whole object. We mentally close the gaps and perceive the figure given below as wholes.

This tendency enables us to perceive whole objects from incomplete and imperfect forms

## II. Law of Proximity

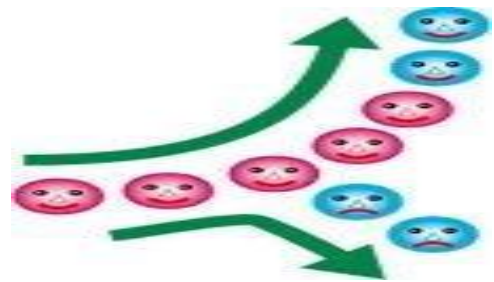
We have the perceptual tendency to group together the auditory and visual events that are close or near one another; they are perceived as a coherent object. In the figures below, we see that on the left, there appears to be three horizontal rows, versus three columns on the right.



## III. Law of Continuity/Good

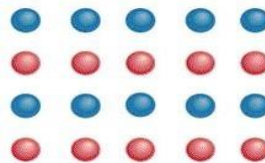
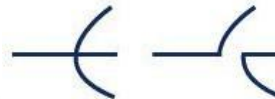
**Continuation** We tend to group the stimuli into smooth and continuous patterns or parts. Humans have a capability to continue contours whenever the elements of the pattern establish an implied direction.

In the drawing below, we see a curved line with a straight line running through it. In the other, we do not see the drawing as consisting of the two segments and perceive it as a continuous pattern.



## IV. Law of Similarity

The tendency to perceive objects, patterns or stimuli which are similar in appearance as a



group; parts of the visual field that are similar in color, light, texture, shape, or any other quality are seen as one.



Elements that appear similar will be perceived as part of the same form/ sequence; there seems to be a

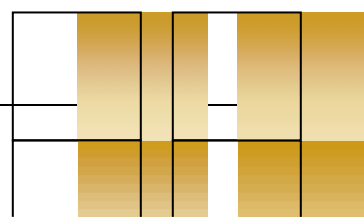
triangle in the circles and the smaller triangles are perceived as one group.

## V. Law of Simplicity/ Law of Prägnanz

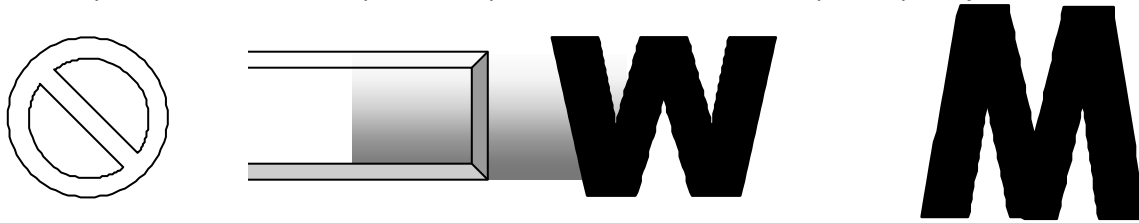
People intuitively prefer the simplest, most stable, straightforward, and basic form of possible organizations. A

stimulus is organized into as good and simple a form as possible; 'good' refers to **symmetrical, simple, and regular**.

In the following figure you tend to see four squares rather than ends of logs of wood or biscuit packs.



In this one you tend to see two separate shapes rather than different separate parts joined



together.

In the figure on the right you see a diamond inside black lines and not as an 'M' under a 'W', which actually is the case.

#### VI. Law of Common Fate

It is the tendency to group together the objects that move together, or seem to move together, and in the same direction. When they are being seen in actual motion, humans' will mentally group them as moving in the same direction. Because of this we often see flocks of birds or herds of cattle, or boys or girls playing together as one group

#### VII. Law of Enclosure/ Connectivity

It is our perceptual tendency to perceive features/ patterns, such as dots or objects as a single unit when uniform and linked; lines, dots, areas, objects etc are perceived as single or same unit when combined or linked.



#### Feature Analysis

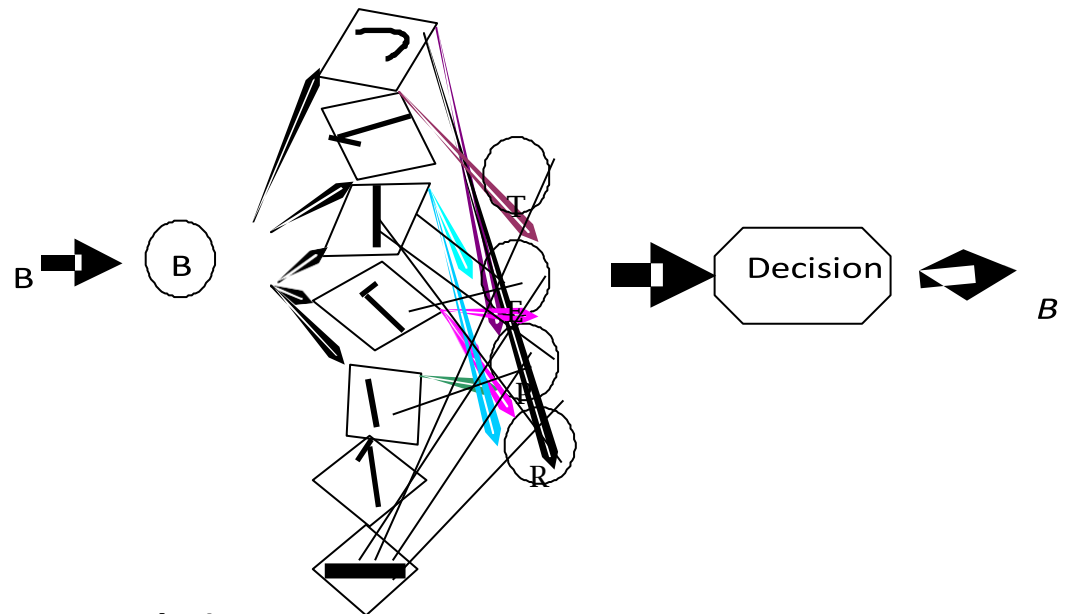
- The process of perceiving a shape, pattern, object, or scene by attending to the individual elements making it up.
- The Gestaltist emphasis was upon the way we interpret the individual elements as a pattern/ sequence which has some sort of meaning; The organized or well formed sequence gives a different percept or meaning as compared to when separate parts or elements are observed.
- The approach of feature analysis looks into the individual components in order to understand the entire nature of what we perceive.
- The feature analysis starts with the activation of the neurons in the brain, as they are sensitive to particular spatial configurations such as circles, angles, edges, curves etc. Since these neurons are individually present, it is taken to be the evidence of the idea that any pattern, sequence or component can be broken down into simpler events or parts e.g. the letter "P" is the combination of a vertical line, and a semi- circle; or an "X" is a combination of a "v" on an inverted "v".
- 150 million objects can be produced out of just 36 fundamental components.

