**PGED S3-04**
**Exam. Code: PSP**

# PSYCHOLOGICAL PRACTICAL

## SEMESTER- III

# EDUCATION

**KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY**

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## COURSE INTRODUCTION

This is the Fourth course in Education for the third semester of two year Master Degree Level. There are total seven units. The learners who are pursuing Master in Education are to perform psychological practical in 12th paper. This course primarily will deal with the psychological practical. The total marks of the paper is divided into the following segments:

**Total marks =100**

a) Practical Notebook=40 marks

5 experiments with apparatus carry 5x4=20marks

4 experiments without apparatus carry 4x3=12 marks

3 Physiological experiments carry 8 marks

b) Psychological Experiments during examination 15x3= 45 marks

3 experiments are to be performed in examination-

i) One with apparatus 15

ii) one without apparatus and 15

iii) One Physiological. 15

c) Viva Voce= 15 marks

While going through this course, you will come across some boxes in the middle of the text. These boxes will explain you more about some important points and concept within the text. Apart from this, there will be some broad and short questions which have been included under "ACTIVITY" and "CHECK YOUR PROGRESS" in every unit. Activities will increase your thinking and reasoning capacity as questions put in ACTIVITY are not directly derived from text. Hints on the answer to the short questions have been put under section "ANSWER TO CHECK YOUR PROGRESS" .Besides, a few text-related questions have been out in "POSSIBLE QUESTIONS/ MODEL QUESTIONS". These questions will help to draw your attention on the probable topics for the examinations so that you can prepare for the examination with confidence and determination.

# CONTENTS


| | | Page No. |
|---|---|---|
| **UNIT 1 :** | **LEARNING** | **5-42** |
| | Concept of learning, Theories of learning, Concept and application of mirror learning in the field of education, Experimental findings through mirror learning apparatus, Concept and application of maze learning in the field of education, Experimental finding through maze learning, Concept and application of mass and spaced learning in the field of education, Experimental finding through mass and space learning. | |
| **UNIT 2 :** | **MEMORY AND FORGETTING** | **43-76** |
| | Concept and definition of memory, Characteristics of memory, Types of memory, Measures and-techniques for effective memorization, Concept of recall and recognition, Application of recall and recognition in the field of education, Experimental findings through recall and recognition, Concept of immediate memory, Experimental finding through immediate memory span. | |
| **UNIT 3 :** | **ATTENTION** | **77-106** |
| | Meaning of attention, Characteristics of attention, Causes or determinants of attention, Types of attention, How can attention be sustained?, Concept of span of attention, Experimental finding through span of attention, Concept of span of apprehension, Experimental finding through span of apprehension, Concept of division of attention, Experimental findings through division of attention. | |
| **UNIT 4 :** | **PERSONALITY** | **107-122** |
| | Need and importance of personality test, Inkblot test, Thematic Apperception Test. | |
| **UNIT 5 :** | **MOTIVATION AND LEARNING** | **123-142** |
| | Concept and meaning of motivation, Theories of motivation, Experimental findings on the basis of level of aspiration, Experimental findings on the effect of knowledge of result on performance. | |
| **UNIT 6 :** | **PROBLEM SOLVING** | **143-164** |
| | Concept of problem solving, Types of problems, Obstacles in problem-solving, Different approaches to problem solving, Psychological experiment on problem solving. | |
| **UNIT 7 :** | **PSYCHOLOGICAL DRAWING AND LABELLING** | **165-174** |
| | Structure and Functions of the Human Brain, Structure and Functions of the Human Eye, Structure and functions of the Human Ear. | |

# UNIT 1: LEARNING

## UNIT STRUCTURE


1.1 Learning Objective

1.2 Introduction

1.3 Concept of Learning

1.4 Theories of Learning

1.5 Concept and application of Mirror Learning in the field of Education

1.5.1 Experimental findings through Mirror learning apparatus

1.6 Concept and application of Maze Learning in the field of Education

1.6.1 Experimental finding through Maze learning

1.7 Concept and application of Mass and Spaced Learning in the field of Education

1.7.1 Experimental Finding through mass and Spaced learning

1.8 Let Us Sum Up

1.9 Further Reading

1.10 Answer to Check Your Progress

1.11 Possible Questions


## 1.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- understand the concept of Learning
- acquire an understanding of different theories of learning
- identify what is mirror, maze and mass and space learning
- conduct experiment based on the concept of mirror, maze and mass and spaced learning

## 1.2 INTRODUCTION

As a learner of Education, you have been acquainted with one of the central concepts of behaviour,i.e, learning. In your previous semester, you have studied in detail about the theoretical concepts and different theories associated with learning. You all know that learning is the process

which brings enduring change in behaviour. The process of learning is shaped by various factors and variables. Diverse experiments have been conducted to find out the relationship between these variables and factors. In this unit, we will be dealing with practicability of learning through such experiments. Here, we will discuss how the process of learning actually takes place either with the assistance of apparatus or without apparatus.

## 1.3 CONCEPT OF LEARNING

Learning is the key process in the behaviour of human change. It begins from the time of birth and continues till death. It is a conscious as well as unconscious process in human life that becomes a part of daily life. The everyday activities and experiences enable all individuals to learn something new in life. It can be defined as a form of growth or change in a person which brings about a permanent change in the behavioural pattern of a person. Learning situations are most natural and common in life, and it involves new ways of doing things. For example, when a child touches a burning candle and gets burnt and he withdraws. Another time when he faces a burning thing he takes no time to withdraw himself away. He learns to avoid not only burning candle but also all burning things. Then we say that the child has learned that if he touches a flame, he gets burnt. This is learning. Experience and training are found to play a dominant role in moulding and shaping the behaviour of an individual from the very beginning. It is an active process. Every organism in this world is engaged in adopting itself to the environment with whatever original endowments it possesses. It is a process by which the individual acquires various habits, attitudes and knowledge that are necessary to the demand of life. Thus, learning identifies itself with change, modification and adjustment of individual throughout the whole life. People continue to change, modify and improve biological instinctive behavior to socially approved one in order to adjust in any situation. Crow and Crow defined learning as the acquisition of knowledge, habits and attitudes. It involves new ways of doing things and it operates in an individual's attempts to overcome obstacles or to readjust to new situations.

It represents progressive change in behaviour. It enables him to satisfy interests to attain goal.

Burns regards learning as a relatively permanent change in behaviour. Behaviour includes both observable activity as well as internal processes such as thinking, attitudes and emotions. On applying a novel idea, skill, knowledge, or based on experience in a problematic situation, an organism modifies his behaviour. This modification or change in behaviour which is more or less permanent and results due to the experience gained in the past is understood as learning.

Gardner Murphy opined that term learning covers every modification in behaviour to meet environmental requirements.

Psychologists have studied learning in a variety of ways, from examining the salivation of dogs in response to meat powder, to how rats press a lever in the pursuit of obtaining some kind of reward, to offering children rewards for doing what is asked of them, to examining how people are able to tie their shoe laces. Learning is the most essential component of human life. The child starts learning as soon as he comes in contact with the environment. Everyone come across this phenomenon in almost every walk of life.



**CHECK YOUR PROGRESS**

**Q 1:** State Burn's view on learning.

.....

.....

## 1.4 THEORIES OF LEARNING

In the previous semester, you have already come across the various laws and theories of Learning. We need no broad elaboration and discussion, still some of the important theories are briefly discussed here to get you acquainted so that you can easily comprehend the experiments done on

these theories.

- **THE THEORY OF CONNECTIONISM (E.L THORNDIKE):** Connectionism is a theory of learning which is based on the importance of the association of ideas. The famous psychologist E. L. Throndike (1974-1949) was the initiator of the theory of connectionisms. It is based on the concept that bonds or connections are formed between situations and responses. It is therefore known as the bond theory of learning. Thorndike opines that all learning is the formation of bonds or connection between Stimulus - Response (S-R). The process of forming connections depends on a number of variables which operate in the environment and the organism. In the words of Thorndike- "Learning is the establishment of bond between stimulus and response and it follows a mechanical process of blind trial and error". Thorndike also formulated his law of effect on this theory which implies that any action which produces satisfaction is likely to recur and any activity which produces dissatisfaction is less likely to recur in future. Hence, this theory emphasizes that the behavior begins with reflexes and natural responses and new behaviours result from the acquisition of new bonds through experience. Those factors which facilitate bond formation are frequency, recency, intensity, vividness, mood of the subject, resulting in satisfactions, and similarity of situations and capacity of the subject. This theory is also known as S-R theory. Throndike introduced the concept of reward in learning. This is also known as reinforcement. Responses which are followed by satisfaction or pleasure are reinforced and the organism is encouraged to repeat the responses again and again. As such, its connection strength increase and learning takes place. This theory is also known as the reinforcement theory of learning.
- **THE THEORY OF CLASSICAL CONDITIONING (IVAN PAVLOV):** The theory of classical conditioning in learning was developed by Russian Physiologist Ivan P. Pavlov (1849-1936). This theory maintains that learning is the result of conditioning of our natural, unlearned responses to some other stimulus. We make a natural response to stimulus in which there can be no question of learning taking place. Such natural

physical response, if connected to some other stimulus and then repeated again and again, may result in a new response or a new behaviour. Such a behaviour or response is called unnatural or conditioned response. This conditioned response is said to be the result of learning. Pavlov was basically interested in studying the process of gastric secretion in dogs. In 1890 Pavlov designed an apparatus that could measure how much a dog's mouth waters in response to food or other things in its environment. We know that salivation is the natural response to food when it comes in contact with the tongue. This response is immediate and does not require any consciousness or will. It may thus by call a reflex action. Pavlov noticed that the dog salivate in response in response not only to food but also to the sight or flavour of the food. He desired a series of experiments to determine the conditions under which it occurred. As a result of such experiments, a very important principle of learning has been established. It is known as classical conditioning theory of learning.

- **OPERANT CONDITIONING THEORY (B. F. SKINNER):** The Theory of operant conditioning was developed by B.F. Skinner (1904-1990) an American physiologist of Harvard University. It was a slight modification of Pavlov's conditioning theory. It maintains that response or behaviour of the organism in learning is not mechanical, passive, or involuntary, but active, purposive and goal oriented. Skinner had emphasized the fact that, "Behaviour operates in the environment to generate consequences". Our behaviour that generates in learning situation may called Operant rather than mere physical reflex behaviour occurring due to mechanical conditioning. Skinner conducted a series of experiments with rats, cats, monkeys and pigeons with a view to understanding the process of learning. He developed his own apparatus known as "Skinner box" and the method of observation to study and analyses behaviour in a systematic and objective way. The term 'operant' emphasizes the fact that behaviour operates upon the environment to generate its own consequences. It means that a response or behaviour

is not necessarily depends upon a specific known stimulus. It is more correct to think that a behaviour or response is dependent upon its consequences. Therefore, for training an organism to learn a particular behaviour or response, it may be initiated to respond in such a way as to produce the reinforcing stimulus. The individual's behaviour should get the new and or reinforcement and he should act in such a way that he is rewarded again and again. In other words, if the behaviour pays off, it is likely to be repeated. Therefore the learning process and the environment should be designed in such a way that it creates minimum frustration and the maximum satisfaction in a learner, with proper reinforcement for the desired training or learning.

- **GESTALT THEORY (LEARNING BY INSIGHT):** Gestalt theory is based on perception. It is another important cognitive theory of learning. According to Gestalt Psychologists, learning takes place neither as a result of trial and error nor as a conditioned response to a conditioned or artificial stimulus. Two Gestalt Psychologists Kohler and Koffka are of the view that all learning consists in perception of the total situation or whole by insight. This is also known as Theory of Insight. The Theory of learning by insight was introduced by the Gestalt psychologists. The basic idea of this theory is that a thing or a problem cannot be understood by the study of its constituent parts but only by the study of it as a totality or whole. To show what is meant by learning by insight, Kohler conducted several experiments on the learning process of Chimpanzees. He confined the Chimpanzee in one closed room with a bunch of banana hanging from above which cannot be reached. There were two sticks in the room which can be joined. At first the Chimpanzee vainly tried to get the banana aimlessly. After sometime, all of a sudden, it got an idea to fit one stick in the hole of another and dragged down the bananas. This occurred due to insightful learning in which the solution came to the mind as a sudden flash of light. Gestalt psychologists criticize the conditioning theory and the theory of connectionism and put emphasis on interrelation and interdependence of the aspects of

learning situation. The most important contribution of the Insight Theory is that it has given importance on inner psychological functioning such as perception, concept formation, problem solving etc.

- **FIELD THEORY OF LEARNING(KURT LEWIN):** Field theory of learning is propounded by German American Psychologist Kurt Lewin. According to the advocates of this theory, "Learning is the organization and reorganization of behaviour which result from many interesting influences on the developing organism acting in its shifting environment." According to this theory, the behavior of an individual is a function of interacting person in the total psychological environmental situation. This theory emphasized an individual's needs, personality, and motivating forces. This theory emphasizes the phenomenon of perception and organization.
- **GUTHRIE'S THEORY OF SUBSTITUTION:** This theory propounds that when an individual is performing activities due to the simulation of a stimulus then in future also the same stimulus will help in repeating the activity.
- **HULL'S THEORY OF REINFORCEMENT:** This theory was propounded by Clark, L. Hull, a professor from Yale University. This theory advocates that the essence of learning lies in what occurs between the stimulus and the response. In other words, the diminution in need reinforces the Stimulus-Response (SR) connections which are present at the time of diminution.
- **THEORY OF PURPOSIVISM (EDWARD TOLMAN):** This theory was propounded by Edward C. Tolman. This theory emphasizes the importance of purpose or goal in learning. Tolman's theory is also known as sign or cue learning. Tolman's theory emphasized the association between the stimuli rather than stimulus-response. He gave the concepts of approach, escape and avoidance.
- **SOCIAL LEARNING THEORY( ALBERT BANDURA):** Albert Bandura focused on the presence and influence of other people on the behaviour of an individual and group. According to this theory, we learn by observing another person's or model's behaviour. Reinforcement given to the

model while performing a particular behaviour, will increase the chances of behaviour being learnt and will be performed by the observer as well. Likewise, there is high probability of the behaviour being stopped by an observer if he finds out that the model has received reinforcement for exercising such behaviour.



**CHECK YOUR PROGRESS**

**Q 2:** Name the person who introduced the concept of reward in learning

.....

**Q 3:** "Behaviour operates in the environment to generate consequences". Whose statement was this?

.....

**Q 4:** What is the basic idea of Gestalt theory?

.....

**Q 5:** Who propounded of theory of purposivism?

.....

## 1.5 CONCEPT AND APPLICATION OF MIRROR LEARNING IN THE FIELD OF EDUCATION

So far, we have discussed about the concept and various theories of Learning. There are various practical and experiments which are conducted to make actual application of these theories of learning or how learning takes place as per the theories. One such is Mirror learning which concentrates on finding out the effect of distributive practices and study how learning takes place through trial and errors. The task has also been used as a classic experimental activity designed to illustrate the effects of learning in many undergraduate and post graduate laboratories for decades. More recently Psychologists like Goldstein, Hopkins and Strube (1994) used the task to demonstrate the observer. Although this activity is designed to provide students with an experience that will allow for comparison of the

task done by left and right hand, and this activity may also be used to illustrate the effects of distributive practice and effects upon the observer

**Application of Mirror Learning**

Mirror learning has so many educational implications. Its application does not restricts to the field of education only, it can also improve basic human interaction. There is no evolutionary advantage in having a mirror learning system, except for the ability to interact. Education is highly dependent on the proper functioning of mirror learning. The goal of teaching is to establish and improve the functionality of the parts of the brain and skills associated with them. There is evidence of the fact that empathy is directly linked to the mirror system, basic human interaction, understanding, intuition, social behaviour, relationships, and caring which in turn may develop from the mirror system. The psychological implications of mirror learning affect education as well. Teachers have been picking out students based on character traits for a long time, but there may be a better way of pinpointing students with specials skills or needs. With more advanced diagnostic tools that are more reliable, special classes could become more prudent. There may be classes for students with particularly developed mirror learning systems, and others for students with weaker mirror responses. Even if the classes remain mixed, it would certainly be beneficial for teachers to know more about their students' learning habits.

## 1.5.1 Experimental findings through mirror learning apparatus

**Experiment No 1.5.1.1**

**Title: Mirror Learning**

**Objectives:** To observe a typical learning through trial and error

**Hypotheses:** Trial and error procedure eliminates errors and leads to improvement in learning.

Apparatus and Materials: The apparatus and materials used for this experiment are-

a) Mirror drawing apparatus

b) Star pattern cards drawn in parallel line

c) One Stop Watch

d) Graph Paper

e) Other stationary

**Subject Information:**

Name: XYZ

Age: X

Sex: X

Educational Status: X

Time: X

Date: X

Place: X

**Description of the Apparatus**

The apparatus used in this experiment is called 'Mirror Drawing Apparatus'. It consists of a mirror which is vertically fixed on the far side of a wooden board. Direct observation of the board is prevented by a screen fixed at a height from the board so that it does not obstruct the movement of the subject's hand along the board. The star pattern is placed on the board fixed on it. Due to the presence of the screen the Subject can see the reflection of the star on the mirror. The Subject is required to trace the star with a stylus and the stylus is connected with an electric wire to the switch board. Every error of the Subject while tracing the star is indicated by a sound of a buzzer and at the same time error is also recorded.

The following diagram of a mirror drawing apparatus will help you to get acquainted with the apparatus-

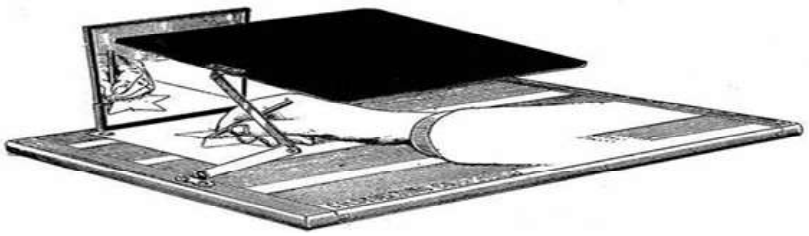


*Diagram 1.1: Mirror Drawing Apparatus*

*https://lh6.googleusercontent.com/proxy/aidHEViLa_V9FzXIp0bVXcT4hUALp1ye3QRFWL7-e8RAM8nX5FvDy1WNDVwCpf_1CkUdI-2UlR_u_JHRpEAu4aDCefQLrWNB4CiKIjPCpBQ=s0-d )*

**Procedure of the experiment:**

At the very outset the experimenter systematically arranges the necessary materials for the experiment. Star outlines are numbered from 1 to 10. After all arrangements, the Subject was invited and following instructions were given-

"This is a simple experiment. This is a Mirror Drawing Apparatus. Here in this apparatus you will see a star pattern on the mirror. It is the reflection of the star which is fixed on the wooden board. You cannot see the star directly because of the screen. Your task is simply to trace between the inner and the outer boundary of the star with the electrically connected stylus only by looking at the reflection on the mirror. You are not supposed to lift the stylus while drawing the star. Crossing the boundary will be treated as an error. Error will be calculated by the sound of the buzzer, so please try to concentrate to check errors. Do you understand? Can I start now?"

After getting a positive reply from the Subject the Experimenter started the experiment after giving a 'Ready' signal. The subject was requested to trace the star for 10 trials each time using a separate sheet bearing the star pattern. The sheets were numbered to indicate the order of the trials from the beginning to the end. Every time the Subject had to start at the same point. The Experimenter recorded the time to complete the star pattern.

The tracing the subject makes anti-clockwise movement, i.e., moves from right to left which reverses the usual movement from left to right. Since Subject learns to trace the star pattern while viewing reversed image in a mirror the familiar situation is altered, eye-hand co-ordination which runs counter to the previous smoothly working ones, must be formed). It is important for Subject to do only star tracing with his hand throughout the experiment and not to see his tracing hand except in the mirror. This will maintain proper controls and a constant set for all trials. At the end of experiment the experimenter thanked the Subject after taking the introspective report.

The Experimenter recorded the time (in seconds) taken by the Subject to draw the star pattern and also the number of errors made in the 10 trials. The Experimenter prepared a graph of Subject's learning- a time curve and an error curve. Time curve shows the change in time and error curve shows the number of errors from trial to trial.

The Experimenter also recorded the voluntary remarks by the Subject or any observed behavior, which indicates the Subject attitude, difficulties encountered and feelings from facial expression.

**Introspective Report**

"It is a very interesting experiment. To draw by looking at the reflection in the mirror was a difficult task. But with practice, trial after trial, I could draw it."

**Table-1.1**

**Record Sheet**

| Serial No | Time in Seconds | Errors | Remarks and Observation |
|---|---|---|---|
| 1 | 106 | 64 | Nervous |
| 2 | 70 | 24 | Nervous |
| 3 | 60 | 56 | Uneasy |
| 4 | 54 | 28 | Excited |
| 5 | 54 | 16 | Uneasy |
| 6 | 62 | 40 | Excited |
| 7 | 44 | 32 | Uneasy |
| 8 | 44 | 48 | Excited |
| 9 | 40 | 14 | Comfortable |
| 10 | 40 | 14 | Comfortable |
| 11 | 40 | 14 | Comfortable |
| 12 | 38 | 8 | Comfortable |

**Result of the Experiment**

The result of the experiment shown in Table I. Graphic representation of the errors and time taken in the 10 trials are also shown in Fig. 1.1

**Conclusion/Observation**

The experiment in mirror drawing illustrates what is perhaps the most fundamental and elementary method of learning like-learning by trial and error and elimination of errors. Mirror drawing helps to establish co-ordination between hand movement and the visual impressions reversed by the mirror. The gradual and irregular way in which such co -ordinations are established are seen from the curves of times and errors. The method of trial and error is especially characterized by this variability- gradually wrong movements are eliminated and the right co-ordinations set up. It is evident from the experiment that the Subject improved more rapidly as regards errors but did not reduce time so much. The result in the experiment shows that trial and error procedure eliminate errors and improves learning. As such the result of the experiment support our hypothesis.