#### In summary

- Stimuli are first broken down into their component parts; these parts are then compared to data stored in our memory in order to find a match; the stimulus is identified and recognized once a match is found.
- The feature analysis starts with the activation of the neurons in the brain, as

they are sensitive to particular spatial configurations such as circles, angles, edges, curves etc. Since these neurons are individually present, it is taken to be the evidence of the idea that any pattern, sequence or component can be broken down into simpler events or parts e.g. the letter “P” is the combination of a vertical line, and a semi- circle; or an “X” is a combination of a “v” on an inverted “V”.

- 150 million objects can be produced out of just 36 fundamental components.
- The figure below shows the process of how we perceive a ‘B’ as a ‘B’.



### Steps in Feature Analysis

- Identify the feature, shape of any object, of which the image falls on the retina.
- Combine/ gather object in some form/pattern so that some sort of representation can be formed.
- In the final stage, we identify/ compare each component/element/ object with the help of past experiences or memories.

### Top- Down and Bottom- Up Processing

'Top- Down' processing refers to the perceptual phenomenon guided/ and influenced by; **O**Knowledge, **O**Experience, **O**Motivation and **O**Expectation

A-e- yo- g-o - ng t- sc—I?

Top- down processing is guided by the higher mental/ knowledge faculty such as meaning of the sentence of which the important letters are missing\_ individuals are able to understand the meaning of the sentence and fill in the gaps by using their prior experiences and memories.

### Bottom- Up processing refers to the

Process of recognizing and processing of information about the individual component/ part of the stimulus.

Humans will be unable to identify the object component unless they are able to recognize and understand the shape and features of each element that makes it up; in the sentence "A-e- yo- g-o - ng t- sc—I?" you will not be able to identify the sentence unless you recognize the individual shapes making up the overall form of the letters.

Top- down and bottom- up processing occur simultaneously and have an interaction with each other, which makes it possible to understand the complex perceptual phenomena.

The process of perception involves the environmental stimuli, which is interpreted, analyzed and integrated with the help of past experiences.

## PERCEPTION

## Depth

## II

## Perception

- **Depth perception is the perceptual tendency/ ability to see objects in three dimensions, although the image that falls on the retina of the eye is two-dimensional; thus enabling us to perceive distance.**
- “Depth Perception” is the skill to perceive depth and distance e.g. we are able to judge the distance of the incoming car, height of the cliff or of a roof top, size of an object, weight of a sand bag etc, in a glance, just by having a look at it.
- This sort of perception is largely due to the fact that we have two eyes which are slightly distant from each other, so the brain integrates the two slightly different images and combines them into one consolidated view; However the differences in images or ‘Binocular Disparity’ is not ignored by the brain. Eleanor Gibson and Richard Walk discovered this phenomena in 1960 by using the miniature cliff with a drop-off covered by sturdy glass.
- Placed the young infants of 6-14 months at the edge of visual cliff. Their mothers motivated them to crawl on the glass, but most of them refused to do so, indicating that they could perceive depth\_\_ this may be due to the fact that they learned to perceive depth in the crawling age.

**Physiological depth cues** are formed by our visual system with the help of muscular movements or adjustments. It is yet difficult to tell how these cues contribute to the depth perception. The adjustments, which the eyes and eye muscles make, are assumed to be of weak nature. These include: **accommodation and convergence.**

**The psychological depth cues:** are based on the interpretation and analysis of the retinal image that is caused by the working of the visual cortex in the brain. **Depth Cues to Perception**

There are two important cues for the perception of depth. These include: **I. Monocular cues for depth perception. II. Binocular cues for depth perception.**

### I. Monocular Cues for Depth Perception

- Also known as “pictorial cues” because painters use these cues in order to tell about depth; these lead to three-dimensional information.
- These generate the ability to judge distance and depth such as linear perspective and interposition with only one eye.
- Depth and location can be perceived with single eye also.

#### i. Relative motion

• **A monocular cue for perceiving depth and distance in which when we move, the objects at different distances change their relative positions with the visual image \_\_\_\_\_ with those that are closest seem to be moving faster. Relative Size**

The monocular cue for depth perception in which we assume that the two objects are similar in size, the one that make the smaller image appears to be more distant.

#### Interposition

A monocular cue for perceiving depth in which the nearer objects partially block/

hinder our image of the more distant objects.

**Relative Height**

- A monocular cue to depth perception and distance in which higher objects appear to be more distant.
  - Can be explained by doing practically as we are moving in car, train, bus etc. Fixate your gaze at some point (fixation point) say a tree, the objects that are closer than the tree seem to be moving backwards and also seem to move faster. The objects that are beyond the fixation point
-

seem to move along but at lower speed and seem as farther away. Brain has the capability to compute these speed and distance clues in order to perceive distances.

### **Linear Perspective**

- The monocular cue for the perception of depth and distance in which two parallel lines seem to be converging at some point indicating increasing distance.
- Rail road tracks, highway tracks etc appear to be converging at some distance and so, contribute to the rail- crossing accidents by making people to over estimate the train's distance: a massive train size makes the perception that it is moving slowly.

### **Relative Brightness**

A monocular cue for depth perception in which the dimmer objects seem to be more distant.

Nearby objects seem to reflect more light than the farther ones. When going for a walk in a thick-fog morning, one may judge distance wrongly as due to fog the objects may be perceived to be farther than they do on the clear shiny morning. That is why they contribute to increasing accidents.

### **Light and Shadow**

Perceptual phenomenon for the perception of depth and distance in which when light strikes an irregular object, certain parts are brightly illuminated whereas others lay in shadow. These shadowed parts tell us about the depth of the parts concerned painters use this phenomenon when portraying something on the canvas such as human face and its various structures.

### **Texture Gradient**

**An American psychologist, James J. Gibson was the ever first individual who emphasized the importance of texture gradient for perceiving depth.**

Mainly applied to textures (structures) of surfaces and arises when we observe the surface when in slant rather than from a straight angle or from above. **Pictorial**

### **Cues for Depth Perception**

Monocular cues are used for the perception of depth and distance

- We can get an extensive 3-D impression in 2-D pictures on a flat surface

### **Atmospheric Perspective**

Particles and vapors in the atmosphere result/ cause the scattering of light that makes a very distant surface appear hazy.

The other techniques they use are;

- Occlusion:** near objects overlap far surfaces.
- Relative height and size:** objects further away from the horizon seem nearer and larger objects seem closer.
- Linear perspective:** provides a strong cue to distance that can effect perception.
- Shading:** provides a cue for shape rather than distance.

### **Motion Parallax**

The change in the position of the retinal image with the side-to-side movement of the head; providing a cue to the distance.

Occurs when objects are at different distances and we are also moving at different rates when in motion. The object nearer to the person appears to move backward but the more distant objects appears to be static as we move. The rate of an object's movement provides a cue to its distance.

Although motion plays an important role in depth perception, the perception of

motion is an important phenomenon in its own right. It allows a baseball outfielder to calculate the speed and trajectory of a ball with extraordinary accuracy. Automobile drivers rely on motion

perception to judge the speeds of other cars and avoid collisions. A cheetah must be able to detect and respond to the motion of antelopes, its chief prey, in order to survive.

How does your brain know which movement on the retina is due to your own motion and which is due to motion in the world? Understanding that distinction is the problem that is faced by psychologists who want to explain motion perception. One explanation of motion perception involves a form of unconscious inference. That is, when we walk around or move our head in a particular way, we unconsciously expect that images of stationary objects will





move on our retina. We discount such movement on the retina as due to our own bodily motion and perceive the objects as stationary.

Psychologist James J. Gibson's explanation of motion perception was too complicated. He reasoned that perception does not depend on internal thought processes. He thought, instead, that the objects in our environment contain all the information necessary for perception e.g. aerial acrobatics of a fly. Clearly, the fly is a master of motion and depth perception, yet few people would say the fly makes unconscious inferences. Gibson identified a number of cues for motion detection, including the covering and uncovering of background. Research has shown that motion detection is, in fact, much easier against a background.

Thus, as a person moves in front of you, that person first covers and then uncovers portions of the background and this reflects movement.

People may perceive motion when none actually exists. For example, [motion pictures](#) are really a series of slightly different still pictures flashed on a screen at a rate of 24 pictures, or frames, per second. From this rapid succession of still images, our brain

perceives fluid motion—a phenomenon known as stroboscopic movement. **Binocular Cues for Depth Perception**

- The ability to judge distance and depth such as retinal disparity and convergence with two eyes, which are slightly apart from each other.
- Our eyes are slightly apart from each other having a distance of about 2 ½ inches or 6 cm, so the images that fall on the two retinas are slightly different.
- These two slightly different images are then integrated and processed by the brain, but it does not ignore the possibility of difference in images known as “binocular disparity”.

#### i. Retinal/ Binocular Disparity

- The cue to depth perception, the greater the disparity (difference) between the two images the retinas receive of an object, the closer the object seems to us this disparity allows the brain to judge distance.
- This can be proved with the help of simple experiments done by you. i.e. hold a pencil directly in front of your nose; the retinas of yours will receive different views/ images. Now make them closer firstly to one eye and then to the other. At greater distance, the disparity is smaller.
- This discrepancy of the two images that falls on the retinas varies with respect to the distance from which the object is being perceived used for determining distance e.g. if we see two objects in which one is considerably closer than the other, the retinal disparity will be greater and we perceive the greater depth between the two.
- On the contrary, if the two objects were at similar distance, the retinal disparity will be minor/ smaller and we perceive the objects at similar distance.
- Movie directors use these phenomena in order to create depth illusions by using two cameras, spaced highly apart, to produce slightly different images, each image for each eye.
- In 3-D movies, the two images are presented simultaneously which produces a double image; special glasses are worn for this purpose to provide us with the genuine sense of the

depth phenomena. **Convergence and Accommodation**

**A binocular cue for depth perception that illustrates, that when we**

**assume that the two objects are of same size, the one that produces a relatively smaller image will be perceived as distant.**

It is a neuromuscular cue in which the more the eyes converge inwards, the nearer the object seems. The eye lens becomes thicker due to the activation of ciliary muscles to focus on the nearer object the degree of activation of ciliary muscles gives us the cue to depth.

Convergence and accommodation are only effective at close distances and can tell only the distance to a single object in the visual field.

### **Selective Attention**

- Perceptual process in which the person chooses the stimulus which he is interested in; paying attention to only the stimulus of interest.

- Humans give attention to the objects that are exceptionally bright, loud, novel, or high in contrast we are also motivated to give attention to the objects that are meaningful as well as relevant e.g. if we are thirsty, we will give more attention to water and the like.
- Advertisers extensively use this phenomena of selective attention using bright contrasts, high volumes and more rapid speech than usual\_ and most importantly broadcast at that time when people are particularly sensitive to their content e.g. the food- related ads are shown at lunch or dinner times.**Stroop Task**
- Difficult and frustrating exercise in which one is confronted with two powerful and competing stimuli the meaning of the word and the colors in which they are written e.g. I LIKE YOU, if written in red ink.
- In these cases, it has been observed the people pay more attention to the reading/ content of the stimulus rather than the color from which it has been written (because they are experienced with reading than with naming colors).

#### b. Dichotic Listening

- A procedure in which individual wears earphones in which different messages are sent to each ear at the same time.
- After hearing the stimuli, the individual is asked to reproduce them aloud as it comes to one ear: “ shadowing”.
- In this process, individual can easily identify the talking person as man or woman and whether change in voices takes place during the message or not.
- Experiments suggest that although people pay full attention to one stimulus at a time, they also pay some level of attention to the other stimuli as well; it shows the possibility of learning something although being unaware of it. The phenomenon

of selective attention is of particular importance for the people who have to constantly monitor e.g. such as pilots, traffic controllers, rescue workers, and firemen.

#### Form-Perception

- A perceptual phenomenon in which we perceive the shape, form or pattern of any object give name to objects-as house, tree, table, chair etc
- Mainly it involves two important principles:
- Figure- ground relationship
- Contours

#### Figure- Ground Relationship

- Our perceptual tendency to see objects with the foreground as well as the background the object is being recognized with respect to its back ground e.g. Black board and chalk, car parked in front of a wall, painting against the wall etc.
- Contrasting figures and their grounds are early and quickly perceived
- It is a vise- versa relationship i.e., figure cannot be observed without a ground and ground cannot be recognized without having a figure.

#### Contours

- Perceptual phenomenon in which we are able to maintain a difference of the form from its background due to the perception of contours e.g. In observing the paper, which has two colors, white and black\_ there is no contour at all. But as it becomes lighter rather than becoming dark, a person can simply identify the difference. And when the difference is much apparent, we simply divide into

two parts as light and dark and skip different shades as lighter or darker where brightness changes abruptly, we perceive contours.