Fig.1.1 Time and Error Curve

**Experiment No-1.5.1.2**

**Title:** Mirror drawing or cross education

**Objective:** To study transfer of skill from one musculature to

**Hypothesis:** Practice with right hand in mirror tracing influencethe level of performance of the left hand.

**Apparatus and Material used:**

(i) Mirror drawing apparatus

(ii) 32 star outline

(iii)Record sheet

(iv) Graph Paper

(v) Stationery

**Subject:** Name: XYZ

Age: X

Sex: X

Educational Status: X

Date: X

Time: X

Place: X

**Description of the Apparatus**

The apparatus used in the experiment in called 'Mirror Drawing Apparatus' (same as discussed in the first experiment). It consists of a mirror which is vertically fixed on the far side of a wooden board. Direct observation of the board is prevented by a screen fixed at a height from the board so that it does not obstruct the movement of the subject's hand along the board. The star pattern is placed on the board fixed on it. Due to the presence of the screen the Subject can see the reflection of the star on the mirror. The Subject is required to trace the star with a stylus and the stylus is connected with an electric wire to the switch board. Every error of the Subject while tracing the star is indicated by a sound of a buzzer and at the same time error is also recorded.

**Procedure of the Experiment:**

For this experiment, the experimenter invited the subject to the laboratory room and asked to sit in the chair and mirror drawing apparatus was presented in front of the subject. The following instruction was given to the subject-

"This is a stylus which you have to place in the starting point of the star pattern. On hearing the word "start" you have to start moving the stylus in the pattern of seeing it on the mirror. Taking care that you should not touch the inner and outer boundary of star pattern. As soon as you reach the end point your one trial will be completed. Do you understand?"

After getting confirmation from the subject the experiment was started. The subject was asked to make 3 attempts with the left hand. The experimenter recorded the error and time in seconds, with the help of a stop watch. After 1 minute rest the subject was asked to make another 10 trials with the help of right hand. In the same manner the time taken in each trial and mistakes were recorded. Then again after giving rest for 1 minute the subject was given another 3 trials with left hand. In the same manner error and time will be recorded.

**Precaution to be taken:**

In doing this experiment following precaution has to be taken care of:

- To enquire whether the subject is left handed or not.
- To develop quiet and calm environment in laboratory room.
- A stop watch should be used in a proper way.
- At least one minute rest should be provided to the subject for each trial.

**Introspective report:**

"The experiment is very interesting one. It is quite difficult to draw with left hand. But after a number of trials it becomes easier for me."

**Table 1.2**

**Record sheet**

| | Number of trials | Time taken in seconds | Errors | Hand | Test |
|---|---|---|---|---|---|
| Phase I (Initial) | 1<br>2<br>3 | 60<br>75<br>59 | 23<br>20<br>11 | LEFT | Initial test or pre-test |
| Phase II (Practice) | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10 | 44<br>38<br>36<br>30<br>30<br>27<br>25<br>28<br>24<br>23 | 8<br>6<br>4<br>4<br>7<br>5<br>3<br>4<br>1<br>0 | R<br>I<br>G<br>H<br>T | P<br>R<br>A<br>C<br>T<br>I<br>C<br>E |
| Phase III (Final) | 1<br>2<br>3 | 42<br>40<br>36 | 9<br>7<br>4 | LEFT | Final test or post-test |

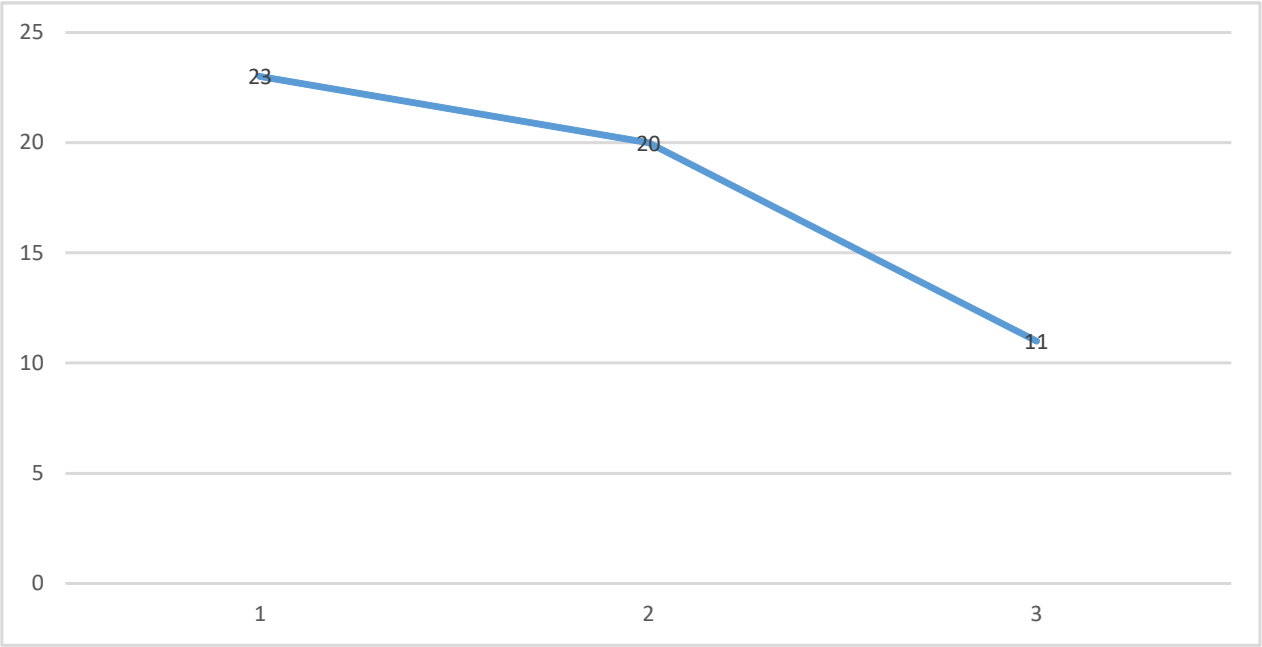



Figure 1.2: Graphical representation of Errors by left hand in initial Test

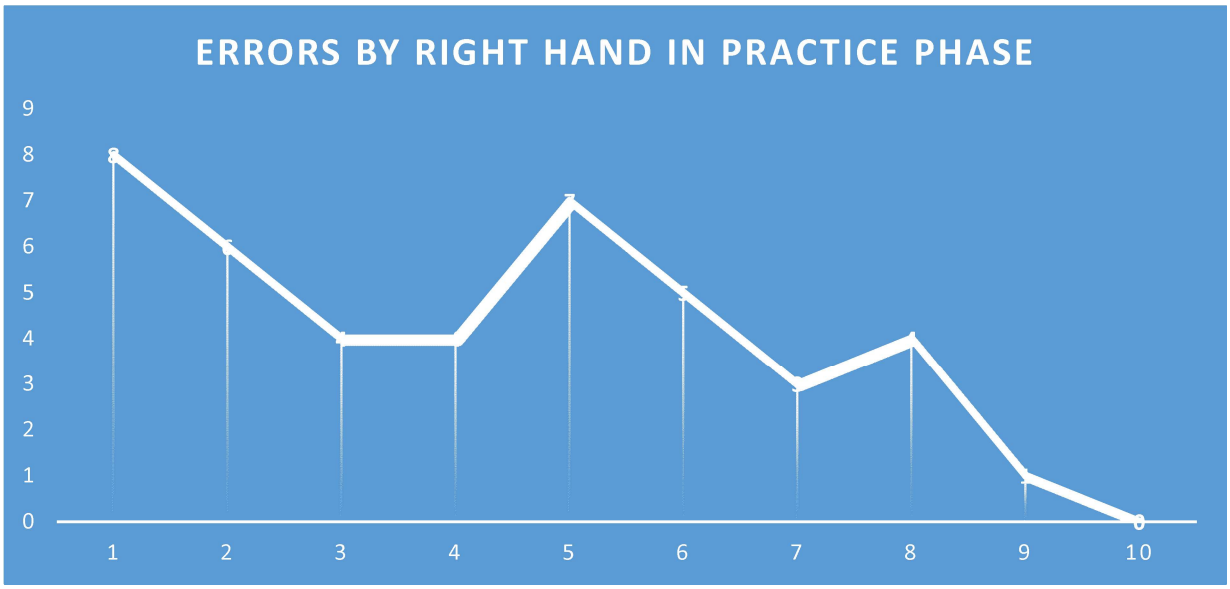



*Figure 1.3: Graphical representation of Errors by right hand (practice)*

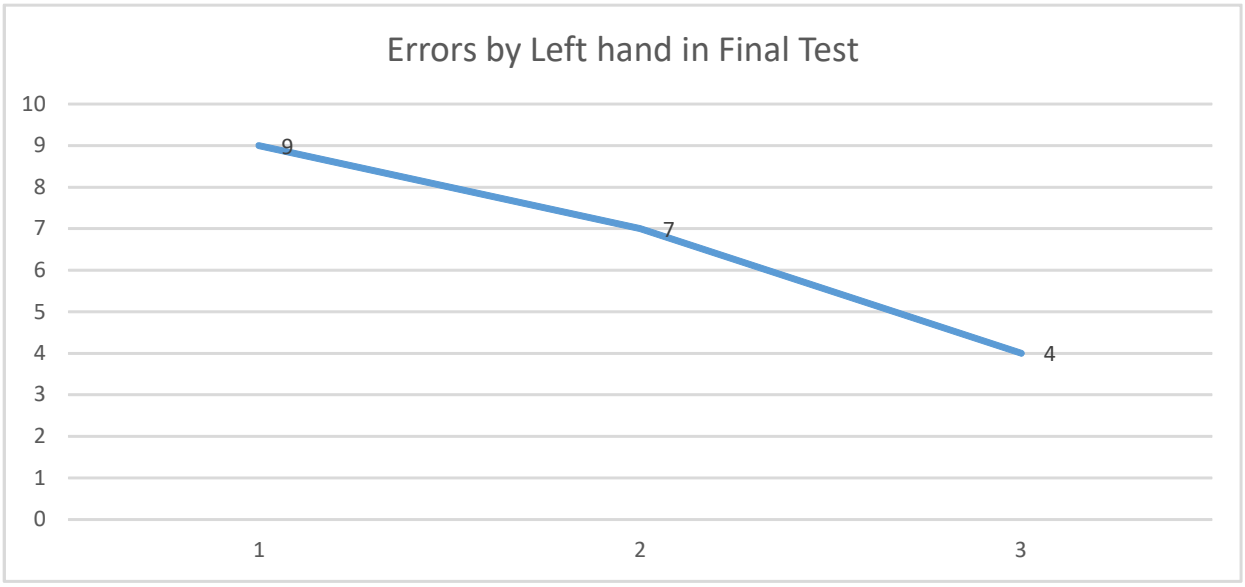



*Figure 1.4: Graphical representation of Errors by left hand in final test.*

**Result:**

The result of the experiment is explained in the following table 1.3. By comparing the errors, that is comparing the difference between the average of trials and the average for trials for the unskilled hand with the difference between the corresponding averages of trials with skilled hand.

**Table 1.3**

**RESULTSHEET**

| MEAN | INITIAL TEST | FINAL TEST | DIFFERENCE |
|---|---|---|---|
| Time | 194/3 = 64.66 | 118/3 = 39.33 | 64.66-39.33 =25.33 |
| Error | 54/3 = 18 | 20/3 =6.67 | 18-6.67 =11.33 |

**Observation:**

After careful observation it is clear that there are some differences between pre-test and post-test. In this experiment there are 3 phases. In 1st phase, the subject took highest time as 75 seconds and made highest 23 errors as he have to do this task with the left hand. In the 2nd phase, the subject practices 10 trials with the right hand where highest time is 44 seconds and lowest time is 23 seconds. And in the 3rd phase it is observed that time taken by the subject is decreasing to 36 seconds and errors also minimized to 4 errors when the subject again done this phase with left hand.

Again in the result sheet the mean of time in initial test is found as 64.66 and in final test it is 39.33 and the calculated difference is 25.33. On the other hand the mean of error for the initial test is found as 18 and for the final test it is 6.67. So, the calculated difference is 11.33. Thus, we can easily concluded by observing the mean differences of time and error that learning by mirror drawing apparatus with right hand facilitate the learning by left hand and thus the hypothesis can be proved.

**Note**

Habits interference is bound up with the question of transfer of training. The three possibilities are---

1. One habit facilitates the acquisition of another (positive transfer)
2. A habit inhibits the formation of a new one (negative transfer of interference)
3. A habit shows neither positive nor negative transfer to the new situation.

## 1.6 CONCEPT AND APPLICATION OF MAZE LEARNING IN THE FIELD OF EDUCATION

Maze learning is the process of learning a route (typically by rats or mice) through a maze in order to obtain reinforcement. This process is a popular experiment in psychology laboratory and it is the main method of studying spatial learning. When the rat makes its way through the entire maze it is rewarded with food. Psychologists have also studied maze learning in human subjects, usually students. A typical maze experiment on students consists of tracing finger mazes while blindfolded, according to the Online Psychology Laboratory was conducted. This type of maze experiment was first conducted in the early 1930s, and computerized variations of the same are still used today

Maze learning helps the teachers to explore the minds of every student in the classroom learning. It helps the teachers to know about their behavioral aspect and helps to detect their cognitive and emotional areas too. It helps in the use of sensory integration movement processes with students with academic and behavioral deficiencies who do not receive special education services. Rats have been used in experimental mazes since the early 20th century. Thousands of studies have examined how rats run through different types of mazes, from T-mazes to radial arm mazes to water mazes. These maze studies are used to study spatial learning and memory in rats. Maze studies helped uncover general principles about learning that can be applied to many species, including humans. Today, mazes are used to determine whether different treatments or conditions affect learning and memory in human beings or not, and even in rats

This is the kind of maze everyone thinks of when they think of rats and mazes. The maze consists of a large platform with a series of vertical walls and a transparent ceiling. The rat starts in one location, runs through the maze, and finishes with a reward in another location. How many trials does it take for a hungry rat to run the maze to the food rewarded at the end with no mistakes? How quickly does the rat complete the maze each time? Does the rat get faster over multiple trials? Over time, rats tend to run the

maze with fewer and fewer errors, more quickly. By graphing the number of errors over time, you can generate a learning curve for the rats.



**CHECK YOUR PROGRESS**

**Q 6:** What is Mirror learning?

.....

.....

**Q 7:** What is Maze learning?

.....

.....

## 1.6.1 Experimental finding through Maze learning

**Experiment No-1.6.1.1**

**Title:** Maze Learning by Punch Board

**Objective:** To determine whether learning time and error decrease with increase in the number of trials

**Hypothesis:** Learning time and error decreases with increase in the number of trials.

**Apparatus and Material Used:**

(i)Punch Board Maze

(ii)Stop Watch

(iii)Screen

(iv)Newspaper

**Subject :** Name: XYZ

Age: X

Sex:X

Educational Status:X

Date:X

Time:X

Place: X

**Description of the Apparatus Used**

A maze presents one or more choice points where there are alternative paths and typically one path leads into a blind alley while the other leads to a goal box. The maze apparatus used in this experiment is the 'Punch Board Maze'. It consists of two pieces of wooden boards, upper and lower of identical size. The upper pieces has drilled into it ten to twelve rows of holes, each row consisting of three holes, in addition there is a single hole at the top and another at the bottom. For one hole of each row in the upper piece there is a hole in the corresponding position in the lower piece randomly distributed over its surface. Each one of the top and bottom holes too have a hole in the corresponding position in the lower piece. For each trial a newspaper is placed under the upper piece and subject is required to insert a pencil, starting with the top hole, in the hole of each row that has a corresponding hole in the lower piece.

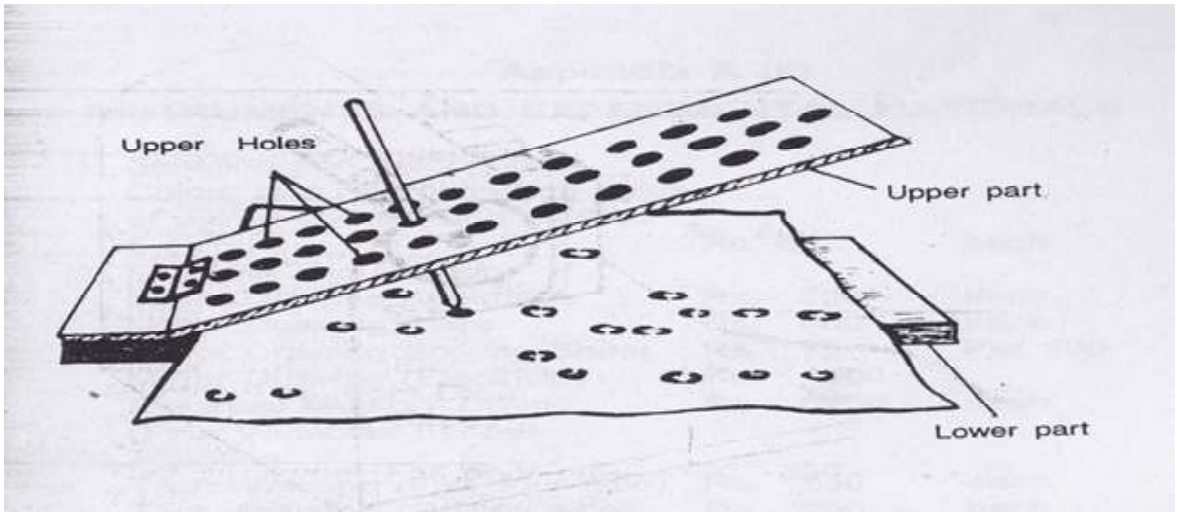



**Diagram 2: Punch Board**

**Source:** https://th.bing.com/th/id/R.ab3a5a730f00d3f74c3e5d589d634991?rik=6lrb0FijSacepw&riu=http%3a%2f%2fwww.csjaintti.com%2fimages%2fphotos%2fc2.jpg&ehk=MQ9CuolWcMX7e%2ft13Ol4Ibz%2bo3SqdAzDJuclULU%2bAOM%3d&risl=&pid=ImgRaw&r=0&sres=1&sresct=1

**Procedure**

The experimenter, after making necessary preparation for the experiment invited the subject and asked the subject to be seated and be comfortable. The Experimenter gave the following instructions-

"This is called a Punch board Maze. It consists of two pieces of wooden board, upper and lower. There are ten rows of holes, each row has 3 holes. There is also a single hole in both the upper and lower part. For every trial a sheet of newspaper will be placed under the upper piece. Your task is to insert your pencil, starting with the top hole. Remember, in each row only one correct point. Each Trial will finish when you reach the bottom hole and insert your pencil therein. You will never be given opportunity of looking at the lower piece. If you hit the correct hole, your pencil will pierce through the paper and pass into the lower piece, otherwise the pencil would only make a mark on the newspaper. For each trial, I will give you a start signal and you move the pencil. Have you understood?"

With this instruction the Experimenter started the experiment. Stop watch was used to record the Subject time. After completing the experiment the Subject introspective report was taken.

Next to it, the Experimenter found out the error score from the newspaper in which the subject marked in all the 12 trials. The time score was also recorded and calculated. No. of errors and time taken are presented through graph.

**Introspective Report**

"I found the experiment very interesting I tried my best to follow the instructions that were given by the experimenter. At the start I committed a number of errors. I made attempt to the more careful and succeeded in gradually eliminating the errors with passage of time in the subsequent attempts."

**Table No- 1.4**

**Record sheet**

| Number of Trials | Number of Errors | Time taken in Seconds |
|---|---|---|
| 1 | 12 | 42 |
| 2 | 09 | 40 |
| 3 | 11 | 38 |
| 4 | 08 | 33 |
| 5 | 07 | 28 |
| 6 | 04 | 25 |

| | | |
|---|---|---|
| 7 | 03 | 19 |
| 8 | 02 | 17 |
| 9 | 01 | 14 |
| 10 | 00 | 15 |
| 11 | 00 | 12 |
| 12 | 00 | 06 |
| | | Total-289 seconds |

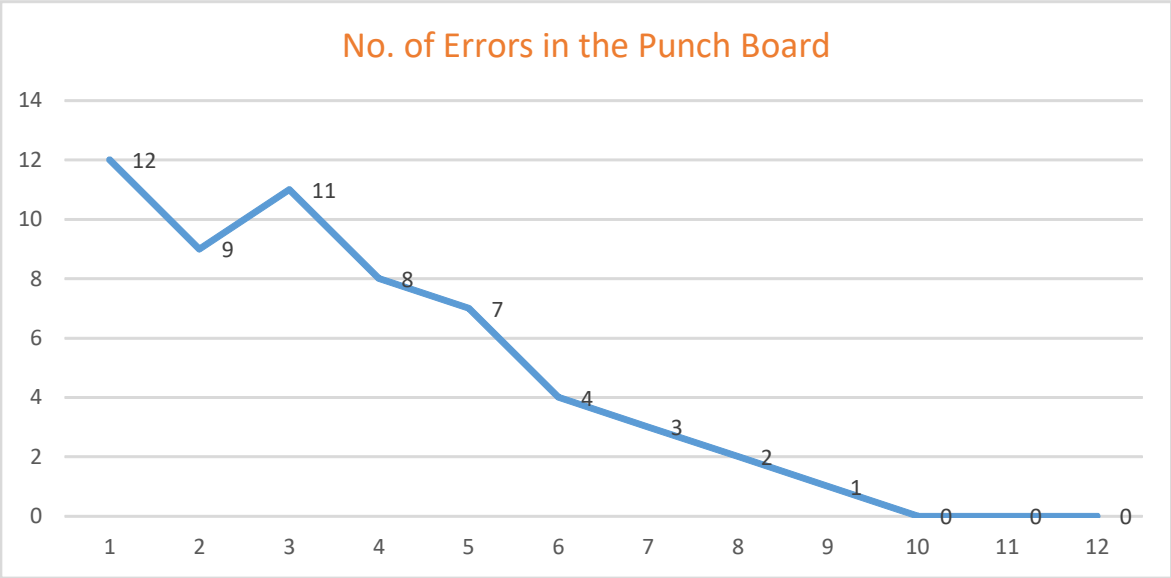



*Figure1.5: Graphical representation of No. of errors in Punch Board Maze learning*

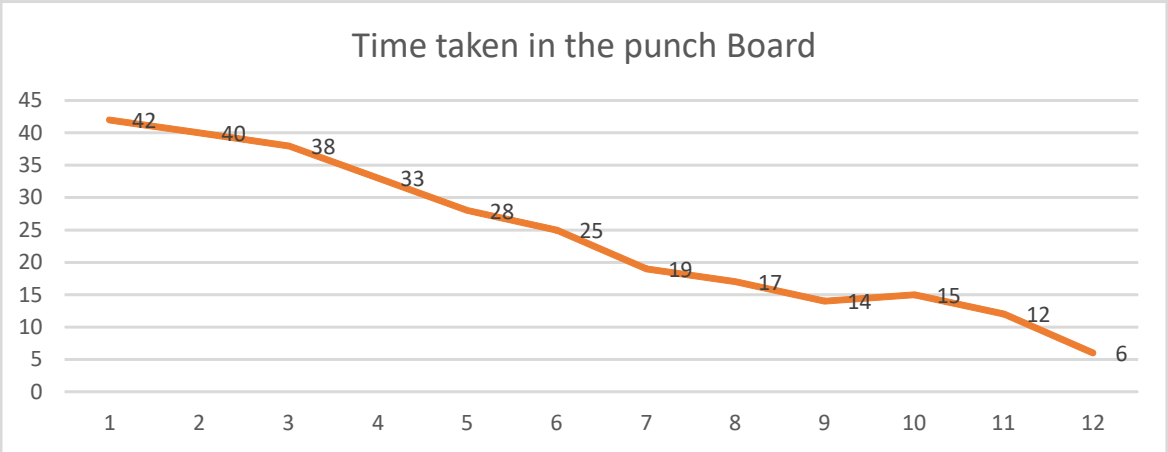



*Figure 1.6: Graphical representation of the time taken in Punch Board Maze Learning*

**Results**

The results of the experiment are shown in Table No 1.4. The error curve and time curve are also graphically represented in Figure 1.5 and Figure 1.6

**Observation**

Maze learning is a sensory motor type of learning. From the experiment it is evident that the subject made 3 errorless trials in the 10th, 11th and 12th trials. The maze was learned in total 289 seconds. Almost every subsequent trial required less time and every subsequent trial involved fewer errors by the subject. Therefore it is evident that practice is helpful in maze learning and learning time error decrease with increase in the number of trials, which supports our hypothesis.

**Experiment No-1.6.1.2**

**Title:** Human Maze Learning

**Objective:** To examine whether practice improves human learning

**Hypothesis:** Practice improves human learning more effectively.

**Apparatus and Material Used:** The apparatus and material used include-

(i)Punch Board Maze
(ii)Stop Watch
(iii)Graph Paper
(iv) Sheets of paper (numbered)
(v) Stationery

**Subject :** Name: XYZ
Age: X
Sex: x
Educational Status: X
Date: X
Time: X
Place: X

**Description of the Apparatus Used**

Description of the Punch Board Maze is already given in the previous experiment.

**Procedure**

After making all necessary arrangements for the experiment, the Experimenter invited the subject and asked the subject to be seated. The following instructions were given-

"This is called Punch board maze. It consists of two pieces wooden board, upper and lower. There are 10 rows of holes, each row consist of 3 holes. There is a single hole in both the upper and lower part. For every trial a sheet of paper will be placed under upper piece. Your task is to insert your pencil, starting with the hole. In each row there is only one correct point. Each trial will end when you reach the bottom hole and insert your pencil therein. You will not be given opportunity to look at the lower piece. If you insert in the correct hole, your pencil will pierce, otherwise the pencil will only make a mark on the paper. For each trial I shall give you a ready signal and you move the pencil. Have you understood?"

It is important to note here that, this experiment include 20 trials, 10 order trials and 10 reverse trials which were taken alternatively. After getting a positive reply from the Subject the Experimenter started with the experiment. Twenty trials were taken in the same procedure, order and reverse. Time taken was recorded with a stop watch. On the completion of the experiment the experimenter thanked the Subject for cooperating.

The Experimenter found out the errors committed by the Subject in all the 20 trials from the paper in which the Subject marked. The time in seconds were also computed separately for both order and reverse trials.

For clarity the data was graphically represented in Fig. 1.7 representing the number of errors in order and reverse trials X axis represented the number of trials and Y axis represented the number of errors Fig.1.8 represented the time in seconds in both order and

reverse trials.

**Introspective Report**

"At the beginning I found it difficult, but with more trials it become easier, as I discovered that I could solve it. I noted that gradually my errors were being reduced and I became aware of the right path I tried to keep in mind the wrong path which I avoided."

**Table No 1.5**

**No of Errors and time taken in order and reverse**

| No of Trials | No of Errors | | Time in Seconds | |
|---|---|---|---|---|
| | Order | Reverse | Order | Reverse |
| 1 | 11 | 8 | 30 | 30 |
| 2 | 6 | 9 | 27 | 24 |
| 3 | 6 | 5 | 20 | 25 |
| 4 | 4 | 2 | 22 | 17 |
| 5 | 4 | 4 | 20 | 30 |
| 6 | 6 | 4 | 30 | 17 |
| 7 | 2 | 3 | 18 | 23 |
| 8 | 4 | 5 | 22 | 22 |
| 9 | 4 | 5 | 20 | 18 |
| 10 | 2 | 3 | 20 | 22 |

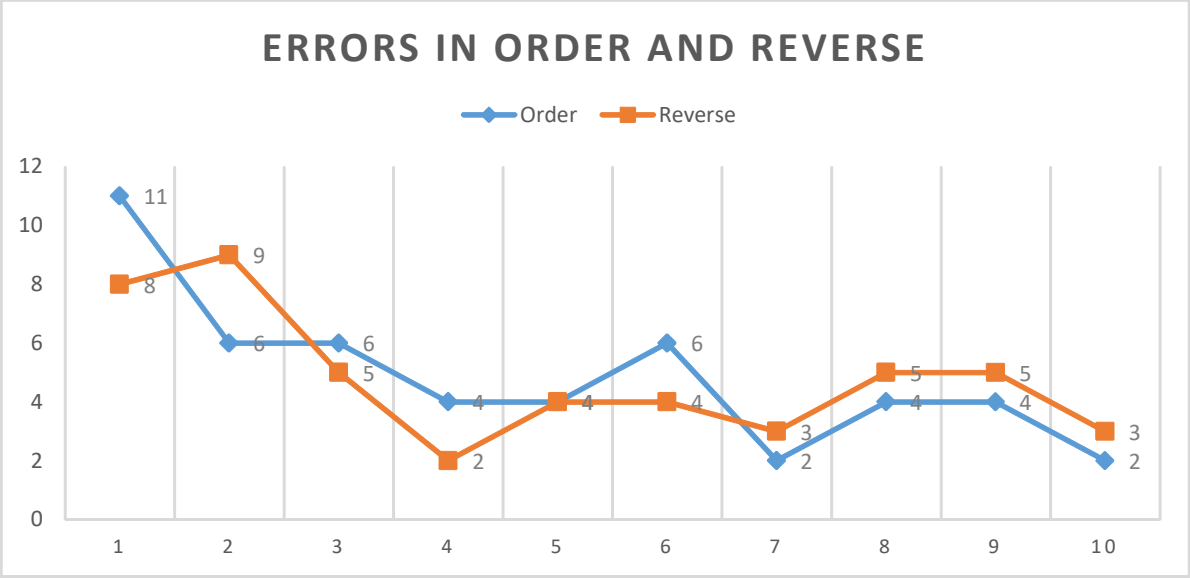



*Figure: 1.7 Graphical representation no of errors in order and reverse trials in Human Maze Learning*

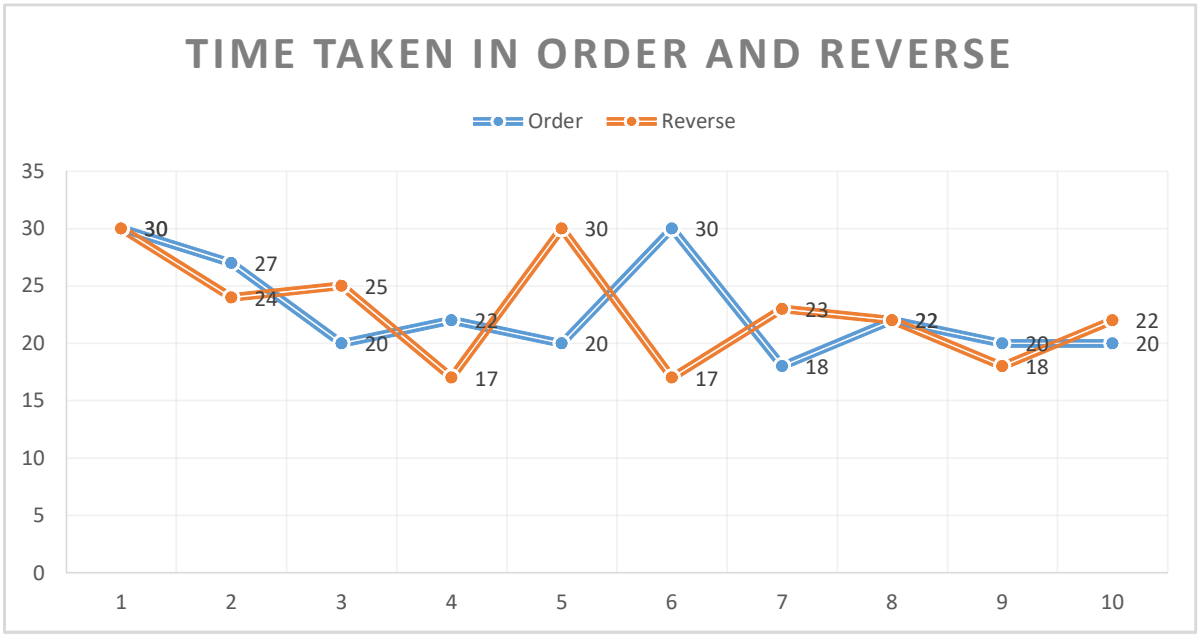



*Figure: 1.8 Graphical representation of the time taken in order and reverse trials in Human Maze Learning*

**Result**

The result of the experiment are shown in Table No 1. 5, Figure 1.7 and 1.8 depict the error and time taken in order and reverse trials.

**Observation**

It is observed from the result of the experiment that Subject committed 11 errors and took 30 seconds in the first order trial. But gradually the errors were eliminated. In the 10th trial the error was only 2. Similarly in the reverse trial also, the Subject made 8 errors and took 30 seconds in the first trial which gradually decreased to only 3 in the 10th trial. It proves that practice helped the Subject to find out the right path. As such, we can retain our hypothesis that practice improves human learning more effectively.

## 1.7 CONCEPT AND APPLICATION OF MASS AND SPACED LEARNING IN THE FIELD OF EDUCATION

**Mass Learning:**

We know that in cognitive psychology practice is most effective, researchers tell us that there are two main ways that students study. The first is called massed practice, which describes studying that is done less frequently, but for large periods of time. Massed learning or practice involves repetitive and uninterrupted practice of a particular skill-based activity over many hours. Massed practice is the opposite of spaced learning. With massed practice, students practice an activity numerous times with practically no breaks. Cramming is an example of massed practice. Massed practice involves studying the material in mass.

**Spaced Learning:**

When training sessions are distributed over time, it is known as spaced learning. It is opposite to mass learning. Spaced learning is spaced out by rest periods such as piano lessons every few days for a year. Spaced learning is also known as distributed practice. It refers to the theory that practicing at regular intervals is more effective that practicing all at once. For example, practicing to drive a car for ten minutes per day over 10 days (100 minutes) is more effective that practicing for 100 minutes non-stop. Distributed practice or spaced learning describes a more spaced-out method, where one can study in intervals over time. Students who rely on distributed practice are much more likely to retain the information beyond the date of the exam, which can help with future classes and with their careers. Overall, distributed practice correlates to a much higher academic success rate.

**Application of mass and spaced learning in the field of education**

Massed practice can be used initially to achieve a certain level of skill. It can then be followed by spaced learning to encourage long-term, continual improvement and retention. Massed practice can be used when

students don't expect to use the skill or knowledge again in the future. Massed practice may be effective for tasks that have clearly defined goals and no need to learn beyond that goal.

For teachers, the most important take-out is that learning spaced out over time is an effective teaching strategy. Teachers can take advantage of spaced learning by planning multiple revision points throughout a program. For example, students in a science class should briefly revisit previous topics on a regular basis, particularly in the lead-up to exams. Similarly, teachers concerned with reading and writing can revisit high- incidence words or common words on a weekly basis. By using spaced learning, teachers ensure that previous learning is not forgotten and that it is committed to long-term memory. Thus, it has a great applicability in the field of education.

### 1.7.1 Experimental finding through mass and spaced learning

**Experiment No: 1.7.1.1**

**Title:** Learning Effects under Mass and Spaced Learning

**Objective:** To demonstrate the difference in rate of learning under mass and spaced learning.

**Hypothesis:** Learning will be faster and with lesser errors when it is spaced than when mass learning is done.

**Apparatus and Material Used:**

(i) Two Lists of twelve (three-letter) nonsense syllables

(ii) Memory Drum

(iii) Stop Watch

(iv) Two sheets of paper, pencil, eraser,

(v) Data recording sheets.

**Subject:** Name: XYZ

Age: X

Sex: X

Educational Status: X

Date: X

Time: X

Place: X

**Description of the material:**

Two lists of 10 nonsense syllables each are to be of an equal level of difficulty. The standard exposure device for verbal materials is the memory drum. This device consists of a drum mounted behind a screen. A strip of paper on which the syllables are printed is fastened around the drum. The drum is driven by a constant-speed motor and exposes each syllable for a short period of time (usually 2 seconds) through a window in the screen. If a memory drum is not available, the syllables may be printed on cards and presented manually. Since rate and length of exposure are of great importance, manual presentation must be carefully timed.



**Photo Source:**

https://utsic.utoronto.ca/wp-content/uploads/2013/04/2013_psy_146%20(4%20of%205)-1024x737.jpg

**Experimental Design:**

**Independent variable:** Massed and spaced presentation of the learning material

**Dependent variable:** the time taken to learn the material and the number of errors made.

**Procedure:** For this experiment, the method of anticipation should be used. The subject is asked to seat in front of the drum. The experiment will be conducted in a calm and quiet environment.

The stopwatch should be used to carefully and accurately record the time taken to master the lists. After each attempt one minutes rest will be given. The list of nonsense syllables should be of equal difficulty level. During the rest interval for the spaced learning the subject will be asked to identify colors so as to ensure that they do not rehearse the list. It is essential that the procedure be quite clear to the subject before the experiment begins.

Hence, the subject will be given the following instructions:

"This is a learning experiment. A series of nonsense syllables will be shown to you through the window in this screen (experimenter points to memory drum). A nonsense syllable is a combination of three letters without any meaning. I want you to look at these syllables carefully. After the list has been presented once, the syllables will be shown again, but this time it will be your task to anticipate each syllable, that is, to spell it out before it appears in the window. When a simple geometric design such as a square or triangle marking the beginning of the list appears, you are to spell out the first syllable. When the first syllable appears, you are to spell out the second, and so on through the entire list. Remember your task is to spell out each syllable before it appears in the window. We shall continue this procedure until you have spelled out each syllable correctly on the same trial."

When the procedure has been fully clarified, the memory drum is started. The rate at which the syllables appear depends on their spacing on the drum. Presentation at 2-second intervals is customary. Presentation of the list is continued until the criterion is reached. The experimenter may, of course, choose a different criterion (a less exacting one like seven correct anticipations or a more exacting one like three errorless trials) and modify the instructions accordingly.

**For Mass Learning,** the presentations of the list follow each other in close succession. An interval of 6 seconds between trials would constitute massed practice.

**For Spaced learning** rest intervals are introduced between successive presentations of a list. For this experiment, a rest interval of 2 minutes will be kept. It is important to control the subjects' behavior during the rest intervals so that they do not rehearse the list, and in effect, mass his/her practice. The best way to control the rest interval is to require the subject to perform a task which does not leave him/her any time to rehearse the syllables. For example he/she may be asked to name a series of colors which appear in the window of the memory drum. Other tasks may be used, but the experimenter must make reasonably sure that the subject does not use the rest period for rehearsal.

**Orders of conditions:** One of the purposes of the experiment is to compare performance under massed and space learning. To obtain the necessary data, it is possible: (1) to divide the members into two groups, one of which works with space, the other with mass learning; or (2) to have each learner work under both conditions. If the second of these alternatives is chosen, it is, of course, necessary to use two different lists of approximately equal difficulty.

Each of the two lists should be used equally often in mass and in space learning. Thus, differences in difficulty between the two lists will affect the two methods of practice to an equal extent and presumably cancel out. Furthermore, half the subjects should start with mass learning, the other half with space learning. This balance sequence of conditions will allow both methods of practice to benefit equally from experience and possibly to suffer equally from the effects of fatigue and boredom. The total experimental design is summarized in the accompanying table.

**Scoring procedure:** The number of errors committed and the time taken in each attempt will be recorded in a tabular form.

**Table 1.6**

**Experimental Design**

| | **Mass Learning** | | **Spaced Learning** | |
|---|---|---|---|---|
| Order of Conditions | First | Second | First | Second |
| List A | Group 1(2) | Group 4(2) | Group 3(2) | Group 2(2) |
| List B | Group 2(2) | Group3(2) | Group 4(2) | Group 1(2) |

Throughout the experiment, a careful record must be made of each individual attempt at anticipation. A typical record sheet will look somewhat as shown in the accompanying tabulation.

**Table 1.7**

**Recording Data of an Individual (Mass Learning)**

| **List A** | **Trial Number** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Syllables** | **1** | **2** | **3** | **4** | **-** | **-** | **-** | **-** | **-** |
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*Similarly for spaced learning, table can be made to record the data.*

**Table 1.8**

**Number of Trials to Reach the Criterion by Group of Mass Learning**

| | **List A** | **List B** | **List B** | **List A** |
|---|---|---|---|---|
| No. of trials | Group 1 | Group 2 | Group 3 | Group 4 |
| Sample 1 | | | | |
| Sample 2 | | | | |
| Average no. of trials | | | | |

**Table 1.9**

**Number of Trials to Reach the Criterion by Group of Spaced Learning**

| | **List A** | **List B** | **List B** | **List A** |
|---|---|---|---|---|
| No. of trials | Group 1 | Group 2 | Group 3 | Group 4 |
| Sample 1 | | | | |
| Sample 2 | | | | |
| Average no. of trials | | | | |

**Table 1.10**

**Comparison between Mass Learning and Spaced Learning**

| | **Mass Learning** | | **Space Learning** | |
|---|---|---|---|---|
| | List A | List B | List B | List A |
| | Group 1 & 4 | Group 2 & 3 | Group 3 & 2 | Group 4 & 1 |
| No. of trials | | | | |

On each trial, and for each syllable, correct indications are indicated by a check mark, incorrect ones by a cross. In this manner, an accurate picture of the temporal trend of learning can be obtained.

**Result and Analysis:**

The late of learning tinder mass and spaced learning are first compared. For each subject the number of trials required to reach the criterion is found out. The mean number of trials to criterion is then determined for the two conditions. Our expectation on the basis of previous experimental results is that the criterion is reached in fewer trials with space than mass learning. To show the difference in the rate of acquisition, learning curves showing number of correct anticipations for successive trials should be plotted.

**Table 1.11**

**Correct Anticipations for Successive Trials**

| | **Mass Learning** | | | | | | | | | **Spaced Learning** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Group 1,2,3,4 | | | | | | | | | Group1,2,3,4 | | | | | | | | |
| Trials | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Average No. of correct answers per trial | | | | | | | | | | | | | | | | | | |

For learning curves showing mass and spaced learning, total number of correct responses per trial taken by 8 samples in group 1, 2, 3, and 4 is divided by 8, and average number of correct responses per trial is plotted on the curve for mass and space learning.

**Discussion/Observation:**

The findings of the experiment will have to be related to the earlier studies on this topic. The reasons for either accepting or rejecting the hypothesis will have to be discussed. Implications for everyday learning can be spelt out.

**Conclusion:**

The conclusion would be either in terms of accepting or rejecting the hypothesis.

**Introspective Report:**

Here the experimenter will ask the subject to give his/her experiences during the experiment in terms of difficulties, boredom, motivation, emotions, feelings and distractions.