### **Motion Perception**

- Motion simply means the relative/ progressive change in the position of the person in space with time. Objects cannot be perceived fully when in motion. It is also difficult due to the fact that our eyes cannot follow the moving object with great precision and efficiency all the time.

## Relative Motion

- While looking at moving automobiles, the ones that are nearer seem to be moving more rapidly than those at a moderate distance, and those that are more distant seem to be moving along.
- Relative motion can also be interpreted through experience, when one can fairly tell the speed of a train or a bus by noticing outside the window as to how rapidly the nearby objects are passing. **Radical Motion**
- A movement directly towards or away from the observer. Continuous and radical motion is being perceived when the retinal image continuously changes.
- The change in size of the retinal image gives the perception of motion.

## Perceptual Constancy

- A perceptual tendency to perceive object as unchanging in size, shape, color, lightness etc., even though changes in illumination and retinal image do take place.

### There are a number of constancies identified by psychologists

**I. Lightness Constancy:** Means that the object's lightness or brightness remains the same in spite of changes in illumination.

Lightness constancy illustrates an important perceptual principle: Perception is relative. Lightness constancy may occur because the white piece of paper reflects more light than any of the other objects in the room—regardless of the different lighting conditions. Another explanation, proposed by 19th-century German physiologist Hermann von Helmholtz, is that we unconsciously take the lighting of the room into consideration when judging the lightness of objects.

**II. Color Constancy:** Closely related with lightness constancy and refers to the perception of color of the object remaining the same in spite of changes in lighting conditions.

Color constancy can be seen if one has worn a pair of sunglasses with colored lenses. In spite of the fact that the colored lenses change the color of light reaching your retina, you still perceive white objects as white and red objects as red. The explanations for color constancy parallel those for lightness constancy. One proposed explanation is that because the lenses tint everything with the same color, we unconsciously “subtract” that color from the scene, leaving the original colors.

**III. Shape Constancy:** Means the shape of the object remains the same in spite of some changes in its orientation.

To understand shape constancy, hold a book in front of your face so that you are looking directly at the cover. The rectangular nature of the book should be very clear. Now, rotate the book away from you so that the bottom edge of the cover is much closer to you than the top edge. The image of the book on your retina will now be quite different. In fact, the image will now be trapezoidal, with the bottom edge of the book larger on your retina than the top edge. (Try to see the trapezoid by closing one eye and imagining the cover as a two-dimensional shape.) In spite of this trapezoidal retinal image, you will continue to see the book as rectangular. In large measure, shape constancy occurs because your visual system takes depth into consideration.

**IV. Size Constancy:** refers to our ability or tendency to perceive objects as remaining of the same size despite having distance from the observer.

When an object is near to us, its image on the retina is large. When that same object is far away, its image on the retina is small. In spite of the changes in the size of the retinal image, we perceive the object as of the same size. For example, when you see a person at a great distance from you, you do not perceive that person as very small. Instead, you think that the person is of normal size and far away.

Similarly, when we view a skyscraper from far away, its image on our retina is very

small—yet we perceive the building as very large. **Visual Illusion**

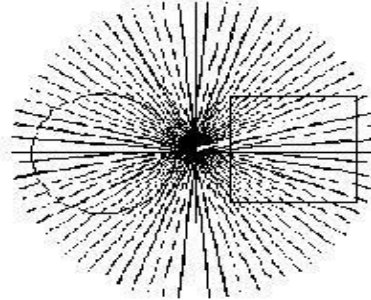
- Also known as optical illusion.  
Illusion is misperception, or false perception.
- It is when the physical stimulus constantly and persistently produces error in perception.
- There are various types of illusion of which the most famous are as follows;

**i. Muller- Lyer Illusion**

The visual illusion in which the two lines of the same lengths appear different because of the change in position of arrows at each end of two lines\_\_ arrows pointing out appear shorter than the arrows pointing inwards.

**Causes of Illusions** Sensory deficits and defects Readiness and expectation  
Atmospheric variables  
Effect of drugs Artistic  
manipulation

## Optical Illusions



The Orbison figure

the two shapes are a circle and a square,  
but appear distorted



## ALTERED STATES OF CONSCIOUSNESS

### Significance of Wakefulness, Sleep, and Fatigue

Wakefulness is the productive part of our life. At the same time sleep is also an essential aspect. When we are awake, we are consuming our physical energy, and after some time we begin to experience fatigue. All these are the various faces of consciousness. Psychologists agree that we may experience different states of consciousness at different times of the day.

### Consciousness

- The awareness of the sensations, thoughts, feelings and emotions, events, and surroundings that are experienced by a person. Consciousness is the subjective experience and understanding of both the environment around our private internal world, unobservable to outside and us. The nature of consciousness spans several dimensions. It can range from our perceptions while wide-awake to the dreams we have during sleep, with wide variation in how aware we are of outside stimuli. Some psychologists argue that 'consciousness' is a term that should be applied even to mental experiences, which we are not aware of. Consequently, some psychologists argue that the definition of consciousness ought to be expanded to include all mental experiences, whether we are aware of them.

### Altered States of Consciousness

The states when an individual is either fully or partially unaware of the sensations, thoughts, feelings and emotions, events, and surroundings that are experienced by a person; this may be due to various reasons. **Consciousness is a continuum**

---

Total conscious

Unconsciousness

The Study of Consciousness Has Long Been in Question

**In the olden times it was not possible to study this phenomenon in a scientific manner. Today a number of scientific techniques are available for assessing, testing, judging, and analyzing consciousness and its altered states e.g. EEG.**

### Varied States of Consciousness

- Sleep
- Dreaming
- Hypnosis and Meditation
- Drug induced states

**Characteristics of the Variations in States of Consciousness** • Affected sensations.

- Impaired thinking: may become shallow, superficial, illogical and irrational.
- Altered emotional response; that may affect personal relationships.
- Abnormal perceptual processing; the sense of time and space may suffer.
- Impaired physiological processes.

## Sleep

- A state of total or partial unawareness ranging from slight wakefulness to light tranquility, to nearly total detachment from the external world.
- Sleep is the time of rest and rejuvenation for the body.
- The muscles and the nerves relax.

- The body recharges its energy for the hours of work to come the next day.
- People may need a siesta in the afternoon too, depending upon the climate, culture, age, and their health status.

### The Stages of Sleep

#### Stage- 1 Stage- 2

#### Stage- 3 Stage- 4

- These stages move in cycles of about 90 minutes duration each.
- The person passes through regular transitions between these stages.
- The sleep becomes less and less deep as the night passes.
- These stages can be studied through an electroencephalogram (EEG).