**Appendix:**

**List A:**

WUB, MIQ, FAJ, LOR, ZEL, HOS, TIK, RAV,NUZ, DOP, KEM, VIF

**List B :**

FAQ, RUL, SIJ, ZOK, PEM, FUY, WAB, NIZ, JOD, CEK, GUH, XIQ



## 1.8 LET US SUM UP

- The Theory of operant conditioning was developed by B.F. Skinner (1904-1990) an American physiologist of Harvard University.
- According to Gestalt Psychologists, learning takes place neither as a result of trial and error nor as a conditioned response to a conditioned or artificial stimulus.
- Field theory of learning is propounded by German American Psychologist Kurt Lewin
- Hull's theory advocates that the essence of learning lies in what occurs between the stimulus and the response.
- According to social learning theory, we learn by observing another person's or model's behaviour
- Mirror learning concentrates on finding out the effect of distributive practices and study how learning takes place through trial and errors.
- Maze learning is the process of learning a route (typically by rats or mice) through a maze in order to obtain reinforcement.
- Massed learning or practice involves repetitive and uninterrupted practice of a particular skill-based activity over many hours
- Spaced learning is spaced out by rest periods such as piano lessons every few days for a year. Spaced learning is also known as distributed practice.
- We understood how learning takes place through mirror drawing apparatus. It has been found from the experiment that the procedure of trial and error helps in improvement of human learning. Besides the second experiment which has been conducted through the apparatus proves that practice makes human learning more effective.
- By the experiment of human maze learning we can also understand that human learning can be more effective through practice. Both the

experiment conducted by the apparatus punch board maze it has been very clearly proved.

- Experiment on mass and spaced learning helps us to know that Learning will be faster and with lesser errors when it is spaced than when mass learning is done.



## 1.9 FURTHER READING

1) R.S. Woodworth: Experimental psychology.
2) S M Mohsin: Experiments in Psychology.
3) Saikia Rasul Lutfun(2018): Psychological and physiological Experiments in Education.



## 1.10 ANSWER TO CHECK YOUR PROGRESS

**Answer to Q. No 1:** Burns regards learning as a relatively permanent change in behavior. Behavior includes within it both observable activity and internal processes such as thinking, attitudes and emotions.

**Answer to Q. No 2:** Throndike introduced the concept of reward in learning

**Answer to Q. No 3:** Skinner stated that Behaviour operates in the environment to generate consequences.

**Answer to Q. No 4:** The basic idea of Gestalt theory is that a thing or a problem cannot be understood by the study of its constituent parts but only by the study of it as a totality or whole.

**Answer to Q. No 5:** Edward C. Tolman was the profounder of theory of purposivism.

**Answer to Q. No 6:** Mirror learning concentrates on finding out the effect of distributive practices and study how learning takes place through trial and errors.

**Answer to Q. No 7:** Maze learning is the process of learning a route (typically by rats or mice) through a maze in order to obtain reinforcement. This process is a popular experiment in psychology laboratory and it is the main method of studying spatial learning.



## 1.11 POSSIBLE QUESTIONS

**Short Questions** (Answer each questions in about 150 words)

**Q 1:** Define learning.

**Q 2:** Briefly discuss some of the theories of learning

**Q 3:** Distinguish between mass and spaced learning

**Long Questions** (Answer each questions in about 300-500 words)

**Q 1:** 'Learning by mirror drawing apparatus improves the learning habit of every learner'. Do you agree with the statement? If yes, prove it by conducting an experiment on it.

**Q 2:** What is the applicability of maze learning in the classroom teaching? With the help of a simple experiment using the apparatus show how a teacher can apply the maze learning to know the mental ability of the learner.

*** ***** ***

# UNIT 2: MEMORY AND FORGETTING

## UNIT STRUCTURE


2.1 Learning Objectives

2.2 Introduction

2.3 Concept and-Definition of Memory

2.3.1 Characteristics of Memory

2.3.2 Types of Memory

2. 3.3 Measures and Techniques for Effective Memorization

2.4 Concept of Recall and Recognition.

2.4.1 Application of Recall and Recognition in the Field of Education

2.4.2 Experimental Finding through Recall and Recognition

2.5 Concept of Immediate Memory

2.5.1 Experimental Finding through Immediate Memory Span

2.6 Experimental finding through Retroactive and proactive Inhibition

2.7 Let Us Sum Up

2.8 Further Reading

2.9 Answer to Check Your Progress

2.10 Possible Questions


## 2.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- Define memory
- Analyse different types of memories, its characteristics
- Visualize how recall and recognition test can help in memorization of a learner
- Analyse how immediate memory is helpful for a learner in the process of remembering
- Analyse how memory and forgetting take place in a hum an being

## 2.2 INTRODUCTION

This unit deals with the concept of memory, its different types how

it can be improved. When you finish reading this unit you will be able to analyze that recall and recognition are important for memorization on the part of the learner. This unit will also help you to understand how recall and recognition are the ways of memorization. Through the experimental findings of recall and recognition, you will be able to understand the important ways which help in the process of human learning.

## 2.3 CONCEPT AND DEFINITION OF MEMORY

Memory is a specific ability of the mind through which learning can be retained and reproduced if and when required. Old faculty group of Psychologists have described memory as a specific faculty or power of mind. It includes three fold mental functions-learning, retaining and remembering.

In the first step of memory, an individual needs to learn and derive sense experience of the environment in order to register its impression. It consists of sensing and perceiving the object of experience in mind. Without learning there can be no question of remembering.

In the next step the learning experience received is being retained in mind in the form of images. After learning there is always an effort to keep its image in mind intact. This retaining is a specific power of mind of an individual inherited by birth.

In the third step we try to revive or reproduce the past image in the present in its original form called remembering. It is an act of unchanged reproduction of what was retained in mind. This mental revival or remembering may again take the form of recall and recognition.

Thus, from the above analysis it may be deduced that memory is a mental activity of retaining and remembering the experiences that were learnt previously. It involves the relative steps of learning, retaining and remembering.

The concept of memory may be clarified with the following definitions:

According to Woodworth and Marquis, "Memory consists in remembering what has previously been learned."

According to Stout, "Memory is the ideal revival so far as "ideal revival is merely reproductive. This productive aspect of ideal revival requires the object of past experiences to be reinstated as far aso possible in the order and manner of their original occurrence."

According to Ryburn, "The power that we have to 'store' our experiences, and to bring them into the field of consciousness sometime after the experiences have occurred, is termed .memory."

### 2.3.1 Characteristics of Memory

The true nature of memory as mental activity may be identified with the following characteristics:

- Memory needs direct experience of sense. In the absence of this, the question of memory does not arise.
- It is an exact and unchanged reproduction of the past experiences in mind.
- Memory depends upon the power of retaining which is inherited by birth.
- Unconscious mind plays an important role in exercise of one's memory.
- Memory needs intellectual ability and better power of mental organization of an individual.
- Repetition makes memory images more durable and lasting.
- It involves three fold activities of mind such as learning, retaining and remembering.

### 2.3.2 Types of Memory

Psychologists have tried to classify memory into certain types according to their nature and purposes served. The board classification consists of habit memory, image memory or true memory, role memory, logical memory, immediate memory. Let us see what we mean by these types.

**Habit Memory**

Bergson has maintained that the past survives in two distinct forms- through motor mechanism and independent recollection. Memory formed out of motor mechanism and independent recollection. Memory formed out of motor mechanism of physical repetition is called habit memory. This form of memory consists in mechanical repetition of the nervous system that constitutes physical habit. Type writing, piano playing etc. involve memory of this kind. Here memory is an affair of the body rather than of the mind.

**Image Memory**

Bergson's concept of memory through independent recollection as against mechanical physical repetition may be known as image memory. It is also stated to be pure memory in the sense that a man's true ability of memory finds expression through his capacity of keeping and reviving the image purely on the basis of mental picture. Bergson has asserted that habit memory relates to body whereas pure memory relates to mind. Describing a memorable event of the past involves pure memory.

**Rote Memory**

This form of memory is described as verbal memory formed out of physical repetition in mouth. It does not require exercise of mental image out of one's own power of retaining. Verbal repetition of something in mouth may result in the formation of habit that enables to remember mechanically. In the absence of such repetition memory fades away. Here there is no question to intellect, learning and logical understanding of the facts and ideas in mind. This may be popularly known as memory out of cramming.

**Logical Memory**

This form of memory may be described as opposite to verbal learning and remembering. Here, the individual is required to exercise his power of reasoning, under-standing and appreciation of the facts and events in learning and remembering. Logical memory may be comparable to that of pure memory that depends upon the power of

retaining. The intelligent students usually make use of this form of memory.

**Immediate Memory or Sensory Memory**

Immediate memory or sensory memory is that memory which helps an individual to recall something immediately after having perceived it. The time interval between learning and remembering here is very little. This forms of memory needs alertness a keenness of the senses and the power of receptivity of the sensory motor nerve. To take example, writing while dictating involves exercise of immediate memory.

**Long-term Memory**

This type of memory is a matter of time that involves in between learning and remembering. As the name suggests, long-term memory "has quite a durable or endless retention of the sensory impressions. That is why; it is also referred to as permanent memory. Remembering our identifying data like our name, father's name, date of birth, date of marriage etc. is the simplest example of our long-term memory. With the help of our long term memory, we can store, retain and remember most of the things of our lives, and can thus make things in our life quite easy.

**Associative Memory**

A significant characteristic of memory is the associative factor involved. We remember something in association with other things. Associative factors like sameness, difference and newness are aids to remembering. There are three. Laws of association that operate in memory which .may be called as law of similarity, law of contrast and law of contiguity. Accordingly, the daughter's face reminds one of the mother, the name of Rama reminds us of Ravana, and truth reminds us of justice. Associative factors also help the student in the exercise of memory' more effectively in examination.

### 2.3.3 Measures and Techniques for Effective Memorization

The following techniques and measures may be adopted for obtaining better results in the process of memorization (learning, retention and its reproduction).

**Will and determination**

There must be firm determination or strong will to learn, retain and reproduce for achieving the desired success in memorization. Materials read, heard or seen without intention or mood is difficult to remember at later times.

**Interest and attention**

Interests as well as attention are essential for effective learning and memorization. We need to learn when our mind is interested. Things that have touched our mind can be easily remembered. In the absence of interest, learning may turn out to be a futile exercise. One who has-no interest in what one learns, cannot give due attention to it, and consequently, o.ne will not be able to learn it.

**Adopting proper methods of memorization**

For memorization it is very necessary to adopt proper method of memorization. But all methods are not suitable for all occasions for all individuals. Therefore, a judicious selection should be made in choosing a particular method in a given situation.

**Use of Image**

Memory activity is nothing more than keeping the learning image in mind. An image is an aid to learning, retaining and remembering. Use of picture, diagrams and maps may therefore make our memory convenient to exercise.

**Use of Rhythm**

Rhythm in learning creates interest and easy attention to anybody. Rhythmic methods like songs, dances and poetry can easily stimulate the mind to keep its image or impression lively.

**Utilizing senses**

We all know that senses are-the gateways of knowledge, and it has been that a person learns better when it is presented through more than one sense. Therefore, attempts should be made to take the help of audio-visual and material and receive impressions through as many senses as possible.

**Provision for rest**

Rest is the essential psycho-physical .condition of learning and remembering. Rest can remove fatigue .and boredom, and revitalizes the body and mind for fresh learning and remembering.

**Repetition ad practice**

Last but not the least is the repetition and continuous practice that adds to effective memorization. Repetition or practice strengthens the bond of learning to keep its impression for long. It revitalizes the image for which forgetting cannot has its impact on memory. Therefore due care should be taken for drill work, practice and review etc. in the process of memorization and learning.

## 2.4 CONCEPT OF RECALL AND RECOGNITION

The act of remembering the past experience in mind may take the form of recall and recognition. These are the two ways of remembering the past image in the present: Their specific nature may be described below -

**METHOD OF RECALL**

It is a mental apprehension or reinstatement of experience perceived on the previous occasion. It is a form of remembering the past experience in mind purely on the basis of image or mental picture of the past. Here, the individual needs better ability of keeping image in mind. If the power of retaining is more, the image may be kept alive and active in mind. Weakness of this power results in fading out of the image from mind. Recall is obvious a difficult form of remembering that involves in keeping and reviving the image or mental picture of the past in the present.

In using the method of recall for using one's power of retention, we

can ask an individual to reproduce the retained material in his memory through the process of- recall (oral citation or written -presentation). For example, a child may be asked to reproduce the retention of the spelling of ten words (remembered by him previously) by away oral recitation or written presentation. This method of recall may take' the following three shape and designs designated as- (i) Free recall method, (ii) Probed recall method and. (iii) Serial recall method.

**(i) Free recall method**

In this method, the learner is provided with a list of items. The item may contain meaningful words like RAT, HAT, PEN, HAND, or digits like. 22, 45, 32, 86, or even nonsense syllables like TAK, SOK, NAK, KAZ, etc. In addition to the use of such lists, we may make use of other study material like a stanza of a prose or poetry composition, an incidence or a pictorial presentation. Here, the learner is asked to recall (orally or in written form) in any order as many items as possible from the list he has seen or been told about. Whatever the material may be, the objective remains to test the power of retention, i.e. what one is capable of recalling out of the total material presented to him for his learning.

**(ii) Probed recall**

In this method, the individual may be provided with a clue for helping him in the process of recalling. For example, in a paired associate list like CORN-MUSIC, BOX-CAT, FOOD-BOOK etc, he may be asked to tell, which word appeared with BOX in the list seen by him. For the items of a serial list, this clue may be in the shape of the location of the item in the list e.g which item was there t the top/bottom/middle of the list seen by him?

**(iii) Serial recall**

In serial recall an individual is asked to recall the items in exactly the same order as presented to him previously for his learning or memorisation. The serial order reproduction, if his retention is quite essential in such measurement. For example, if one is able to recall 12 words correctly out of 20, but out of this 12, he is wrong at four times in terming their serial recall, he :may then be scored as 12-4=8 instead of 12.

**METHOD OF RECOGNITION**

It is comparatively an easier form of remembering than that of recall. Recognition is an act of identification or verification of the given .experiences on the basis of the past image. For the exercise of recognition, the object of experience already remains present before the senses. We are here required to select or identify it from the given object. It is an associative form of remembering that works. The image of the past here is already given for .its verification. One is not- to depend entirely on the mental picture to retain. Generally, there are two types of recognition test that are employed for testing one's power of retention. These are named .as simple recognition test and multiple-alternate recognition test.

**Simple recognition type test**

In this type of test, the individual is presented with .a photograph, picture, scene of a film or a real item to decide whether or .not he has seen it before. He may also be presented with an audio tape, smell or taste experience to decide whether he has listened, smelled or tasted it ever before, and if yes, he is asked to tell something about it, though its recognition.

**Multiple-alternate recognition test**

In this test, one has to recognize a .particular person or item seen, heard or experienced before, out of the several pictures, voices or items presented to him. For example, he can be presented with .1O pictures or photographs. He may be asked to recognize a particular person, place or event out of the given alternatives. The words, letters, symbol etc. can also be used for such recognition tests. In addition to this, some suitable multiple objective type questions may also be constructed for testing the powers of recognition like -

Which of the parties was established by Dr: B.R Ambedkar?

a) The Peasants and Workers Party of India.
b) All India Schedule Caste Federation.
c) The Independent Labour Party.

### 2.4.1 Application of Recall and Recognition in the field of Education

Recognition is easier than recall. Multiple choice tests are generally easier than fill in the blanks test or essays, because it is easier to recognize the correct answer out of a group of possibilities than it is to have to dredge up the answer out of one's own mind.

Still, in order to be able to recognize the correct multiple choice answer, it has to be "somewhere" in one's brain: otherwise there's nothing to recognize. And someone with mastery of a topic can fill in the blanks or can write an essay.

In this connection we can think of our brain like a file cabinet, with tons of information stored in it. When we recognise a piece of information, it's like the tab on a file folder in our head; the whole file folder now gets pulled up. By writing down anything we know about a problem, getting started in any possible way, we are hopefully going to write something that we then recognise, and our brain is going to pull the tab and bring up the rest of the folder.

Our brain contains over four terabytes of information (which is a way too big a number to imagine), yet our working memory, the part of our brain that consciously works on a problem, can only hold about seven bits at any time.

Think about how impossible it is to multiply big numbers in our head, but it is very easy to do on paper. Our brain knows how to multiply, but it can't keep track of all those digits. This is why writing was invented in the first place.. People found themselves with way more knowledge that they could hold and work with in their heads, and' so they invented a way to put information "out there". 'they scratched it in-the dirt or into clay tablets or they inked it onto papyrus or pap.er, Once people invented writing they could work with far more than just seven bits of information at a time.

## 2.4.2 Experimental findings through Recall and Recognition

**Title:** Recall and Recognition.

**Objective:** To determine the relative capacity of retentively in recall and recognition of meaningful materials.

**Hypothesis:**

i) Recognition score exceeds recall score

ii) Percentage of recognition of figures is higher than the percentage of recognition of words.

**Materials:**

i) A set of 40 meaningful figures

ii) A set of 40 meaningful words

iii) A stopwatch

iv) Screen

v) Record Sheets

vi) Stationery

**Subject:**

Name:

Sex:

Educational Status:

Date

Time:

Place:

**Procedure:** To connect the experiment, at first the experimenter prepared two sets of cards. One set consisting of 40 meaningful figures pasted on equal sized (5cm x 5cm) cards (coloured figures against white background) and another set of cards (6cm x 2cm) of meaningful words (written in block letters against white background) for, the purpose of the experiment. The sets were of equal difficulty. Record sheets were also maintained and the subject on whom the experiment was to be conducted was selected.

The experiment was conducted n two phases. In the first

phase of the experiment, to test the capacity of retentively in recall, the experimenter systematically set twenty cards depicting figures on the experimental table and there was a wooden screen between the experimenter and the subject. The stop watch was kept ready to record the time allotted to the subject. Keeping the screen in between, the experimenter instructed the subject as to what was to be done. The subject was given the following instructions- "You will be shown 20 cards depicting figure, which will be exposed for 2 minutes only. Please be alert and attentive. After two minutes you will have to write down on this sheet of paper the figures you can recall and remember. Are you clear?".

After the subject had reproduced the figures exposed, the experimenter mixed up the originally presented 20 cards with 20 new cards. After mixing the cards the subject was then given the following instructions- "I have mixed the previously presented cards depicting figures with 20 new cards. Please try to recall and recognise the cards previously shown by picking them up from the whole set of 40 cards. Do you understand?"

After giving 5 minutes interval the experimenter started the second phase of the experiment. In the second phase of the experiment it was to determine the relative capacity of retentivity in recall and recognition of meaningful words. Accordingly the experiment was conducted with the same procedure by which the former experiment on recall and recognition of figures was performed.

After the experiment was over the experimenter took the introspective report from the subject and thanked the subject for co-operating Introspective Report: It was a very interesting experiment to me and I enjoyed it very much. I did not find much difficulty in recognizing the figures and words, I could easily recall the easier and known words but found little difficulty in recalling the unknown words.

**RECORD SHEET- 2.1**

**RECALL AND RECOGNITION OF FIGURES**

| SERIAL NO. | FIGURES | RECALLED | RECOGNITION |
|---|---|---|---|
| 1 | BUS | | |
| 2 | SHIP | √ | √ |
| 3 | DEAR | √ | √ |
| 4 | FOX | √ | √ |
| 5 | RHINO | √ | √ |
| 6 | ZEBRA | √ | √ |
| 7 | CAR | √ | √ |
| 8 | BOAT | √ | √ |
| 9 | LION | | √ |
| 10 | DOLL | √ | √ |
| 11 | WOLF | √ | √ |
| 12 | BEAR | √ | √ |
| 13 | GIRAFFE | √ | √ |
| 14 | OX | | |
| 15 | KITE | | |
| 16 | BALL | √ | √ |
| 17 | HORSE | √ | √ |
| 18 | ELEPHANT | √ | √ |
| 19 | CAT | √ | √ |
| 20 | DONKEY | | |
| 21 | BUFFALO | | √ |
| 22 | DOG | | |
| 23 | CAMEL | | |

| | | | |
|---|---|---|---|
| 24 | PIG | | |
| 25 | RABBIT | | |
| 26 | INKPOT | | |
| 27 | CROW | | |
| 28 | PARROT | | |
| 29 | HOUSE | | |
| 30 | BANANA | | √ |
| 31 | PENGUIN | | |
| 32 | FROG | | |
| 33 | HAND | | |
| 34 | SUNFLOWER | | |
| 35 | WATCH | | |
| 36 | ICE-CREAM | | |
| 37 | CYCLE | | |
| 38 | ROCKET | | |
| 39 | TRAIN | √ | √ |
| 40 | TREE | | |
| | TOTAL | 15 | 20 |
| Percentage 15/20×100=75% | | | 20/20×100 = 100% |

**RECORED SHEET - 2.2**

**RECALL AND RECOGNITION OF WORDS**

| SERIAL NO. | FIGURES | RECALLED | RECOGNITION |
|---|---|---|---|
| 1 | BOOK | √ | √ |
| 2 | SECURITY | √ | √ |
| 3 | SEEDS | | |
| 4 | TABLE | √ | √ |

| | | | |
|---|---|---|---|
| 5 | UNIFORM | | |
| 6 | FISHERY | | |
| 7 | STAR | √ | √ |
| 8 | POPPY | | |
| 9 | WORLD | √ | √ |
| 10 | HISTORY | | |
| 11 | OCEAN | | |
| 12 | TOMATO | | √ |
| 13 | WINGS | | |
| 14 | VEGETABLE | √ | √ |
| 15 | WEST | | |
| 16 | CLOUD | | √ |
| 17 | HANDBAGS | √ | |
| 18 | DOVE | | |
| 19 | BLOOD | √ | √ |
| 20 | WOOD | | |
| 21 | KITTEN | √ | √ |
| 22 | STONE | √ | √ |
| 23 | HEART | √ | √ |
| 24 | ORANGE | √ | √ |
| 25 | WATCH | | |
| 26 | GLASS | | |
| 27 | SHIP | √ | √ |
| 28 | PENCIL | √ | √ |
| 29 | PROFIT | | |
| 30 | PRIZE | | |

| | | | |
|---|---|---|---|
| 31 | ICE-CREAM | √ | √ |
| 32 | EYES | | |
| 33 | MASTER | | |
| 34 | MOTHER | √ | √ |
| 35 | EARTH | √ | √ |
| 36 | UTENSILS | | |
| 37 | MUSHROOM | | |
| 38 | PARK | √ | √ |
| 39 | SNAKE | | |
| 40 | DOLPHIN | | |
| | TOTAL | 18 | 19 |
| Percentage 18/20×100=90% | | | 19/20×100 = 95% |

**Table - 2.1**

| | **Recall** | **Recognition** |
|---|---|---|
| Figures | 75% | 100% |
| Words | 90% | 95% |

Table No. 2.1 Showing the percentage of recall and recognition for figures and words

**Results:** The results of the experiment are shown in record sheet no IX, depicting the percentage of recall and recognition of meaningful figures, and record sheet no X depicting the percentage of recall and recognition of meaningful words. Table XI shows the percentage of both recall and recognition of figures and words.

**Observation and Discussion:** It is observed from the experiment that the subject's percentage of recall and recognition of figures is 75% and 90%, and the percentage of recall and recognition of words is 90% and 95% respectively. Thus, from the

result of the experiment, it is evident that percentage of recognition of figures is higher than the percentage of recognition of words. The recognition scores also exceed the recall scores. This indicates that the nature of the material which is presented, are retained and recognized due to the presence of conditions as intensity, similarity, distinctness, meaning, vividness which play an important role.

## 2.5 CONCEPT OF IMMEDIATE MEMORY

We all know that immediate memory is the ability to remember a small amount of information over a few seconds. It is an important type of memory for making sense of what is going on around you. For Example, immediate memory is used when reading to recall what happens sentence by sentence, or when recalling a phone number just looked up in the phone book. There is a limit to how much can be stored in immediate memory. Unlike other forms of memory, information in immediate memory fades very quickly casts only for a few seconds). Immediate memory is not affected much by age at any age people can usually store 5 to 7 pieces of information in immediate memory.

There are certain rules to be followed to improve immediate memory. Such as :

- To keep one's mind active. Participate in activities that require to think and learn, such as playing bridge or attending a lecture.
- To exercise. There is some evidence to suggest that physical exercise contributes to memory retention.

### 2.5.1 Experimental Finding through Immediate Memory Span

**Title:** Immediate Memory Span

**Objectives:** To determine the immediate span of the subject for digits (Forward and Backward)

**Hypothesis:** Forward memory span exceeds backward memory span

**Materials:** (i) Two lists of numbers consisting of 4 to 12 digits
(ii) Screen
(iii) Stationery

**Subject:** Name:
Age:
Sex:
Educational Status:
Date:
Place:
Time:

**Procedure:** In this experiment the immediate memory spans of the subject for digits-Forward and Backward is to be determined. Two lists of numbers were prepared consisting of 4 to 12 digits. In preparation of the lists, care was taken to avoid repetition. The subject was requested to take his seat. The experimenter placed a wooden screen in between the experimenter, and the subject so that the subject cannot see the list. The experiment was conducted in two phases. In the first phase the experimenter is to determine the forward memory span. Here, the experimenter said out the digits and the subject repeated it. The subject was given the following instructions -

"Please be seated comfortably. This is a very simple experiment which I am going to conduct now. I will say some numbers, and your task is to memorise these numbers and repeat them in the same way and order as soon as I finish. Do you follow?" (The experimenter started with a short list and proceeds to longer ones to test the subjects limit The experimenter should continue the experiment till the subject is unable to reproduce perfectly).

After an interval of lo minutes, the experimenter commenced the second phase of the experiment In the second phase, the experimenter is to test the backward memory span of the subject. Here the subject is to recite the numbers said by the experimenter in the reverse order.

The subject was given the following instructions- 411 have already tested your forward memory span, now I shall determine your backward memory span. The only thing you have to do is to recite the numbers in a reverse manner which I will say you. For example, if I say, 1234, you are to say in the manner 4321. Have you understood? Can I start now?

Introspective Report: "1 had a lot of difficulty in reproducing the correct numbers; It was quite easier for me to reproduce the numbers in forward manner but upto 6 numbers but it was very much difficult for me to reproduce the numbers in the backward manner. But overall the experiment is very interesting to me."

**Result:** The results of the experiment are recorded in worksheet no.XII depicting the forward memory span and worksheet no. XIII depicting the backward memory span. The true average span was obtained by giving three lists of each length a credit of 1/3 for every perfectly recited list.

**Observation and discussion:** It was observed from the experiment that the forward memory span exceeded the backward memory span. The forward memory was found to be 7 and backward memory span 5. It was also observed that the subject got all the

lists correct up to and including 6 digits in the forward memory span. So the subject was credited with 6 as a basal value. The subject succeeded twice with 7 digits, and once in 8 digits, not at all in 9, 10, 11 and 12 digits, so the subject's total score was found to be 6×3/3= 6.

**WORKSHEET - 2.3**

| **FORWARD MEMORY SPAN** | | |
|---|---|---|
| **Digit Span** | **List of Digits 4 to 12** | **Subject's reproduction** |
| 4 | 1 2 3 4<br>2 4 6 8<br>3 6 9 0 | 1 2 3 4 √<br>2 4 6 8 √<br>3 6 9 0 √ |

| | | |
|---|---|---|
| 5 | 2 4 6 7 8<br>2 3 4 6 8<br>8 7 6 5 3 | 2 4 6 7 8 √<br>2 3 4 6 8 √<br>8 7 6 5 3 √ |
| 6 | 1 2 3 4 5 6<br>0 9 8 7 6 5<br>2 4 6 8 9 0 | 1 2 3 4 5 6 √<br>0 9 8 7 6 5 √<br>2 4 6 8 9 0 √ |
| 7 | 1 3 5 7 9 0 2<br>8 5 6 9 7 3 2<br>2 0 3 6 7 5 4 | 1 3 5 7 9 0 2 √<br>8 5 6 9 7 3 2 √<br>2 0 3 6 7 ……. X |
| 8 | 9 3 2 4 6 7 9 0<br>6 2 3 4 8 9 1 0<br>1 2 3 4 5 6 7 8 | 9 3 2 …….. X<br>6 2 4 …….. X<br>1 2 3 4 5 6 7 8 √ |
| 9 | 8 5 6 9 7 3 2 1 0<br>5 7 8 6 5 7 2 1 4<br>1 2 3 9 8 7 5 6 4 | 8 5 6 …….. X<br>5 7 6 8 ……. X<br>1 2 3 4 ……. X |
| 10 | 6 7 5 4 3 2 8 9 0 1<br>5 3 2 3 9 7 6 4 2 3<br>7 9 2 4 5 6 7 9 2 3 | 6 7 5 4 …….. X<br>5 2 3 4 ……. X<br>7 9 3 4 6 ……. X |
| 11 | 4 5 7 8 9 2 3 6 4 7 1<br>5 6 8 1 2 3 4 5 6 9 0<br>4 5 2 3 6 7 8 9 1 0 3 | 3 2 4 2 ……. X<br>1 2 3 4 0 5 6 …….. X<br>8 3 2 4 5 6 1 0 5 7 …….. X |
| 12 | 3 2 3 4 5 6 7 8 9 7 2 7<br>1 2 3 4 0 9 8 7 6 4 5 6<br>8 3 2 4 5 6 1 0 9 3 7 6 | 3 2 4 2 …….. X<br>1 2 3 4 0 5 6 ……. X<br>8 3 2 4 5 6 1 0 5 7 ……. X |
| Result of Forward memory Span = 6 × 3/3<br>= 18/3<br>= 18/3<br>= 6 | | |

**WORKSHEET - 2.4**

| **BACKWARD MEMORY SPAN** | | |
|---|---|---|
| **Digit Span** | **List of Digits 4 to 12** | **Subject's reproduction** |
| 4 | 1 2 3 4<br>2 4 6 8<br>6 7 8 9 | 1 2 3 4 √<br>2 4 6 8 √<br>9 8 7 6 √ |
| 5 | 2 4 6 8 0<br>5 2 1 3 4<br>5 7 8 9 0 | 0 8 6 4 2 √<br>4 3 1 2 5 √<br>0 9 8 7 5 √ |
| 6 | 2 6 7 9 3 4<br>1 2 3 6 9 0<br>2 3 5 8 9 1 | 4 9 7 6 ……..X<br>0 6 9 ……X<br>1 9 8 6 ……..X |
| 7 | 1 2 3 7 8 9 5<br>3 4 6 7 8 6 4<br>6 3 4 7 8 9 2 | 4 9 6 5 ……..X<br>3 4 8 9 ……X<br>2 9 8 7 ……..X |
| 8 | 1 2 3 4 9 8 7 6<br>3 2 1 3 4 6 7 5<br>7 3 2 4 6 9 0 1 | 6 7 9 4 ……..X<br>4 7 9 4 ……..X<br>1 9 0 3 ……..X |
| 9 | 3 4 2 5 6 9 8 0 7<br>5 6 4 2 3 7 8 2 1<br>4 5 6 7 2 4 8 9 5 | 7 0 8 9 2 ……..X<br>1 2 6 7 ……X<br>5 9 8 4 3 …….X |
| 10 | 6 2 3 4 5 8 9 0 1 2<br>5 3 8 6 2 0 1 7 4 1<br>7 9 2 8 7 6 5 2 4 0 | 2 0 1 4 ……X<br>1 7 1 4 9 ……..X<br>0 4 2 8 ……X |
| 11 | 4 5 9 7 3 4 6 8 7 1 0<br>1 2 3 4 0 9 8 5 6 4 7<br>8 4 7 5 3 6 2 1 9 4 8 | |

| | | |
|---|---|---|
| 12 | 9 2 4 5 3 8 7 6 9 2 4 3<br>8 5 6 7 4 2 6 8 7 9 0 2<br>4 5 5 3 9 7 8 5 6 7 8 0 | |
| Result of Backward memory Span = 5 | | |

The backward memory span was less than the forward memory span. As in case of backward memory span, more mental alertness and concentration was needed. It is observed from the experiment, that it is a simple and quick method of ascertaining an individual's memory span. Such experiment furnishes an answer to the question- How large a quantity of a given sort of material can be reproduced perfectly after one single presentation. Thus we can conclude that our results support our hypothesis.

## 2.6 EXPERIMENTAL FINDING THROUGH RETROACTIVE AND PROACTIVE INHIBITION

**Experiment on Retroactive Inhibition**

**Problem:** To demonstrate the phenomenon of retroactive inhibition and to study the effect of similarity between the original and interpolated learning tasks.

**Introduction:** Memory includes within it a combination of processes by which information is encoded, stored, and retrieval. Three are three stages of any memory system: encoding, storage and retrieval. Failure at any of the three stages results in forgetting or loss of information.

Researches have shown that a number of factors are responsible for forgetting. These factors range from the amount of time, the type of material, to the kind of memory traces formed and a variety of external factors that may interfere in storage or recall. A number of studies have shown that interference of any kind is a major determinant of forgetting. Interference takes place when two or more sets of information are present. When information being learned interferes with information already present in the memory it is termed as 'retroactive interference or retroactive

inhibition.' Suppose learning of a new language of computer interferes with the old language one can say that forgetting is taking place due to retroactive inhibition.

Retroactive interference has been defined as 'a result of decreased recall of the primary studied functions due to the learning and recall of succeeding functions'. It is a classic paradigm that was first officially termed by Muller. These memory research pioneers demonstrated through their studies that filling the retention interval or the amount of time that occurs between the initial learning stage and the memory recall stage with different tasks and material caused significant interference effects with the already learned items.

Müller and Pilzecker showed that the materials and the task that intervene between presentation and recall interfere with the already existing information and they named this phenomenon "retroactive interference" (RI). Indeed numerous other experiments by them http://www.ncbi.nlm.nih.gov/pmc/articles/PMC264433O/ - R26(1900) provided strong evidence against a (sole) time based theory and for an interference theory. Muller and Pilzecker believed that it is not only time which causes decay or fading of memory traces but, according to them forgetting could be induced by subsequent interference. Their findings were later supported by Jenkins and Dallenbach (1924) who found that people recalled more nonsense syllables when they slept between presentation and recall than when they stayed awake. This consequentially led to the notion that Retroactive interference played a somewhat large role in the human forgetting process.

Though the concept originated years ago, it is still considered useful in explaining the concept of forgetting. Researches became more complex as they explored the kind of material or information which leads to interference. Material that was similar tended to cause more interference as compared to a situation where the interfering task was dissimilar.

Based on the above theoretical framework one can hypothesize.

**Hypothesis:**

Recall of items from the first task correctly will be less when the similarity between the original and interpolated tasks is more.

The number of trials taken to relearn the first task will be more when the similarity between the original and interpolated task is more.

**Method:**

**Sample:** 15 Subjects with similar demographic details such as age, gender, educational qualifications, and socio-economic background will be a part of the study.

**Materials:**

A list of 12 two-syllable adjectives (List A),

A second list of 12 two-syllable adjectives which are synonyms of the adjectives in List A, (List B), and

A list of 12 three place numbers (list C).

A memory drum or computers monitor for the exposure of the stimulus items.

**Description of material:**

There are two lists of adjectives which are similar to each other. These two lists will be used for subjects being tested for high similarity between the two tasks The third list with three place numbers will be used for the group of subjects where the two tasks will be dissimilar.

**Memory drum:** This device consists of a drum mounted behind a screen. A strip of paper on which flic syllables are printed is fastened around the drum. The drum is driven by a constant-speed motor and exposes each syllable for a short period of time (usually 2 seconds) through a window in the screen.

In case a memory drum is not available, a computer screen can he used where the exposure for each item can be preset.

**Experimental Design:**

**Independent Variable:** The degree of' similarity between the two tasks.

**Dependent Variable:** Number of errors in the recall of the first list.

The experiment will have three groups:

a) Control group,

b) Experimental groups, and

c) Task group- (i) similar material/task group and (ii) different material/task group.

For both the experimental groups, an ABA design will be followed wherein the subjects will be first presented with List A followed by List B, and then will be asked to recall List A.

**Controls and Precautions:**

- The experiment should be conducted in a calm and quiet atmosphere.
- The subjects in all the groups should be matched in terms of their demographic details.
- The similar lists should be high on similarity.
- A control group which will not be exposed to any interfering task will be used.
- The experiment will be conducted on all the subjects separately.

The time interval between the presentations of the two lists would be the same for all subjects.

**Procedure:**

The experiment will be conducted on each individual separately.

**Instructions:**

The following instructions will be given to the control group:

"You will be shown a list of words that you have to learn. You can take as many trials as you want. After you have learnt it to perfection, you will be asked to recall it."

To the experimental group the following instructions will be given:

"You will be shown a list of words that you have to learn. You can take as you want. After you have learnt it to perfection, you will be presented with another list that you will have to learn."

**Administration:**

The procedures used with the three groups are as follows:

**Similar material/Task group:** The members of this group will presented with List A and when they have learnt it to an errorless recall, they will be presented with List. They are then given a rest period of 5

minutes. At the end of rest period, the subjects will be asked to recall List A. The number of items recalled correctly and the number of trials required to relearn it to an errorless criteria will be recorded.

**Different material/Task group:** The procedure for this group will be identical with that for the similar group. In this, List A and List C will be given.

**Control group:** The members of this group will be asked to learn List A to an error-free level. After a specified period of time, they will be asked to recall List A. The number of items recalled correctly and the number of trials to reach the error-free criterion will be recorded.

The experimental design illustrates the paradigm conventionally used in the study of retroactive inhibition.

**Result and Analysis:**

Retroactive inhibition is defined as decrement in retention due to an interpolated activity. To demonstrate this effect, we compare the relearning performance of the control group with that of the experimental group.

Two measures of retention will be used:

- The number of items correctly anticipated on the first relearning trial, and
- The number of trials required for relearning to an error free criterion.

These two measures will be computed for the control group and the experimental groups. 1f the performance of the Experimental Groups is significantly poorer than that of the control group, retroactive inhibition has been demonstrated.

**Table 2.2**

**Comparison of Similar, Different and Control Group**

| No. of Subjects | Similar Material Group | | Different Material Group | | Control Group | |
|---|---|---|---|---|---|---|
| | No. of items correctly anticipated on first relearning trials (List A) | No. of trials required for relearning to criterion (List A) | No. of items correctly anticipated on first relearning trials (List A) | No. of trials required for relearning to criterion (List A) | No. of items correctly anticipated on first relearning trials (List A) | No. of trials required for relearning to criterion (List A) |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| Average | | | | | | |

To evaluate the effect of similarity of original and interpolated activity, relearning of the two experimental groups will be compared with each other. The same two measures of retention- No, of items correctly anticipated on first relearning trial (List A) and the number of trials required for relearning to criterion (List A)- will be are used.

Graphs (bar diagrams and forgetting curves) illustrating the difference in the performance of the three groups will be used to present the results. Based on the results the hypothesis will either be accepted or rejected.

**Discussion:**

Comparison of the two experimental groups on these measures will show whether or not, and to what extent, the degree of similarity of original and interpolated learning has influenced the amount of retroactive inhibition. The acceptance or rejection of the hypothesis will be supported by citing studies with similar findings.

**Introspective Report:**

Here the experimenter will ask the subject to give their experiences during the experiment in terms of difficulties, boredom, motivation, emotions, feelings and distractions.

**Experiment on Proactive Inhibition**

**Problem:** To demonstrate the phenomenon of proactive inhibition, i.e., old learning interferes with the recalling of new learning.

**Introduction:** Forgetting refers to apparent loss of information already encoded and stored in an individual's long-term memory. Researches show that interference of any kind is a major determinant of

forgetting. Interference takes place when there are two or more sets of information. Proactive interference takes place when previously learned information present in long-term memory interferes with the information one is acquiring at present. When a poem already present in the long-term memory of the person interferes with the retention of a new poem, it is known as proactive inhibition.

Underwood (1957) strongly rejected retroactive inhibition as a reason for forgetting. He gave a strong argument stating that forgetting is primarily an outcome of, proactive interference (PI), i.e., the interference of 'to-be-retained material' by previous as opposed to subsequent information. Underwood found a correlation between the number of lists presented prior to the 'to-be-retained material' and 'per cent list' recall. This was the reason

why he gave strong arguments against both the time based theories of forgetting and retroactive inhibition being a cause for forgetting.

Based on the above research, the following hypothesis can be formulated:

i) The presence of an earlier task/material will reduce correct recall from the new task/material.

ii) The presence of an earlier task/material will increase the number of trials to relearn the new task/material.

**Method:**

**Sample:** 8 Subjects with similar demographic details such as age, gender, educational qualifications, and socio-economic background will be a part of the study.

**Material:**

i) Two lists consisting of 10 nonsense syllables each.

ii) Memory drum: In case a memory drum is not available, a computer screen can be used where the exposure for each item can be preset.

**Description of Material:**

i) The two lists of nonsense syllables which should be of an equal level of difficult

ii) This device consists of a drum mounted behind a screen. A strip of

paper on which the syllables are printed is fastened around the drum. The drum is driven by a constant-speed motor and exposes each syllable for a short period of time (usually 2 seconds) through a window in the screen. (In case a memory drum is not available, a computer screen can be used where the exposure for each item can be preset.

**Experimental Design:**

**Independent variable:** Learning of the two tasks.

Dependent variable. Recall of the second task in terms of the number of items recalled correctly and the number of trials needed to relearn the second task to an error-free criterion.

The design followed here will include an experimental group and a control group. In the experimental group, an ABB design will be followed. That is in the first instance, the subject will be asked to learn List A followed by list B, and then a recall of List B.

**Controls and Precaution:**

- The experiment should be conducted in a calm and quiet atmosphere.
- The subjects in both the groups should be matched in terms of their demographic details.
- The similar lists should he same on their difficulty level.
- A control group which will not be exposed to any interfering task will be used.
- The experiment will be conducted on all the subjects separately.

The time interval between the presentations of the two lists would be the same for all subjects.

**Procedure:**

**Table 2.3**

**Experimental Plan for Demonstrating Proactive Inhibition**

| **Group** | **Phase 1** | **Phase 2** | **Phase 3** |
|---|---|---|---|
| **Experimental Group** | Learn List A | Learn List B | Recall List B |
| **Control Group** | Rest or unrelated activity | Learn List B | Recall List B |

As soon as the subject is ready, the experimenter should give the following instruct ions:

a) **Instructions:** To the experimental group, the following instructions were given:

"You will be presented with a list of nonsense syllables which you have to learn. You can take as many trials as possible and finally learn it to an error-free criterion. After this, you will be provided with List B which also has to be learnt."

b) **Administration:** Four subjects were included in the experimental group. They were first given List A till they reach the level of criterion of one perfect recall. After giving a rest period of 5 minutes, in which the subject was allowed to rest, the subject was provided with List B till the level of criterion of perfect recall. Again a two-minute break was given, following which the subject was asked to recall the List B. The number of items recalled correctly and the number of trials taken to reach an error-free criterion was recorded.

The remaining four subjects were included in the control group. They were given the following instructions: "You will be presented with a list of nonsense syllables which you have to learn. You can take as many trials as possible and finally learn it to an error-free criterion. After this you will be asked to recall the list."

They were given a rest period of 5 minutes, following which they were provided with List B till the level of criterion of perfect recall. Again a two-minute break was given. The subject was asked to recall the List B and the number of items recalled correctly. Also, the number of trials taken to reach an error-free criterion was recorded.