### Electroencephalogram (EEG)

- An apparatus/machine that measure records and displays electrical activity within the brain of a person.
- Brain wave activity, or electrical charge, is recorded in the form of a graphic pattern.

#### Stage-1 Sleep

- The initial stage when one is in transition between wakefulness and sleep.
- The brain waves during this phase are quite rapid and low-voltage.
- In the beginning of this stage one does not dream, although photograph like images may appear.
- Heart rate is elevated and irregular; breathing is rapid, and the blood pressure high.
- Rapid eye movement takes place.

#### Stage-2 Sleep

- A level of sleep deeper than stage-1.
- The wave pattern becomes more regular, that may momentarily show sharp peaks, or waves that are sharply pointed, called 'sleep spindles'.
- If a person is at stage-2 sleep, it becomes difficult to wake him up.

#### Stage-3 Sleep

- The brain waves are slower.
- Higher peaks and lower valleys are shown by the wave pattern.
- Stage-3 and stage-4 sleep dominate the first half of the night.

#### Stage-4 Sleep

- In this stage the person is almost cut off from the external world, and is least responsive to stimulation from outside: the deepest sleep.
- The brain wave pattern now is more regular and even slower.
- The time during which this stage is most likely to occur is the early part of the night.
- Lighter stages of sleep dominate the last half of night.

### How much sleep do we need? Circadian

#### Rhythm

- An internal pace maker and biological control system: Biological processes that repeatedly occur on roughly a 24-hour cycle. e.g. sleep, body temperature etc.
- Circadian Rhythm may vary from person to person in terms of its pattern; some people feel like going to sleep early and some late; even during the day some need a midday nap and some do not.

### REM: Rapid Eye Movement Sleep

- Sleep characterized by rapid movement of the eyes.

- REM dominates a little more than twenty percent of an adult's sleeping time.

- Occurs during stage-4 sleep.
- Eyes move back and forth.
- Sleep is very deep and the major muscles seem as if paralyzed.
- Difficult to wake up the person during REM sleep.
- Usually people dream during REM.
- It is thought that eyes move back and forth during REM because they are following the action-taking place in dreams.
- REM sleep plays an important part in a person's life, both physical and psychological, as the body needs a certain amount of REM sleep.
- Experiments have shown that people whose REM sleep was interrupted and disturbed by being awakened, exhibit a rebound effect: they try to avail every chance to get REM sleep whenever they get a chance. **How much of sleep is required?**
- At least some amount of sleep is necessary.
- The number of hours people need to go to sleep may range from 3 to 9 hours, and even less or more: But on average people sleep for 7-8 hours at night.
- Sleep has a cumulative effect. The person tries to make up for the hours of sleep that he missed in previous nights.
- Sleep deprivation in humans as well as animals has adverse effects although temporary.
- Sleep deprivation affects all faculties, mental and physical: causes fatigue, and irritability; concentration and logical thinking are adversely affected.
- Reaction time is slowed.
- Sleep Deprivation may have serious consequences in case of academic performance, automobile driving, and certain professions requiring sharp alertness of mind and body.
- **A good night's sleep keeps one fresh and ready for facing stresses of everyday life. Sleep Disorders**
- Sleep related problems ranging from inability to sleep, to difficulty falling to sleep, to interrupted sleep, to feeling sleepy even when one has had enough hours of deep sleep; Generally known by the name of Insomnia, sleep disorders include sleep walking and sleep talking as well.

### Causes of Sleep Disorders

- Sleep disorders or slumbering problems may be due to various reasons:
- Stress
- Preoccupation (concern or fear etc.)
- Mental illness
- Noise pollution
- Digestive problems
- Physical illness
- Drug abuse and medication
- High caffeine intake, and many other

### How to Handle and Treat Sleep Disorders?

**REMEMBER:** The actual problem of most people suffering from sleep disorders is not that they can not fall asleep, but the concern that “I will not be able to sleep today too.”

### Practical Steps for Getting Rid of Most Sleep Problems

- **Avoid taking sleeping pills.**
- Fix a place/room where you will go to sleep every night, and do not do anything else over there.
- Do not “think” about going to sleep.
- Keep television away from your sleeping place, and if it is there **NEVER EVER** watch an interesting movie or program at sleep time.

- Develop a habit of reading at bedtime, but **NEVER EVER** read an interesting or exciting book.

- If you are in your bed and still can't go to sleep, then get out of the bed and take a round around the house and come back. Develop a habit of rising early in the morning every day, at the same time.
- Do not change your sleep time.
- Learn some relaxation exercises.
- Avoid caffeine.
- Avoid heavy meals at night, and eat your dinner about two hours before bedtime.
- A glass of warm milk helps quite often.

### **Dreams and Sleeping**

- Dreams are mental experiences during sleep.
- Every body dreams though they may forget the contents.

#### **Why do we dream?**

- Different psychologists have tried to explain this phenomenon, thus pointing towards the significance of dreams. The main explanations are:
- **Theory of unconscious wish fulfillment: Sigmund Freud**
- **Reverse Learning Theory**
- **Dreams for Survival Theory**
- **Activation Synthesis Theory**

### **Freud's Theory of Unconscious Wish Fulfillment**

- Unconscious wishes that cannot be fulfilled in real life and are repressed, find an expression in the dreams.
- The manifest content represents the latent content. However the manifest part is different from the latent part, and represents the unfulfilled wishes in a symbolic form.
- The psychoanalyst is trained in digging out the hidden content, and can bring it to the conscious level.

### **Reverse Learning Theory**

- There are loads of irrelevant information that accumulates in our mental repertoire throughout the day. If we let this information keep piling up, it will confuse us and hinder clearer thinking. Dreams are a way of getting rid of this accumulation.
- Dreams do not mean anything more than a scavenger.
- We are in a way unlearning what we had learnt unintentionally.

### **Dreams-for-Survival Theory**

- Dreams are a source of reconsidering and reprocessing important information.
- Dreams do have a meaning with reference to our daily living, and represent our concerns, decisions, uncertainties etc.
- It is a capacity inherited from our non human ancestors who had limited capacity for processing information during daytime due to smaller brains; hence the mechanism of information processing during sleep as well.

### **Activation- Synthesis Theory**

- Dreams are a by-product of fundamental biological processes.
- During REM sleep our brain generates random electric energy that stimulates memories stored in various portions of the brain.
- The brain puts these random memories into such an order that forms a comprehensible storyline. The gaps in the story are filled in so that the consequent scenario becomes logical.
- Theory proposed by Hobson.

#### **Other Altered States of Consciousness**

- Hypnosis and Meditation

- Drug Induced States

### **Hypnosis**

- A condition in which the person is in a highly suggestible state.
- Following a number of instructions by the hypnotist, the person enters a trance and follows the suggestions or further instructions without resistance.
- The instructions are followed even after the person is out of the trance.
- However, a hypnotic state does not mean total loss of will; people may not follow instructions that clash with their moral/ethical ideology.
- It is primarily a varied state of consciousness in which one is not fully awake.
- Self-hypnosis is also taught.

### **Why Do People Go For Hypnosis?**

People may choose hypnosis as a therapy for various reasons; e.g. for:

- Quitting smoking
- Quitting alcohol
- Pain management
- Assertiveness training/overcoming shyness
- Improving sport performance
- Treatment of psychological problems (fears/ phobias)
- Eating Disorders
- Recalling events

### **How Effective Is Hypnosis?**

There is no conclusive evidence available in this regard.

### **Meditation**

- The person learns (after instruction) to refocus attention and to concentrate in such a way that he/she is totally detached from all the unwanted stimulation for as long as he/she desires.
- Its history can be traced in many religions.
- For focusing attention a word, syllable, or sound may be repeated  
e.g. the way we do in transcendental meditation(TM).
- In some forms of meditation some object e.g. a marble, crystal, candle flame, or picture may be used
- The main idea is to concentrate.

### **Physiological changes due to meditation**

- Decreased heart rate
- Lowered blood pressure
- Lessened oxygen usage
- Changed brainwave pattern

### **How does meditation affect?**

- It gives a heightened feeling of relief and relaxation.
- Concentration is sharper.
- Insight is improved and problem solving better.
- It has a positive effect on health, and in some studies longevity has been found to be associated with prolonged practice of TM.

### **Drug Induced States**

- Changes in consciousness due to use/abuse of different drugs.

### **Psychoactive drugs**

- Drugs that affect behavior and mental processes including cognitions, emotions and perceptions.

- More deep rooted and adverse effects are caused by the addictive drugs; drugs causing dependence.

**Effects of Drugs Main**

effects:

- Withdrawal effects
- Overdose effects

The withdrawal effects determine, to a great extent, the success of a quitting program.

**Categories of Drugs**

- Stimulants
- Depressants
- Narcotics
- Hallucinogens

**Stimulants**

- They give you a “high” feeling; they influence the CNS, and the person’s heart rate, Blood pressure, and muscle tension is increased.
- Cocaine
- Amphetamines
- Benzedrine
- Dexedrine

**Depressants**

Depressants’ intake leads to a slowed down nervous system. These include:

- Barbiturates
- Alcohol

**Narcotics**

Create a feeling of relaxation, and alleviate anxiety and pain. Are highly addictive.

- Heroin
- Morphine

**Hallucinogens**

Drugs that produce hallucinations; affecting perceptual processes:

- Cannabis
- Marijuana (bhang)
- Hashish
- Hash oil
- LSD
- PCP (Phencyclidine)

**Why do people take drugs?**

Addiction Role

modeling Peer

pressure

Stress/ Relaxation

Thrill/Excitement/Experimenting

**Lesson 20 LEARNING**

- Learning is commonly understood as the act, process, or experience of gaining knowledge or skill.

For a layperson it is knowledge or skill gained through schooling or study. *With reference to Psychology;* it is the behavioral modification especially through experience or conditioning

- **The best definition of learning is that: Learning is a relatively permanent change in behavior, and the frequency of its occurrence; this change is not automatic and results from practice or experience**
- Learning usually refers to improved performance, acquisition of skills, and a positive change in behavior; however the change may also be negative in nature
- Learning is distinguished from behavioral changes arising from such processes as maturation and illness, but does apply to motor skills, such as driving a car, to intellectual skills, such as reading, and to attitudes and values, such as prejudice.
- There is evidence that neurotic symptoms and patterns of mental illness are also learned behaviors. Learning occurs throughout the life span in humans and animals, and learned behavior accounts for a large proportion of all behavior in the higher animals, especially in humans.

### Types/ Forms of Learning: In Terms of the Content

Considering the content of what has been learnt, there are varieties of learning: i. Verbal learning ii. Motor learning iii. Problem solving **Verbal Learning**

Basically man is a verbal learner who learns about the environment through experiences.

- Verbal learning involves the person's own association, experiences and relations with the phenomenon that has been learned.

#### ii. Motor Learning

- It involves the practical application of the learned phenomena.
- There are various tasks/ activities in which motor skills are of primary importance as compared to the ones requiring verbally learned material; e.g. learning the skills like playing football, tennis, cricket etc; or the training of technicians whose motor skills need to be highly efficient.
- In learning motor skills two things are important; quickness of movements and the results that are achieved through it. **iii. Problem Solving**
- Problem solving tasks usually involves trial and error and primarily include verbal processes.
- While doing the problem-solving task, individual learns many responses that can be helpful for him in different situations

#### How Do We Learn?

Three main explanations of learning are:

- Classical conditioning
- Operant conditioning
- Cognitive approaches to learning.

#### Basic

#### Terminology

#### Stimulus

A physical energy source that has an effect on a sense organ, thus producing a response.

### i. Response

- The action, behavior, or reaction triggered by a stimulus.

### Environment

- External factors, variables, conditions, influences, or circumstance affecting one's development or behavior.

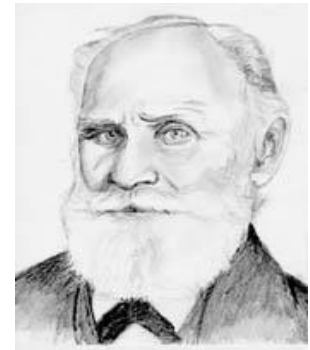
### Variable

- A behavior, factor, setting, or event that can change/ vary in amount or kind.
  - Why are children scared of darkness?
  - Why some children jump with joy at the sight of a cat and some start screaming in fright?
  - Why does one coming from office start feeling relaxed at the very sight of his home?
  - Why does one start feeling bad at the thought of going to a dentist?
  - Why does one starts feeling hungry at the sight of one's favorite fast food joint?
- Classical Conditioning provides answers to all these questions Classical conditioning forms an association between two stimuli.**

*Classical Conditioning* is when a stimulus acquires the ability to cause a response that was previously caused by another stimulus. This learning process essentially