**Results:**

**Table 2.4**

**Scores Obtained by Experimental and Control Group**

| Sl. No. | Experimental Group | | Control Group | |
|---|---|---|---|---|
| | No. of items correctly anticipated on first relearning trial (List B) | No. of trials required for relearning to criterion (List B) | No. of items correctly anticipated on first relearning trial (List B) | No. of trials required for relearning to criterion (List B) |
| 1 | | | | |
| 2 | | | | |

There are two measures to be used:

- No. of items correctly anticipated on first relearning trial of List B, and
- The number of trials required for relearning to criterion of one perfect recall of List B.

The results will have to be analyzed in terms of the hypothesis being accepted or rejected. Graphs and curves to illustrate the difference between the control and experimental groups will be made.

**Discussion:** Comparison of the two groups on these measures will show whether or not, and to what extent, the hypothesis is accepted or rejected. The acceptance or rejection of the hypothesis will be supported by citing studies with similar findings.

**Introspective Report:** Here the experimenter will ask the subject to give their experiences during the experiment in terms of difficulties, boredom, motivation, emotions, feelings and distractions.

**Appendix:**

List A: XEW, CAJ, VUQ, DIJ, WOY, KEM, HAX, QUT, LAV, JIS

List B: MOX, KEZ, ZUY, FAP, BOZ, ZIV, GAF, FEV, QOM, XID



## 2.7 LET US SUM UP

- The memory is nothing but remembering what we have already learned. Memory involves three steps learning, retaining and remembering.
- There are different types of memory- Habit memory, Rote memory, Image memory, Logical memory, Sensory or Immediate memory, Long term memory, and Associative memory.
- There are different measures and techniques of effective memorisation such as will and determination, attention and interest, proper methods of memorisation, use of image, rhythm, senses, rest, repetition and practice.
- Recall and recognition are two ways of remembering. We know that recall takes place in three forms such as Free recall, Probed recall and Serial recall. In Free recall a person is to recall what one is capable of recalling out of the total material presented to him. In Probed recall an individual is presented with some cue in the process of recalling And, in the Serial recall the individual is asked to recall the items in exactly the same order as presented to him previously for his learning or memorisation.
- The method of recognition is an easier form of remembering than that of recall, Generally, there are two types of recognition test that are employed for testing ones power of retention. These are simple recognition type test and multiple-alternate recognition test.
- From the experiment of recall and recognition, we can view that recognition score exceeds recall score. Hence, we can say that recognition is much easier than recall. We can also see that in both the phases of the experiment, it is found that the percentage more than that of recall.
- We know that immediate memory is the ability to remember a small amount of information over a few seconds. This memory is not affected much by age. At any age, people can usually store 5 to 7 pieces of information in immediate memory. To keep one's mind active and through exercising, one can improve immediate memory to a great extent.

- From the experimental finding through immediate memory we can clearly understand that forward memory span exceeds backward memory span. It is easier to memorise and reproduce easily in forward manner but it is difficult to reproduce in reverse manner. In case of backward memory span, more mental alertness and concentration is needed.



## 2.8 FURTHER READING

1) Mangal S.K 2007: Essentials of Educational Psychology, Prentice Hall of India Private limited, New Delhi.
2) Saikia Cr. Lutfun Rasul 1997: Psychological and statistical Experiments in Education, Saraighat Printers, M.C. Road, Guwahati.
3) S.S Chauhan 2007: Advance Educational Psychology, Vikash Publishing House, New Delhi.



## 2.9 ANSWER TO CHECK YOUR PROGRESS

**Ans to Q No.1:** Memory is the specific ability of mind through which learning can be retained and reproduced if and when required. It consists in remembering what has previously been learned. The three process or three fold functions of memory are learning, retaining and remembering.

**Ans to Q No. 2:** Remembering one's date of birth.

**Ans to Q No. 3:** Immediate memory is that form of memory where a small amount of information is remembered and reproduced in a short period of time. In such type of memory, retention time is extremely brief, generally from a fraction of a second to several seconds.

**Ans to Q No. 4:** Enter the cinema hail and see the seat number given on your ticket, after occupying the seat, we forget the seat number. Another example is to remember a telephone number from the directory, but after making the call, we usually forget it.

**Ans to Q No. 5:** Immediate memory can be improved through following ways:

- To keep one's mind active. Participate in activities that require to think and learn, such as playing bridge or attending a lecture.
- To exercise. There is some evidence to suggest that physical exercise contributes to memory.



## 2.10 POSSIBLE QUESTIONS

**Very Short Questions** (Answer each question in about 50 words)

**Q 1:** What do you mean by memory?

**Q 2:** Give an example of multiple-alternate memory.

**Q 3:** In what way, ¡s immediate memory helpful to human memorization process?

**Short Questions** (Answer each question in about 150 words)

**Q 1:** Discuss in brief about different types of memory.

**Q 2:** Differentiate between long term and Short term memory.

**Q 3:** Mention the different characteristics of memory.

**Long Questions** (Answer each question in about 300-500 words)

**Q 1:** Explain how the use of image helps in effective memorization.

**Q 2:** Explain in your own words, the method of recall and recognition as the ways of remembering.

**Q 3:** Discuss the different techniques for effective memorization.

**Q 4:** Discuss the experiment on retroactive and proactive inhibition.

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# UNIT 3: ATTENTION

## UNIT STRUCTURE


3.1 Learning Objectives

3.2 Introduction

3.3 Meaning of Attention

- 3.3.1 Characteristics of Attention
- 3.3.2 Causes or Determinants of Attention
- 3.3.3 Types of Attention
- 3.3.4 How can attention be sustained?

3.4 Concept of Span of Attention

- 3.4.1 Experimental Finding through Span of Attention

3.5 Concept of Span of Apprehension

- 3.5.1 Experimental Finding through Span of Apprehension

3.6 Concept of division of attention

- 3.6.1 Experimental Finding through Division of Attention

3.7 Let Us Sum Up

3.8 Further Reading

3.9 Answer to Check Your Progress

3.10 Possible Questions


## 3.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- explain the concept of attention
- identify different types of attention
- illustrate different ways of retaining attention
- analyse the practical way of improving the levels of attention in your day to day life.

## 3.2 INTRODUCTION

This unit will introduce you to the meaning of attention, its characteristics, causes and types of attention. Besides, you will also be

able to identify the different ways of sustaining attention presented in this unit. You will be able to visualize how attention takes place in the real sense. Here in this unit, three main experiments of attention is conducted with the help of the apparatus they are span of attention, span of apprehension and division of attention.

## 3.3 MEANING OF ATTENTION

Attention is the cognitive process of selectively concentrating on one aspect of the environment while ignoring other things. Attention has also been referred to as the allocation of processing resources. It is one of the important areas to be studied in the field of education, psychology and neuroscience. Attention is a mental effort or striving to control or regulate the conscious mind. Attention was originally considered as an inborn mental faculty and due importance was given on the cognitive or intellectual aspect of mind in attention. Although at present it is described as a mental effort or striving, this has its effect on our cognitive process is worth mentioning. So McDougal has described attention as a striving which has its impact on the cognitive aspect of mind. It is an active effort of our conscious mind. Through this act consciousness is being controlled, concentrated and regulated to a particular object or idea of thought. Through attention, individual selects a particular object or idea of thought in mind and concentrates or focuses his attention on it. In short attention is an act of concentration consciousness. For providing a proper meaning to the term "attention", let us look at a few definitions forwarded by eminent authorities on this concept.

According to Ross, "Attention is a process of getting an object of thought clearly before the mind."

According to McDougal, "Attention is merely conation or striving, considered from the point of view of its effect on cognitive process."

Sharma, R.N, "Attention can be defined as a process which compels the individual to select some particular stimulus according to his interest and attitude out of the multiplicity of stimuli present in the environment".

Dumville, "Attention is the concentration of consciousness upon one

object rather than upon another."

### 3.3.1 Characteristics of Attention

The nature and significance of attention may find expression through the following points-

- Attention is a mental activity through which conscious mind is being concentrated at an object or idea of thought.
- It is a fixation of mind through which freedom of consciousness is being regulated or concentrated.
- Attention is a striving activity of mind.
- Attention is essentially a process and not a product.
- It helps in our awareness or consciousness of our environment.
- At one time we can concentrate or focus our consciousness on a particular object only.
- The concentration or focus provided by the process of attention helps us in the clarity of the perception of the perceived object or phenomenon.
- In the chain of the stimulus-response behaviour it works as a good mediator. Properly attended stimulus yields better response. Therefore, for providing an appropriate response one has to pass through the stage of preparedness or alertness (mental as well as physical) set by the process of attention.
- It is not merely a cognitive function but it is essentially determined by emotional and conational factors of interest, attitude and striving.

The conclusion derived from the above, may thus lead us to think of attention as a process carried out through cognitive abilities and helped by emotional and conational factors to select something out of the various stimuli present in one's environment and then bring it in the centre of one's consciousness in order to perceive it clearly for deriving the desired ends.

### 3.3.2 Causes or determinants of Attention

What causes one to attend, why do we attend or under what condition attention is paid- are the vital questions to be considered. These questions are very pertinent for a teacher in a classroom while drawing the attention of his/her students. Answers to these questions may be either external or internal, objective or subjective. Their specific nature may be described below-

**OBJECTIVE CONDITIONS**

Attention is determined largely by the external objects, their situation and conditions. There are significant characteristics of the external objects which can draw our attention quite instinctively. They may be identified below-

- **SIZE:** Size of an object naturally draws our attention. Bold letters in the news headline or newspaper naturally draws attention of the reader.
- **INTENSITY:** Bright object has more intensity of stimulus to draw attention; bright light, loud sounds are thus the objects of attention to anybody.
- **MOBILITY:** The moving objects can easily catch our eyes. The moving pictures in cinema are the objects of anybody's attention compared to that of the still pictures.
- **NOVELTY:** Novelty or newness of the object is of universal appeal to people. New books and new teachers easily draw attention of the school students.
- **CHANGE:** Everybody wants a change of the old situation. A new assignment of job and a new person are more stimulating to anybody for attention.
- **SECRECY:** Secretive or prohibitive objects act negatively in mind to create interest and attention. The movie picture labeled as "for adults" draw more attention to the adolescents.
- **SITUATION:** Situation or location of an object may act advantageously to draw attention. Important news is published

in a specific area of the newspaper for this purpose.

- **DISCIPLINE:** Things presented in a disciplined way may easily draw our attention. Systematic and disciplined writing of the students in examination script naturally draws attention of the examiner.
- **CONTRAST:** Contrast of things presented is a condition of attention. A white man among the black, a girl among the boys are the causes of attention due to contrast.
- **RARENESS:** Things very rare to be had may naturally draw anybody's attention. A rare animal kept in the zoo may draw more attention of the viewers.
- **STRANGENESS:** Strange objects can catch the eyes of the spectators. The horror pictures with unusual story can attract attention and interest of the people.

**SUBJECTIVE CONDITION**

Subjective conditions of attention are inherent in the individuals' own mental makeup. Some of them are inborn and some others are acquired. Their nature and characteristics may be presented as below-

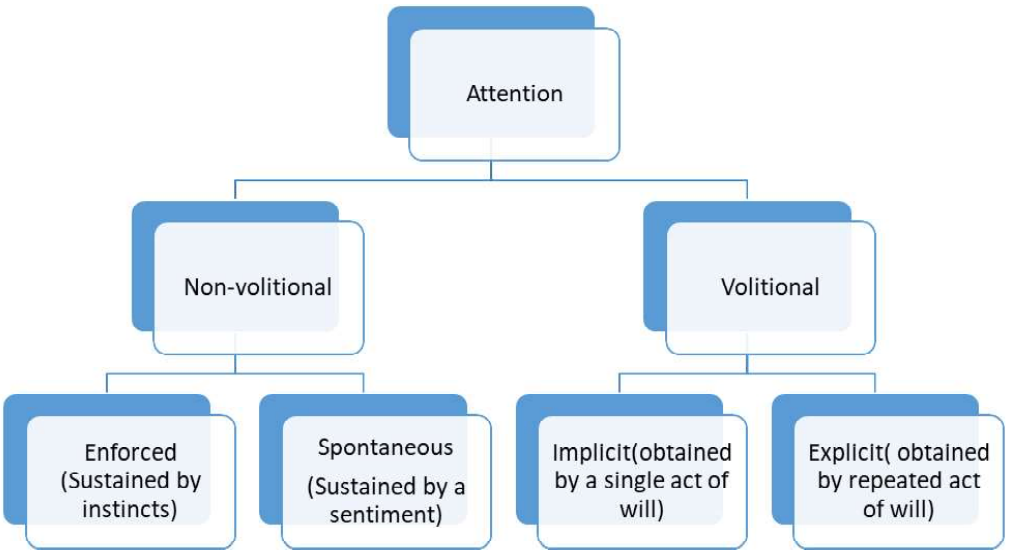
- **INTEREST:** It is the innate and inherent condition of attention. Interest may also be acquired through training. A man interested in the game of chess can concentrate his attention due to this reason.
- **TEMPERAMENT:** Temperament is a mental disposition that determines ones attention. Accordingly a man with a religious bent of mind is more attracted to the religious principles and practices than any other person.
- **INSTINCT:** Inborn instinctive tendencies are the urges of the organism to attend to situation with a typical kind of behaviour. Hunger urges one to attend to food; curiosity makes one to attend to new knowledge.
- **EMOTION:** Feeling an emotion urge one to pay attention and become interested quite passionately. One deeply attends to a

letter received from a beloved.

- **SENTIMENTS:** It is the permanent state of emotional experience in mind that urges one to attend to something with interest. Mother attends to every aspect of her child's behaviour out of sentiment.
- **DESIRE:** Psychological needs that give rise to desire in mind makes one to be attentive. Need of examination creates desire in mind of the students to attend the classes.
- **PAST EXPERIENCES:** Previous learning experience received on certain subject or field of work naturally forms an acquired interest in mind to attend. Accordingly, a historian and a scientist attend to books of their own interest when they visit a library.
- **HABIT:** Habit is the result of repetition that takes permanent form in one's thought, feeling and activity. Accordingly, a habitual smoker or a drunkard is more attentive to their own respective objects of interest.

### 3.3.3 Types of Attention

Various authors have classified attention in a variety of ways but the following classification given by Ross seems to be more agreeable.



- **Non-Volitional or Involuntary Attention:** This type of attention is aroused without the play of will. It is non-volitional in the sense that one's attention is drawn by the stimulating power of the object without any mental readiness. Here, no mental effort or voluntary readiness of mind is needed to attend. Attention is sustained by instinct aroused by the object or sentiment already formed in mind. Mother's attention towards her crying child, attention towards the members of the opposite sex, sudden loud noise, bright colours, etc are examples of non-volitional attention. Non-volitional attention as classified above can be aroused by our instincts and also by our sentiments. The attention which is aroused by the instincts is called Enforced Non-Volitional attention. And the other sub-type of non-volitional attention aroused by the sentiments is called Spontaneous Non-Volitional attention.

- Enforced non-volitional attention is quite instinctive in nature. The external object enforces or compels one to pay attention to it. The individual cannot control or regulate his mind here. Primary school children looking outside the classroom when a car passes through the road side is attention of this kind.
- Spontaneous non-volitional attention is sustained by the acquired interest and sentiment of individual towards something. Here, attention remains passive, but acts spontaneously due to interest already formed in mind. Owing to this acquired interest one may listen to classical music quite involuntarily.

- **Volitional or Voluntary Attention:** Attention is volitional or voluntary when it calls forth the exercise of will. It demands the conscious effort on our part. Usually in such a type of attention, we have a clear-cut goal before us and for its accomplishment we, with all our efforts, make ourselves attentive. Attention paid at the time of solving an assigned problem of mathematics, answering questions in an examination hall, consulting the

railway time-table at the time of embarking on a railway journey are some of the examples of volitional attention. Volitional attention is further sub-divided into two categories- Implicit and Explicit volitional attention.

- Implicit volitional attention is guided by deep involvement of individual in the subject for which attention grows from within. Wisdom and maturity of knowledge make individual attention implicit. A scholar and a scientist deeply engaged in their subjects of study may pay attention of this kind.
- Explicit volitional attention is one in which the external situation makes a man attend to something quite willfully. Students paying attention to books when examination comes nearer is an instance of explicit volitional attention. This type of attention is situational in nature. It continues as long as the situation is there.

### 3.3.4 How can attention be sustained?

Attention is by nature variable and short lived. It undergoes quick changes from one object to the other owing to the fact that attention is a selective activity of mind. For effective use of it, we need to fixed up our mind and give attention for a reasonable length of time. It cannot be left to be unrestrictedly moved from one object to other object quite instinctively. In this regard our efforts should be to sustain our attention according to necessity. In order to do so it is necessary to consider certain psychological devices that may be presented below-

- **Formation of habit:** In order to regulate attention there is the need of formation of habit. Habit formation can bring about control and regulation to sustain attention. Educational environment should also be organized suitably for that.
- **Effect of Discipline:** Disciplinary rules and control at home and in school may bring about regulation on behaviour of individual to sustain attention. Parents and teachers have their respective

roles to play here.

- **Formation of ideal environment:** An ideal educational environment with peace and serenity is necessary to sustain attention. Such an environment should be able to make habitual and voluntary self-control and regulation of instinctive tendency of children.
- **Making free from distraction:** All the distracting situations in learning should be deliberately controlled for sustaining attention. A school should therefore be away from an industry, market places, cinema halls, so on.
- **Dynamic nature of teaching:** Teaching method adopted by the teacher should not be mechanical and stereo-typed. It should be dynamic and enjoyable to students in order to sustain attention.
- **Learning by doing:** Active method of learning is always preferable to the passive method for sustaining attention. Students need to be given individual freedom of self-activity and self-involvement in their learning.
- **Formation of sentiment:** For durable attention in learning, sentiment of the learner may be effectively used. For this purpose teacher should try to form favourable sentiment towards the learning subjects as well as to his own personality.
- **Creating motivation:** Teacher should act as a motivator to students rather than as a lesson maker in the classroom. Learning should not be started so long as mental readiness or desire to learn could not be created in the learner's mind.
- **Development of will-force:** Concentration of mind to sustain attention is very necessary. For this purpose training in the development of the will-force through activities like Yoga culture may be an effective step.



**CHECK YOUR PROGRESS**

**Q 1:** What is attention?

.....

.....

**Q 2:** Mention four characteristics of attention.

.....

.....

**Q 3:** Mention any four determinants of attention.

.....

.....

## 3.4 CONCEPT OF SPAN OF ATTENTION

While defining attention we have emphasized that in a strict psychological sense, only one object, idea or fact can be the centre of consciousness at one particular moment. Attention has certain limitations so far as the number of objects on immediate presentations is concerned. One cannot attend to too many things when presented at a time. Span or range of attention is the limit to which one can attend to a number of objects on immediate presentation. It is the amount of concentrated time on a task without becoming distracted. It may be defined as what one can perceive in terms of number of objects stimuli on account of a mere glimpse of the environment in which stimulus or object are present.

Historically speaking, it was Sir William Hamilton who, in the year 1859, first experimented on the span of attention. For his experiments, he spread out marbles on the ground before his students and concluded that on an average the span of visual attention is limited to 6-7 marbles i.e., we are unable to see more than 6-7 marbles at a time. However, if these marble pieces are arranged in groups or units, we can attend to a greater number of the marbles. Further experiments were performed by psychologists like

Jevons (1871), Glanville and Dallen Back (1929), Woodworth and Shalsberg (1968), etc.

Psychologists have determined such limits by using an apparatus called "Tachistoscope". It comes from the Greek word "Tachistos" which means "quick" and "scope" which means "to see". The apparatus determines the span of visual attention on presentation of a number of dots or figures for fraction of a second. It has been obtained that on an average, man can report correctly the number upto 5 or 6. This span or range of attention is educationally significant so far as limitations of sensory ability of one's attention is concerned.

For the measurement of the other sensory span of attention, different techniques may be employed. For example, the span of auditory attention may be measured by tapping a number of asking the subject how many taps he heard.



***Diagram 3.1: Tachistoscope***

*Source: http://vlp.mpiwg-berlin.mpg.de/vlpimages/images/img3991.jpg*

*Zimmermann, E. 1928. Psychologische und PhysiologischeApparate: Liste 50. (p. 0046, fig. 589)*



**CHECK YOUR PROGRESS**

**Q 4:** Discuss in your own words the meaning of Span of Attention.

.....

.....

**Q 5:** Who was the first person to perform experiments on Span of attention?

.....

.....

### 3.4.1 Experimental Finding through Span of Attention

**Title:** Span of Attention

**Objective:** To determine the span of visual apprehension.

**Hypothesis:** With the increase in the number of stimuli, the span of visual attention gradually decreases.

**Apparatus and Material used:**

i. Tachistoscope (Falling door apparatus).

ii. Ten cards showing dots varying from three to twelve on each card.

iii. Record sheets.

iv. Graph paper.

v. Stationery.

**Subject:** Name:

Age:

Sex:

Educational Status:

Place:

Date:

Time:

**Description of the apparatus:** The name of the apparatus which will be used in the experiment is known as 'Tachistoscope'.

The apparatus is mounted on a wooden frame. The front of the apparatus is covered by a metallic sheet which is painted in black. In the middle of the metallic front there is a rectangular wooden box that is fitted with a glass through which materials used in the experiment may be exposed. Cards of the size of the slit may be inserted in the box and may be kept tight behind the glass with the help of a wooden mechanism fitted with springs. On the back of the apparatus, there is a metallic door with a bigger slit. The door is used for exposing experimental materials through the slit in the apparatus. A releaser is there to release the falling door.