**Historical background** allows us to predict what is going to happen.

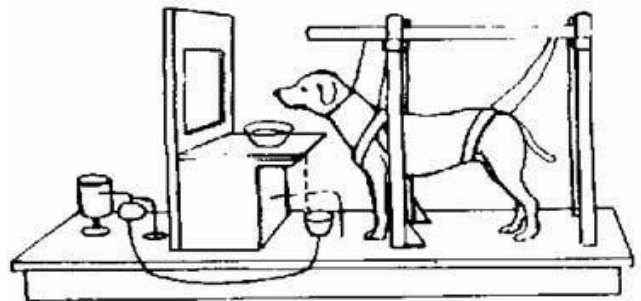
- In 1879 Ivan Pavlov, the Russian physiologist and pioneer of classical conditioning, began his research work on the digestive process, primarily that of dogs.
- He won Nobel Prize for that in 1904.
- The focal point of his investigation was the salivation reflex in dogs.
- It was already known that the dogs would salivate if food powder led into their mouths, as it was a 'reflex.'
- The dogs would salivate every time the food powder was presented.
- Pavlov observed that after some time, the dogs at times salivated just before food was put into their mouths. They also salivated at the sight of the food, and even at the sight of the lab assistant who brought food for them.
- This is where the concept of classical conditioning emerged.



were

### Classical Conditioning: The Theory

- A type of learning in which a previously neutral stimulus starts eliciting a response that was originally the response to a natural stimulus i.e., a stimulus that was meant to produce that response; it so happens because the neutral stimulus had been closely associated with the natural stimulus.



### Basic Terminology in Classical Conditioning:

#### i. Reflex

- An automatic, unlearned response resulting from a specific stimulus.

#### ii. Un Conditioned Stimulus (UCS)

A stimulus that elicits a response reflexively, naturally, and reliably.

iii. **UN Conditioned Response (UCR)**

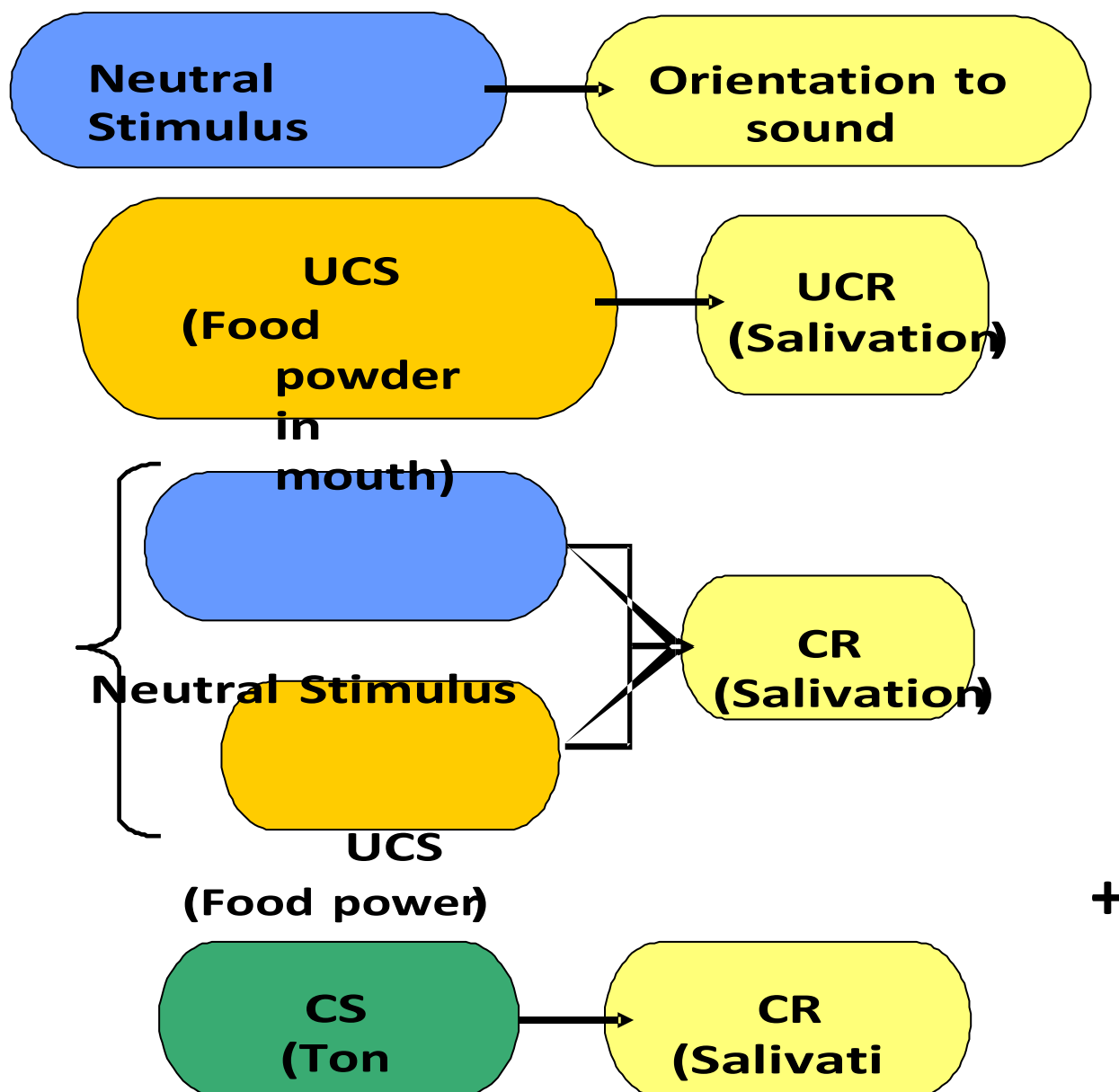
- A natural, reflexive, reliable, response of the UCS.

iv. **Conditioned Stimulus (CS)**

- A primarily neutral stimulus which, when paired with the UCS, starts evoking a response (different from its own natural response) and the same as UCR.

v. **Conditioned Response (CR)**

- After conditioning, the CS begins to elicit a new, learned response i.e., CR.

**Pavlovian Classical****Conditioning****Before Conditioning**

John.B.Watson: (1878- 1958)

- American psychologist initially trained in introspection at the University of Chicago but found it extremely vague and mentalistic.

- 
- He became interested in experimental research with animals.
  - Gave a revolutionary, pragmatic approach often known as ‘**radical behaviorism**’.
  - For Watson, observable behavior is all that psychology should be looking at.
  - Environment and external world (environmental stimuli) is what shapes and determines behavior.