**Description of Cards:** The dots are prepared first and those dots are pasted on the chart-paper. The chart paper was cut according to the size of the board in the Tachistoscope. The number of dots vary from 3 to 12; that is, all together 10 cards were prepared. The dots are equally spaced. The dots should be placed in such a way that they should not form any symbol or design. After preparation of the cards and making everything ready for the experiment the following procedure may be followed.

**Procedure:** During the experiment, the Tachistoscope was placed on the table of the laboratory room. The subject was invited to sit in the chair, where the apparatus was placed. The apparatus was placed in such a way so that the subject could see the card clearly. The experimenter then explained the nature of the experiment by giving the following instruction as:-

"You will be shown some cards with dots in them. Please give your full attention as each card will be shown to you for only half of the fraction of a second. After seeing the cards with the dots, you have to report the number of dots you have seen. Is it clear to you? Are you ready?"

After getting positive response from the subject, the experimenter started the experiment. The experimenter then put the card at the slit and then asked the subject to give full concentration. The experimenter then put the card one by one in

the slit and released the falling door and accordingly the subject reported to the experimenter the number of dots seen. The experimenter exhibited the dotted cards in serial order and the experiment was stopped when all the cards had been exposed 50 times, that is each card has been shown for 5 times in a random order. All the responses made by the subject were recorded in the work sheet.

**Worksheet No: 3.1**

**Title: Span of Attention**

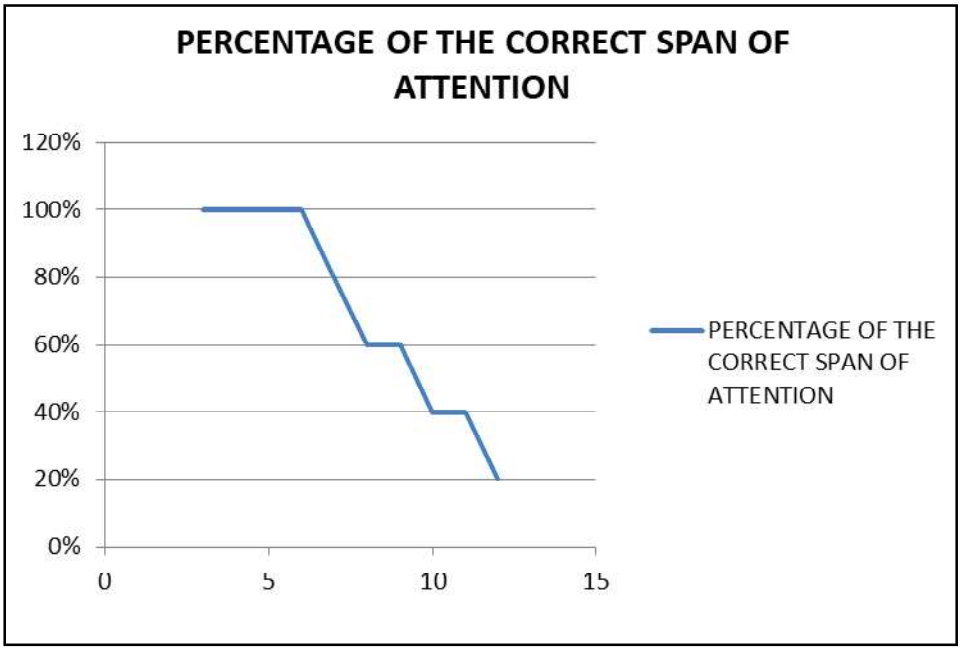
| CARD NUMBER | ACTUAL NUMBER OF DOTS SHOWN | ACTUAL NUMBER OF DOTS RESPONDED IN 5 TRIALS | | | | | TOTAL NUMBER OF CORRECT DOTS RESPONDED | PERCENTAGE OF THE CORRECT SPAN OF ATTENTION |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | | |
| 1 | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 100% |
| 2 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 100% |
| 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 100% |
| 4 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 100% |
| 5 | 7 | 7 | 7 | 8 | 7 | 7 | 4 | 80% |
| 6 | 8 | 7 | 8 | 8 | 8 | 9 | 3 | 60% |
| 7 | 9 | 9 | 10 | 8 | 9 | 9 | 3 | 60% |
| 8 | 10 | 11 | 11 | 11 | 10 | 10 | 2 | 40% |
| 9 | 11 | 12 | 10 | 11 | 12 | 11 | 2 | 40% |
| 10 | 12 | 11 | 12 | 11 | 11 | 10 | 1 | 20% |

After completion of the experiment, the introspective report was taken and the subject was thanked for his co-operation and was allowed him to leave the laboratory room.

After that the percentage of span of attention for each card was found out. The percentage of span of attention was shown graphically. For this purpose two ordinates 'X' and 'Y' was drawn in the graph paper where X-axis represented the number of dots and

Y-axis represented the percentage of the span of attention. Percentage was plotted on the graph paper and points were joined in a straight line.

**Fig: 3.1**




Result: The results of the experiment are shown in worksheet number 3.1. It shows the percentage of correct apprehension and Fig-3.1 of the graphical representation shows the number of dots and the percentage of correct apprehension.

Introspective report: "When the dots were less it was easy to pay attention, but when the number of dots were gradually increasing it was very difficult for me to concentrate. But overall I found it very interesting."

Observation and discussion: From the experiment it can be observed that the span of visual apprehension gradually decreases with the increase of number of stimuli (dots). In 5 trials, the 10 set of card is where dots are presented varying from 3 to 12 on each card is shown to the subject. The subject's visual span of attention is 100% in case of 6 dots. It means from 3 to 6 number of dots, the subject is able to give 100% attention. But in case of more than 6

dots subject's attention gradually decreases and the percentage of correct span of attention is 80% in case of seven (7) dots. Similarly with 8 and 9 dots it reaches the level of 60% span of attention. While with 10 and 11 dots the total number of correct dots responded by the subject is only 2 and correct span of attention is 40%. And in 12 number dot the subject is able to respond only 1 trial correctly. So the correct span of attention is only 20%. It makes us clear that the subject's span of visual apprehension gradually decreases with the increase of the number of stimuli. Hence, it is clear that as the number of dots are increased like 7, 8, 9 then the subject's level of visual apprehension gradually decreases. Therefore, the hypothesis can be soundly accepted.



**ACTIVITY 3.1**

Conduct an experiment of your own to test the span of attention by preparing the cards with number of dots and with proper graphical representation.

## 3.5 CONCEPT OF SPAN OF APPREHENSION

Span of apprehension is the maximum number of stimuli or units of information that can be processed at one time after brief presentation. Span of apprehension directly determines short-term memory capacity. The term "span of apprehension" is sometimes used interchangeably with attention span, though technically span of apprehension refers to a more basic processing capacity that influences attention span.

The idea of span of apprehension aroused out of efforts in the field of cognitive psychology to demonstrate the processes by which information is transferred from sensory storage to short-term memory, and the constraints on the transfer.



**CHECK YOUR PROGRESS**

**Q 6:** Fill in the blanks:

a) Span of apprehension directly determines…….....

b) Span of apprehension is the effort of ……. psychology.

c) Through span of apprehension information is transferred from…….. to ……

### 3.5.1 Experimental finding through span of apprehension

**Title:** Span of apprehension

**Objective:** To make a comparative study of the subjects span of apprehension for letters and digits by constant stimuli method.

**Hypothesis:** The span of apprehension for digits is larger than the span of apprehension for letters.

**Apparatus and Materials:** The apparatus and materials used for this experiment are-

1) Tachistoscope
2) One set of eight cards consisting of certain alphabets ranging from 3 to 10 (Set I)
3) One set of 8 cards consisting of digits ranging from 3 to 10 (Set II).
4) Graph paper.
5) Record sheet.
6) Stationery.

**Subject:** Name:

Age:

Sex:

Educational Status:

Date:

Time:

Place:

**Description of the apparatus:** In the experiment, the apparatus known as 'Tachistoscope' will be used. The apparatus is mounted on a wooden frame. The front of the apparatus is covered by a metallic sheet which is painted in black. In the middle of the metallic front there is a rectangular wooden box that is fitted with a glass through which materials used in the experiment may be exposed. Cards of the size of the slit may be inserted in the box and may be kept tight behind the glass with the help of a wooden mechanism fitted with springs. On the back of the apparatus, there is a metallic door with a bigger slit. The door is used for exposing experimental materials through the slit in the apparatus. A releaser is there to release the falling door.

**Preparation of the cards:** While preparing the cards the experimenter must see that the letters or digits of the cards should be so randomly placed on the cards that they do not form any designs or meaningful words. The letters or digits written in the cards should be equally spaced and should be written in block letters. The number of digits should be from 3 to 10. For performing the experiment, the experimenter prepared two sets of eight cards with letters in one set and digits in the other set. After that the experimenter put the apparatus before the subject and gave the following instructions-

"First of all you will be shown some cards with letters in them. You will be shown the cards for a fraction of second. Please pay attention as soon as the cards are shown to you. After seeing the cards you have to report the number of letters you have seen. Are you clear with my instruction?"

After giving the instruction the experimenter exposed the cards to the subject with a ready signal after placing the card on the card holder. As soon as the door exposed the card, the subject reported the number of letters seen. The experimenter presented

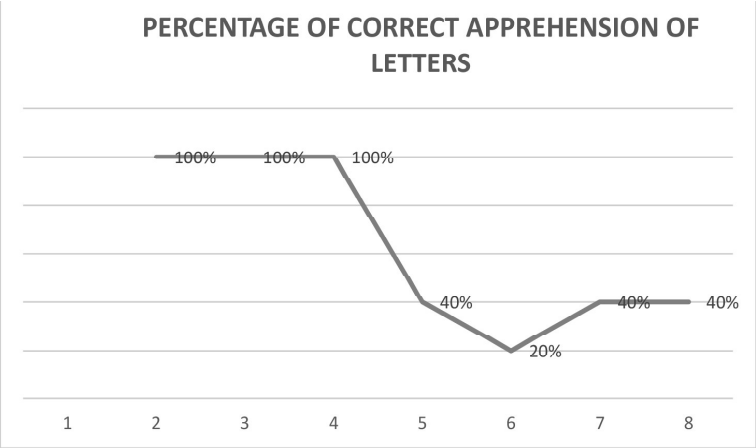
the cards in a random order and stopped when the cards had been exposed forty times. (Each card had been shown for 5 times). To neutralize the effect of eye strain a rest interval of 10 minutes was given to separate the two phases of the experiment.

**Worksheet-3.2**

**Data showing right and wrong apprehension of letters of each card from trial to trial**

| Card Number | Actual number of letters | Number of trials | | | | | Correct responses | Percentage of correct apprehension |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | | |
| 1 | 3 | √ | √ | √ | √ | √ | 5 | 100% |
| 2 | 4 | √ | √ | √ | √ | √ | 5 | 100% |
| 3 | 5 | √ | √ | √ | √ | × | 5 | 100% |
| 4 | 6 | √ | × | × | √ | × | 2 | 40% |
| 5 | 7 | √ | × | × | × | × | 1 | 20% |
| 6 | 8 | × | × | √ | √ | × | 2 | 40% |
| 7 | 9 | × | × | × | √ | √ | 2 | 40% |
| 8 | 10 | × | × | × | √ | × | 1 | 40% |

**Fig: 3.2**



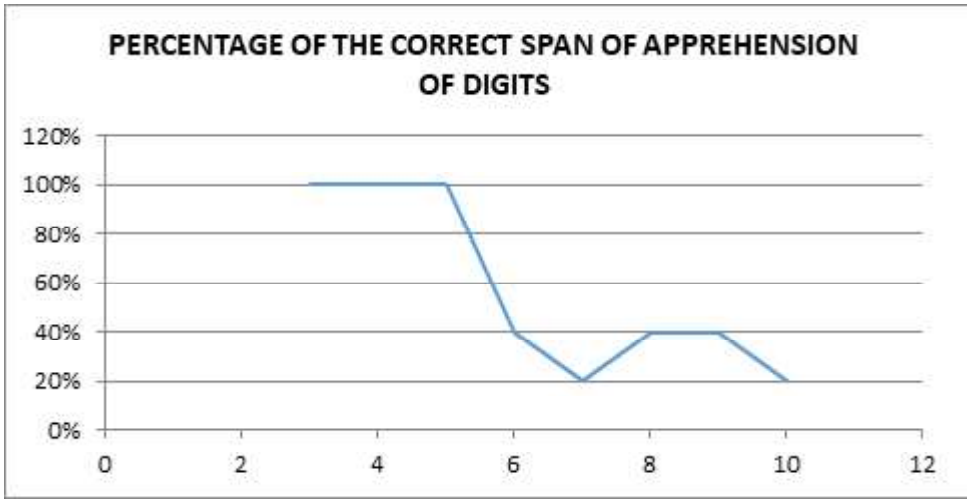
In the second phase of the experiment, the experimenter in a similar way, presents the number of cards with digits one by one and in the same way the subject reported the number of digits seen by him. The data showing the right and wrong number of apprehension of digits is shown in the worksheet below-

**Data showing right and wrong apprehension of digits of each card from trial to trial**

**Worksheet 3.3**

| **Card Number** | **Actual number of digits** | **Number of trials** | | | | | **Correct responses** | **Percentage of correct apprehension** |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | | |
| 1 | 3 | √ | √ | √ | √ | √ | 5 | 100% |
| 2 | 4 | √ | √ | √ | √ | √ | 5 | 100% |
| 3 | 5 | √ | √ | √ | √ | √ | 5 | 100% |
| 4 | 6 | √ | × | × | √ | × | 2 | 40% |
| 5 | 7 | √ | × | × | × | × | 1 | 20% |
| 6 | 8 | × | × | √ | √ | × | 2 | 40% |
| 7 | 9 | × | × | × | √ | √ | 2 | 40% |
| 8 | 10 | × | × | × | √ | × | 1 | 20% |

**Fig-3.3**




When the experiment was over the subject was thanked for his co-operation and was allowed to give his introspective report and take leave from the laboratory room.

**Introspective report:** "It was difficult for me to give correct answer after seeing letters and digits but gradually I could respond. It was an interesting experiment for me."

**Result:** The results of the experiment are shown in Worksheet 3.2 and 3.3. It has also been shown graphically. Two graphs were shown separately for letters and digits (Fig 3.2 and Fig 3.3). The percentage of correct apprehension was plotted on the graph paper and points were joined by the straight lines.

**Observation and discussion:** From the experiment it can be observed that the subject was found to be doing better in remembering digits. It was easier for the subject to remember the digits than letters. The percentage of correct apprehension of digits was more than letters. Hence, we can safely retain our hypothesis.



**ACTIVITY 3.2**

Conduct an experiment of your own to test the span of apprehension by preparing the cards with number of digits and with proper graphical representation.

## 3.6 CONCEPT OF DIVISION OF ATTENTION

Attention is said to be the concentration of conscious mind or focusing of consciousness at a particular object, idea or situation at a particular point of time. Accordingly attention cannot be given to more than one object at a time. It is indivisible. Although there are people who can do more than one thing at a time, that seems to divide attention to more than one object. An expert lady can talk while knitting wool with her hand. An experienced driver can talk and smoke while driving the car. In such cases it seems to be obvious that one can attend to two or three activities at a time out of the division of attention. This division of mind and attention seems to be an extra-ordinary ability of a person. Division of attention means a simultaneous focusing upon two separate activities. The activities should be separated from each other; like both of the activities should be combined in a group or one of the two activities should not be automatic.

Psychologists have undertaken observation and experiment in this regard. They have given the testee to do two things at a limited period of time and observed the nature of reaction and behaviour of individual in such cases. They have found that the testee could not do well either of the two activities by dividing their attention in mind. They also needed more time to do so. It was also found about 40% of efficiency in each kind of activity has suffered. Out of the result of such experiment it may be maintained that division of attention cannot take place as a matter of fact. Concentration of mind cannot be divided into two or more activities at a particular point of time. It is an illusory concept of the common people. Here, it should be noted that one can do two things at a time out of habit. Habitual activity needs no attention or concentration of mind.

Many researchers have tried to study the effect of the division of attention on the work product. It has been found that the work products suffer less if both the tasks are simple and similar but in the case of difficult and dissimilar tasks, the division of attention surely results in deterioration of both quality and quantity of nearly all the tasks attended and performed simultaneously by an individual. It is very rare that division of attention

produces no effect. It has happened only in exceptional cases of individuals like the famous figure of the late Hardayal and mathematics wizard Shakuntalaji or in case when except for one, the remaining tasks can be performed automatically requiring the least or no attention.



**CHECK YOUR PROGRESS**

**Q 7:** What do you mean by division of attention?

.....

.....

### 3.6.1 Experimental findings through division of attention

**Title:** Division of Attention.

**Objective:** To verify the hypothesis that efficiency of work or attention decreases when two tasks are performed at the same time.

**Hypothesis:** The output of the work is decreased in both tasks when they are performed simultaneously.

**Materials used:** a) Two physical task

b) Two mental task

c) One Physical and one mental task.

d) A stop Watch

e) Record Sheets

f) Stationery

**Subject:** Name:

Age:

Sex:

Educational Status:

Date:

Time:

Place:

**Procedure:** In this experiment the subject is provided with three conditions. In the first condition the subject is provided with a single task. In the second condition the subject is again provided with another task and in the third condition the subject is required to perform both the tasks equally at the same time. Let us now discuss in detail all the three conditions performed by the subject in the experiment.

In the first condition the subject is asked to write a letter of the alphabet say 'S' with right hand for 2 minutes and then the number of 'S' written by the subject is counted and recorded under 'S1' in Table-1. After that the subject is again asked to write the letter 'D' with left hand similarly for 2 minutes and then again it is counted and recorded under 'S2' in Table-I. The subject is then asked to write the letter 'S' with right hand and letter 'D' with left hand at the same time for 2 minutes and the number of 'S' and 'D' are counted and written under D1 and D2 in table I respectively. The example of the first condition is presented below:

| **Subject Written alphabet 'S' with right hand** | **Subject Written alphabet 'D' with left hand** |
|---|---|
| S S S

table II. After that the subject is asked to tell every 3rd alphabet starting from 'A' and when the subject comes to 'Z' the subject is to continued back from 'A'. The subject was asked to stop after 2 minutes. The number of the correctly spoken alphabet were counted and written under S2 in table II. At the end of the second condition the subject was asked to write down every 4th number and speak out the third alphabet at the same time. The experimenter recorded the alphabets spoken by the subject and counted the correct number of alphabet and written numbers under D1 and D2 respectively in table II. The example of the second condition is given below:

| **Natural Numbers Written by the Subject** | **Alphabets Spoken by the Subject** |
|---|---|
| 4 8 12 16 20 24 28……<br>Total= 30 | C F I L O R U X A D……<br>Total= 36 |
| Natural number Written by the Subject | Alphabets Spoken by the Subject |
| 4 8 12 16 20 24 28 32……..<br>Total= 15 | C F I L O R U X A D……<br>Total = 18 |

For the third condition the subject was asked to write the letter 'S' with right hand and to tell every 3rd letter of the alphabet at the same time for 2 minutes. The correctly written alphabets and correctly spoken alphabets were counted and recorded under D1 and D2 in table-II. The example of the third condition is presented below:

| **Letter 'S' written by the subject with right hand** |
|---|
| S S S

RESULT: The result of the experiment is shown in Table-I, Table-II and Table-III respectively. To find out the result in this experiment, the formula $CD = \frac{D1 + D2}{S1 + S2}$ was applied to determine the co-efficient of division of attention. If efficiency is affected by the division of attention between two tasks than the co-efficient will be always less than 1.

**Table I**

| S1 | S2 | D1 | D1 |
|---|---|---|---|
| 100 | 20 | 15 | 13 |
| $CD = \frac{D1 + D2}{S1 + S2} = \frac{15 + 13}{100 + 20} = \frac{28}{120} = 0.23 < 1$ | | | |

**Table II**

| S1 | S2 | D1 | D1 |
|---|---|---|---|
| 30 | 36 | 15 | 18 |
| $CD = \frac{D1 + D2}{S1 + S2} = \frac{15 + 18}{30 + 36} = \frac{33}{66} = 0.5 < 1$ | | | |

**Table III**

| S1 | S2 | D1 | D1 |
|---|---|---|---|
| 100 | 36 | 30 | 10 |
| $CD = \frac{D1 + D2}{S1 + S2} = \frac{30 + 10}{100 + 36} = \frac{40}{136} = 0.29 < 1$ | | | |

**OBSERVATION AND DISCUSSION**

Division of attention means simultaneous focusing of attention upon two separate activities, whether they are physical or mental tasks given at the same time. The subject shifts attention back and forth from one task to the other. The subject losses

efficiency in performing the task as found out in the results of the present experiment.

In the experiment it was observed that the subject had a shift of attention in performing double task as it is quite difficult to write the 4th number of the natural numbers and to speak out every 3rd letter of the alphabet. Similarly, it is also seen that in case of the double task, there is a decrease in scores in D1 and D2 in all the three tables (Table I, Table II, and Table III). It is also seen that writing and speaking at the same time is quite a difficult task as seen in the two mental tasks. From this experiment it is clear that the subject's efficiency was affected by the division of attention between the two mental tasks. Hence, it can be said that the double task of both mental and physical task appear to be very difficult and thus our hypothesis can be retained.



## 3.7 LET US SUM UP

- Attention is a mental effort or striving to control or regulate the conscious mind. Attention was originally considered as an inborn mental faculty and due importance was given on the cognitive or intellectual aspect of mind in attention.
- Attention as a process is carried out through cognitive abilities and helped by emotional and conational factors to select something out of the various stimuli present in one's environment and then bring it in the center of one's consciousness in order to perceive it clearly for deriving the desired ends.
- There are generally two causes or determinants of attention- objective and subjective conditions. The objective conditions or determinants of attention are size, intensity, mobility, novelty, change, secrecy, situation, discipline, and contrast, and rareness, strangeness of any object or thing. Again subjective conditions of attention are interest, temperament, instinct, emotion, sentiments, desire, past-experiences and habit.
- Attention is of two types- Volitional or voluntary attention and Non-

Volitional or involuntary attention. Again volitional attention is again sub-divided into two categories- implicit and explicit volitional attention and non-volitional attention is also classified into enforced and spontaneous non-volitional attention.