- Learning is what matters in what a person is, and not the inborn instincts, impulses, drive, id, or unconscious motivation. An understanding of learning will encompass all aspects of personality

### Impact of Learning Experience

“Give me a dozen healthy infants, well formed, and my own specified world to bring them up in, and I’ll guarantee to take any one at random and train him to become any type of specialist I might select doctor, lawyer, artist, merchant- chief, and yes, even beggar- man and thief, regardless of his talents, penchants, tendencies, abilities, vocations and race of his ancestors” (**Watson, 1924**).

### Little Albert’s

### Case Learned

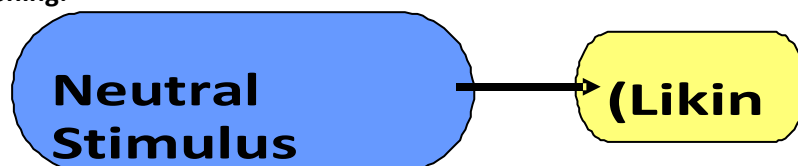
### Fear

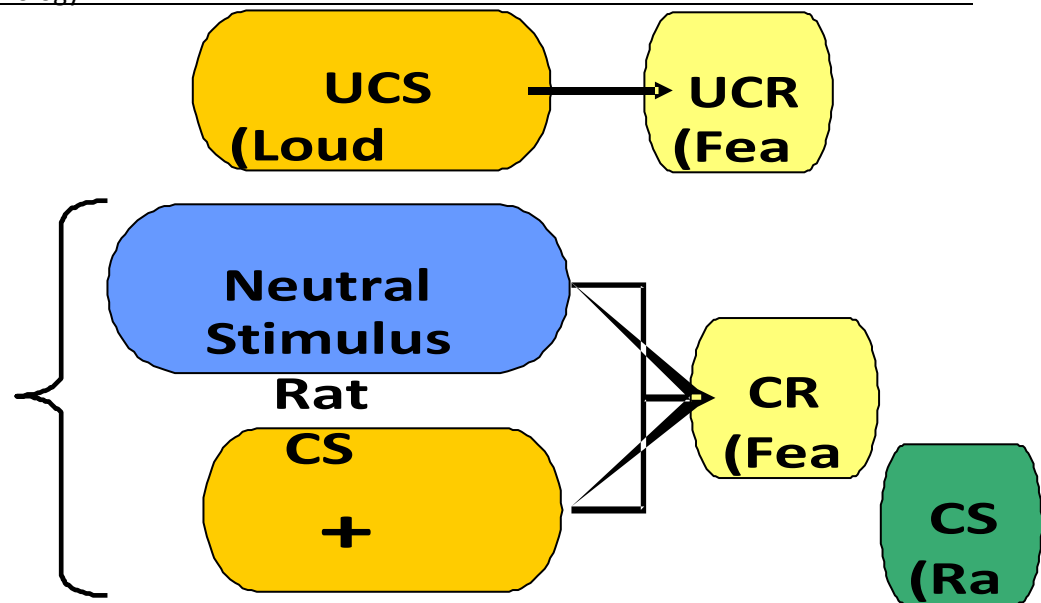
- 1920: Developing Fear: Watson and Rosalie Rayner’s experiment
- Eleven- month old Albert who enjoyed playing with a cute white rat was made afraid of it by linking a loud frightening sound with the appearance of the rat.
- The experiment was further expanded and Watson and Rayner demonstrated that the fear of the rat could be generalized to all sorts of stimuli: a dog, a cotton ball and a Santa Clause. In Albert’s case, the same sequence of events i.e., presenting the rat with the gong was repeated three times; on all repetitions he began crying, showing that a classical association had been established.
- Seven conditioning trials were repeated on two occasions and then the rat was presented without the gong; Albert still cried.
- Watson called this ‘conditioned emotional response’.
- Watson and Rayner worked with Albert once again after about a week.
- He was presented with the same objects.
- This time he showed the same fear response towards other objects similar to the rat i.e., cotton balls, white fur, and a Santa Clause mask having a white beard.

### This indicated that ‘stimulus generalization’ had taken place

- The researchers had plans to experiment on unlearning the emotional response
- For three weeks they worked on extinguishing the response using Pavlov’s ‘extinction’ procedure: presenting the rat without gong. But could not achieve success.
- Watson and Rayner could not get a chance to undo the learning as the child’s mother removed him from the hospital.

### Before Conditioning:





## Stages and Extensions of Classical Conditioning

### □ Acquisition

- Extinction
- Spontaneous recovery
- Stimulus generalization
- Stimulus discrimination
- Higher Order Conditioning

### Acquisition

The stage when the stimulus in question generates a conditioned response; The stage of initial learning when responses are established and then gradually strengthened as a result of repeated pairing and presentation.

- This is when classical conditioning can be said to have taken place. **Extinction** • The unlearning of the conditioned response by weakening it, leading to its disappearance; using the same principles as those for learning the response.
- The state when the conditioned stimulus i.e. bell, buzzer, gong etc does not accompany the unconditioned stimulus e.g. food.
- The response gradually diminishes, extinguishes, or declines, as the UCS repeatedly does not appear with the CS.

### Spontaneous Recovery

- Does the response disappear permanently, once extinction has taken place? Not always!
- Pavlovian experiments showed that some days after extinction, the dog salivated again on hearing the bell/ buzzer.

**Consider the case of someone who left smoking but the very sight of someone else who is smoking makes him feel like smoking.**

**The same may happen with a child whose fear of dogs had been treated.**

The re occurring responses are comparatively weaker in nature than they initially were; similarly their extinction takes place sooner and easily.

### Generalization

- Stimuli similar to the original CS may elicit the same response as to the CS or UCS e.g. a buzzer responded to as a bell.
- Pavlovian experiments showed that the dogs also salivated on the tones that were similar to the original tone but were never used while presenting the food.
- Such responses are not as strong as the original ones.
- Consider **the case of Albert's fear of all white- furry objects**

### Discrimination

- The process whereby the organism learns to restrict its response to one specific stimulus; differentiating between similar stimuli.
- Pavlov's dogs salivated only at the tones, which were similar in nature.
- **Consider the case of a child who is scared of the neighbor's dog alone (that barks every time the child passes by), and not all dogs.**

### Higher Order Conditioning

- A process when an already conditioned stimulus is repeatedly paired with a neutral stimulus, and ultimately the neutral stimulus begins to evoke the same response as to the original stimulus.
- **Consider the case of a child who was scared of the neighbor's dog, became scared of all dogs, and finally started screaming at the mere name of a dog.**

### Applications of Classical Conditioning in Everyday Life

- Negative emotional responses: fears, phobias fear of reptiles, dark places, and school phobia.