- Attention can be sustained through formation of habit, disciplinary rules, formation of ideal environment, making situation free from distraction, dynamic nature of teaching, learning by doing, formation of sentiment, creating motivation and development of will-force.
- Attention has certain limitations so far as the number of objects on immediate presentations is concerned. One cannot attend to too many things when presented at a time. Span or range of attention is the limit to which one can attend to a number of objects on immediate presentation.
- Psychologists have determined limits of attention by using an apparatus called "Tachistoscope". It comes from the Greek word "Tachistos" which means "quick" and "scope" which means "to see".
- Span of apprehension is the maximum number of stimuli or units of information that can be processed at one time after brief presentation. Span of apprehension directly determines short-term memory capacity.
- Division of attention means a simultaneous focusing upon two separate activities. The activities should be separated from each other; like both of the activities should be combined in a group or one of the two activities should not be automatic.



## 3.8 FURTHER READINGS

1) Mangal S.K 2007: Essentials of Educational Psychology, Prentice Hall of India Private limited, New Delhi.
2) Saikia Dr. Lutfun Rasul 1997: Psychological and statistical Experiments in Education, Saraighat Printers, M.C. Road, Guwahati.
3) S.S Chauhan 2007: Advance Educational Psychology, Vikash Publishing House, New Delhi.

## 3.9 ANSWERS TO CHECK YOUR PROGRESS

**Ans to Q No 1:** Attention is a mental effort or striving to control or regulate the conscious mind. It involves the way we attend to or concentrate or focus on a task. It is the cognitive process of selectively concentrating on one aspect of the environment while ignoring other things.

**Ans to Q No 2:** The four characteristics of attention are:

- Attention is a striving activity of mind.
- Attention is essentially a process and not a product.
- It helps in our awareness or consciousness of our environment.
- At one time we can concentrate or focus our consciousness on a particular object only.

**Ans to Q No 3:** Determinants or causes of attention depend upon external and internal factors. The four important determinants of attention are size and novelty of the object which is external or objective by nature and interest and desire of a person which is subjective by nature.

**Ans to Q No 4:** Span of attention is the limit to which one can attend to a number of objects on immediate presentation. It is the amount of concentrated time on a task without becoming distracted. It may be defined as what one can perceive in terms of number of objects stimuli on account of a mere glimpse of the environment in which stimulus or object are present.

**Ans to Q No 5:** Sir William Hamilton, in the year 1859, first of all tried to perform experiments on the span of attention.

**Ans to Q No 6:** a) Short-term memory capacity.
b) Cognitive
c) Sensory storage to short-term memory.

**Ans to Q No 7:** Division of attention means a simultaneous focusing upon two separate activities. The activities should be separated from each other; like both of the activities should be combined in a group or one of the two activities should not be automatic.



## 3.10 POSSIBLE QUESTIONS

**Very Short Questions** (Answer each question in about 50 words)

**Q 1:** Define attention.

**Q 2:** What do you mean by non-volitional attention?

**Q 3:** What do you mean by volitional attention?

**Q 4:** What is enforced non-volitional attention?

**Q 5:** What do you mean by spontaneous non-volitional attention?

**Q 6:** What is implicit volitional attention?

**Q 7:** What is explicit volitional attention?

**Short Questions** (Answer each question in about 150 words)

**Q 1:** Discuss the nature of attention.

**Q 2:** Explain how attention can be sustained?

**Q 3:** Give a brief description of 'Tachistoscope'.

**Long Questions** (Answer each question in about 300-500 words)

**Q 1:** Discuss in detail the causes or determinants of attention.

**Q 2:** Conduct an experiment of your own to determine division of attention.

*** ***** ***

# UNIT 4: PERSONALITY

## UNIT STRUCTURE


4.1 Learning Objectives

4.2 Introduction

4.3 Need and Importance of Personality Test

4.4 Inkblot Test

4.5 Free-word Association Test

4.6 Thematic Apperception Test

4.7 Let Us Sum Up

4.8 Further Reading

4.9 Possible Questions


## 4.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- Identify the needs and importance of personality test
- Explain the importance of Inkblot test
- Describe the role of Thematic Apperception Test in assessing personality.

## 4.2 INTRODUCTION

Test is necessary for assessing, measuring and evaluating the performance of a person, a situation, an institution and so on. Test is a foundation on the basis of which further activities are undertaken in order to get the result regarding a system or a person. It helps to systematize a problem in order to ensure the solution to that problem. Thus, test helps to find out if the system is going in the right direction or not. In an educational institution, for assessing and evaluating reliability and validity, the course for constructing a test is a must. Test helps the individual to design and develop the items in a systematic way so that a result can be achieved. Test is a must for removing the pitfalls n an item, in a system or in a situation in order to ensure the effectiveness of the particular objects. In an

educational institution, psychological tests are conducted for projecting the personality and the behavior of the learners. In this unit, we are going to discuss the importance of some techniques which are essential for assessing and projecting the personality of a human being.

## 4.3 NEED AND IMPORTANCE OF PERSONALITY TEST

The term personality has been derived from the Latin word 'Persona'. Persona means mask. According to the concept of mask, personality was thought to be the effect and influence of an individual wearing a mask. Psychologically, personality is the integrated and dynamic organization of the physical, mental, moral, and social qualities of the individual that manifests itself to others in social life.

Personality is the reflection of the sum total of human behavior. Personality is an area of study that deals with complex human behavior, including emotions, actions, and cognitive (thought) processes. Psychologists study the patterns of behavior that make individuals different from one another. Regarding personality, it was rightly opined by Allport that Personality "is the dynamic organization within the individual of those psycho logical systems that determine his unique adjustment to his environment": This definition is very comprehensive and includes all aspects of an individual's personality. Here, the word 'dynamic' means that personality of an individual undergoes constant change but is stilt organized. It constitutes two types of systems: mental and physical, and these two systems interact with the internal and external environments. The word 'determine' emphasizes that it is the psychophysical system, which activates the organisms for action.

Therefore, to have a better understanding on the students, studying personality is an essential pre-requisite for an educational institution. The psychological understanding for a teacher is essential to have a better understanding of the pupil in the classroom. Psychological testing provides the knowledge to understand the personality of the students as well as learners and individuals. In psychology, there are many theories of

personality which discuss the personality of human beings in terms of its varied dimensions.

Test construction is made in terms of psychological test, physiological test, and diagnostic test and so on. In an educational institution, psychological tests are mostly used. Psychological tests have been used primarily for the determination and analysis of individual differences in general intelligence, specific aptitudes, educational achievements, vocational fitness and non-intellectual personality traits and so on. Non-intellectual personality traits are associated with age, sex, and racial membership, differences that might be attributed to heredity or environmental factors, differences among persons at different occupational levels and other personality traits such as the mentally gifted, the mentally retarded, the neurotic and the psychotic.

Psychologists have developed various theories of personality to study its structure and growth. We know that personality is revealed in the distinctive characteristic ways in which one reacts to everyday situations. Personality always functions as a whole. But psychologists seem to emphasize the examination of personality from different angles, such as, types, traits, nature etc., and this has made the topic a complex one. However, it will not be possible for us to describe all types of theories in this discussion. By testing personality, the psychologists and teachers can project the behavior, the attitudes, the emotional levels, the sentiments of the learners and so on. There are various techniques and procedural steps that can project the personality of the human beings. Rorschach Inkblot Test and Thematic Apperception Test are the two best and easiest ways or techniques for projecting the personality of the individuals. The Rorschach Technique and the TAT are prominent not only in psychology but also in anthropology, sociology, education and psychiatry.

## 4.4 INKBLOT TEST

The Rorschach test is also known as the Rorschach Inkblot Test, or the Rorschach Technique or simply the Inkblot Test. It is a psychological

test in which subjects' perceptions of inkblots are recorded and then analyzed using psychological interpretation, complex algorithms, or both. Some psychologists use this test to examine a person's personality, characteristics and emotional functioning. It has been used to detect underlying thought disorder, especially in cases where patients are reluctant to describe their thinking processes openly. The test is named after its creator, Swiss psychologist Hermann Rorschach.

In the 1960s, the Rorschach Technique was the most widely used projective test. In a national survey conducted in the US, the Rorschach Technique was ranked eighth among all psychological tests used in outpatient mental health facilities. It is the second most widely used test, by the members of the Society for Personality Assessment and to some extent (about 20%), it is used for forensic assessment cases. This Inkblot Test is mostly used by clinical psychologists (about 80%) for diagnosis of the patients.

Later on, the Rorschach Inkblot Tests have been becoming popular and in 1857, the inkblots inspired the German doctor Justinus Kerner who wrote a popular book of poem, each of which was inspired by an accidental inkblot. French psychologist Alfred Binet had also experimented with inkblots as a creativity test, and, after the turn of the century, psychological experiments where inkblots were utilized multiplied, with aims such as studying imagination and consciousness.

Rorschach began his experiments with inkblots as a means of stimulating and testing imagination. First time, this technique was used, for content analysis, but later on Rorschach changed the emphasis from content to determinant analysis. It consists of ten cards. Rorschach developed his test and methods as a practical tool to be applied to clinical cases in the study of unconscious factors in perception and meaning and to reveal dynamic factors of behavior and personality. In this test, it was believed that every performance of an individual is an expression of his or her total personality. In responding to inkblot, the subject is generally unaware of what he or she reveals by the reports of what he or she sees. In fact, the perception on what he or she is telling brings forth the insight of his or her

personality.

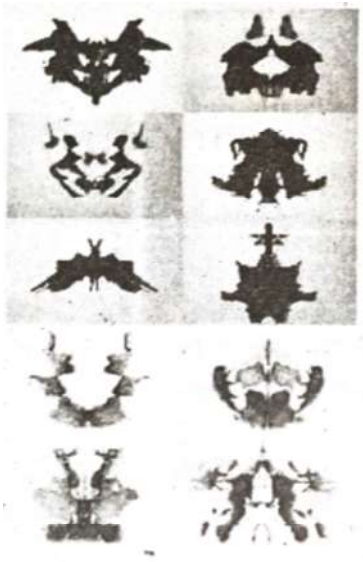


Fig 1: Images of Cards

**In card I,** subjects often inquire about how they should proceed, and question on what they are allowed to do with the card. Being the first card, it can provide clues about how subjects tackle a new and stressful task. it is not, however, a card that is usually difficult for the subject to handle, having readily available for popular responses.

**In card II,** the red blots are often seen as blood, and are the most distinctive features. Responses to them can provide indications about how a subject is likely to manage feelings of anger or physical harm.

**Card III** is typically perceived as containing two humans involved in some interaction, and may provide information about how the subject relates with other people.

**Card IV** is dark in color and is generally perceived as a big and sometimes threatening figure; compounded with the common impression of the subject being in an inferior position ("looking up") to it, this serves to elicit a sense of authority. The human or animal content seen in the card is almost invariably classified as male rather than female, and the qualities expressed by the subject may indicate attitudes toward men and authority. Because of this, Card IV is often called "The Father Card".

**Card V** is an easily elaborated card that ¡s not usually perceived as threatening, and typically instigates a change of pace" in the test, after the previous more challenging cards. It contains few features that generate concerns or complicate the elaboration, and it is the easiest blot to generate a good quality response.

Texture is the dominant characteristic of card VI, which often elicits association related to interpersonal closeness; it is specifically a "sex card".

**Card VII** can be associated with femininity (the human figures commonly seen ¡n it being described as women or children), and functions as a "mother card", where difficulties in responding may be related to concerns with the female figures ¡n the subject's life.

People often express relief about card VIII, which lets them relax and respond effectively. Similar to card V, it represents a "change of pace"; However, the card introduces difficulties ¡n elaboration, it being complex and the first multi-colored card in the set. Therefore, people who face complex situations or emotional distress or difficulty, may be uncomfortable with this card.

Characteristic of card IX is that it is indistinct and creates general vagueness.

**Card X** is structurally similar to card VIII, but its uncertainty and complexity are reminiscent of card IX: people who find it difficult to deal with many concurrent stimuli may not particularly like this otherwise pleasant card. Being the last card, it may provide an opportunity for the subject to "sign out" by indicating what they feel their situation is like, or what they desire to know.

**Procedure of the Test:**

The Rorschach test is used from nursery school level through adulthood It consists of ten cards approximately 18×24 cm in size. Each of the blots has near-perfect bilateral symmetry; five are kin black and white with differently shaded areas; two contain black, white, and color in varying amounts (e.g. red), three are in various color or multicolored on a white background. After the test, subject has seen and responded to all of the inkblots (free association phase), the tester then presents them again one

at a time in a set sequence for the subject to study. The subject is asked to note where he or she sees what he or she originally saw and what makes it look like that inquiry phase. It means the instructions are very simple; the subject is asked by showing the cards, according to Rorschach's own formula: what does it look like? What could this be? etc. and the specialists and clinicians should draw out the fullest possible responses of the subject or patients ¡n each card for making a better diagnosis in. their treatment.

In this test, Rorschach did not impose time limit. Hence, there are no fixed time restrictions in terms of the number of responses for each card. The examiner makes note of the various aspects of the subject's behavior namely a verbatim record of the response; time passed between presentation of each card and the reaction time, length of time in long pauses between responses; total time required for each card, position in which card is held for each response and so on. The three recordings of time are useful in determining emotional resistance to what the individual might be perceiving in a particular inkblot.

After all ten cards have been presented for responses, a second phase i.e. the inquiry follows. There are two main purposes of the inquiry. The first s to learn which aspects of the blot initiated and sustained the association process response to wholes, parts, small details location, color, shading- all of which are essential items of information for scoring purposes. Second, the inquiry gives the subject an opportunity to add to, or clarify his original response.

After inquiry, the scoring part is necessary in Rorschach's method. Scoring is based on four categories i e. location determinants content and interpretation. The interpretation of a Rorschach record is a complex process. It requires a wealth of knowledge concerning personality dynamics in general and a considerable experience with the Rorschach method in particular. Proficiency as a Rorschach administrator can be gained within a few months. However, even those who are able and qualified to become Rorschach interpreters usually remain in a "learning stage" for a number of years.

The interpretation of the Rorschach test is not based primarily on the contents of the response, i.e., what the individual sees in the inkblot (the content). In fact, the contents of the responses are only a comparatively small portion of a broader cluster of variables that are used to interpret the Rorschach data: for instance, information is provided by the time taken before providing a response for a card can b& significant. In particular, information about determinants (the aspects of the inkblots that triggered the response, such as form and color) and location (which details of the inkblots triggered the response) is often considered more important than content, although there is contrasting evidence. "Popularity" and "originality" of responses can also be considered basic dimensions in the analysis.

**Content:** Content is classified in terms of "human", "nature", "animal", "abstract", etc. More than any other features in the test, content response can be controlled consciously by the subject.

**Location:** This section requires expansion. The basis for the response is usually the whole inkblot, a large portion, a small portion, a minute detail, or part of the white background. The area may be well defined, or merely vague and blurred. Analysis of the responses in respect to location is revealed to the extent of the subject's perceptual organization or disorganization, and is measured in terms of agreement with norms of perception and ability to analyses the whole and synthesis the parts.

**Determinants:** Determinants are also known as characteristics. It includes the determinants or characteristics of the inkblot as perceived by the subject. The determinants are those aspects o: qualities of the blot that have produced the responses to it. These may be form, color, shading, perspective, motion or the combinations of them. Form is the most common determinant, and is related to intellectual processes; color responses often provide direct insight into emotional life. Shading and movement have been considered more ambiguously, both in definition and interpretation.

**Interpretation:** After getting the score in each response and then tabulating the results, the next and significant step is to analyse the relationships existing between the frequencies in several categories. For example, to analyse the relationship between the ratio of wholes to larger

details and to minute details, relationship between colour and movement etc. From this part, the personality of the individual or the subject can be drawn. Rorschach Comprehensive System (RCS) is the standard method for interpreting the Rorschach test.

**Validity and Reliability of the Test:** Through this method, the experienced, skilled and expert clinicians are able to draw remarkably acute and sound inferences from Rorschach protocols: but this is a subjective matter. Ideally, the test should draw out the reliability and validity of the inkblot test objectively. There are several problems and principles that should be kept in mind in evaluating studies on the reliability and validity of the Rorschach test. First, while certain part-scores are significant, interpretation is essentially global in character, but there are no satisfactory statistical methods to deal with universal patterns of responses as yet. Secondly, rating and scoring of responses introduce a greater subjective element. In fact, the scoring method of Rorschach Comprehensive System (RCS) is very subjective.

## 4.5 FREE WORD ASSOCIATION TEST

**Test on Free Word Association**

**OBJECTIVE:** To study the nature of the subject with reference to a list of words.

**MATERIALS:**

1) A LIST OF 30 STIMULUS WORDS.
2) A stopwatch
3) A screen
4) A record sheet
5) Stationery like pen, paper, graph, scale, pencil, eraser etc.

**SUBJECT'S DATA:-**

| | |
|---|---|
| Name: xxxxxxxx | Date: |
| Age: | Time: |
| Sex: | Place: |
| Status: | |

**PROCEDURE:** A suitable corner of the psychological laboratory of the Department of education was selected for conducting the experiment were kept ready. A list consisting of 30 stimulus words having different associative word was kept ready along with a stopwatch to record the time. A record sheet was also prepared having 6 columns such as serial numbers, stimulus words, and subject's response word, time taken in seconds, introspective report and law of association. A screen was also kept ready which was also kept ready which was to be placed the experiments and the subject in conducting the experiment.

After arranging the materials to be used in the experiment, the subject was invited to the laboratory room and was asked to sit comfortably opposite to the experiments. The necessary information about comfortable or not.

On getting a positive reply, the experiments instructed the subject in the following manner, - "See, this is a simple experiment, I am going to do with you. Here, I will utter 30 stimulus words one by one and you have to give a response word after hearing each word. For example, if I say 'come' your response may be 'go' or other words which comes to your mind. Please be very careful and attentive to the word I say. There is no time limit but try to give your response as soon as possible. In the process of giving your responses, you have to give an introspective report which brings out the associative meaning of the stimulus words and the response word. Are you clear with my instruction?"

After getting a positive reply, the experiment was started. The experimenter placed screen in between the subject and herself in order to abstract the subject's view to the worksheet. The experiments then uttered the 30 stimulus words one by one and the subject tried to respond to each and every word by taking the minimum possible time which was recorded by the experimenter in the worksheet. For each response, the subject also tried to give an introspective report expressing the meaning she tried to convey word. In this way, the subject responded to all the 30 stimulus words and the experiments recorded the response words, time taken in seconds by the subject and the introspective report in the worksheet. After completing

the experiment the subject was thanked for her co-operation and was allowed to leave the laboratory room after singing the worksheet.

**INTROSPECTIVE REPORT:**

The experiment was very interesting. At first, I found some difficulty in responding to the stimulus words. But gradually, it became easy and I tried to respond as quickly as possible. I enjoyed my task in the experiment.

**RESULT:** After conducting the experiment, the total time taken by the subject was calculated and it was found to be 157 seconds. Then by using the following formula, the average reaction time taken by the subject was calculated which is shown in the records.

$$\text{Average Reaction time} = \frac{\text{Total time in seconds}}{\text{Total no. of words}}$$

$$= \frac{157}{30}$$

$$= 5.23 \text{sec/word}$$

The result can also be represented through the graph.

**OBSERVATION:** From the result of the experiment, it has been observed that the subject had to think seriously in order to give the appropriate associative response words to some of the stimulus words, which resulted in more time consumption on the part of the subject. It has also been found out that the subject's response words mostly falls under the law of contiguity which means having some relation. From this free word association test, we came to know the nature of thinking of the subject. As the experiment provides freedom of thinking the subject could think and give any kind of associate response word to the stimulus words without any obligations.

## 4.6 THEMATIC APPERCEPTION TEST

The Thematic Apperception Test (TAT) is a projective psychological test and develops the imaginative capacity of the person. Proponents of this technique assert that a person's responses reveal underlying motives, concerns, and the way they see the social world through the stories they

make up about ambiguous pictures of people. Historically, it has been among the most widely researched, taught, and used of such tests.

The TAT was developed during the 1930s by the American psychologist Henry A Murray and the psychoanalyst Christiana D. Morgan at the Harvard Clinic at Harvard University. Anecdotally, the idea for the TAT emerged from a question asked by one of Murray's undergraduate students, Cecilia Roberts. She reported that when her son was ill, he spent the day making up stories about images in magazines and she asked

Murray if pictures could be employed in a clinical setting to explore the underlying dynamics of personality.

Murray wanted to use a measure that would reveal information about the whole person but found that the contemporary tests of his time lacked so many things. Therefore, he created the TAT The rationale behind the technique is that people tend to interpret ambiguous situations in accordance with their own past experiences and current motivations, which may be conscious or unconscious. After World War II, the TAT was adopted more broadly by psychoanalysts and clinicians to evaluate emotionally disturbed patients. Later, in the 1970s, the Human Potential Movement encouraged psychologists to use the TAT to help their clients understand themselves better and stimulate personal growth.



**Procedure of the Test:** TAT is a projective method that consists of thirty pictures card. The person being examined is told that there is a test

of imagination, that he or she is to make up stories to suit himself or herself, and there is no right or wrong responses. The pictures are shown at a time. The subject is informed that each card shows a scene. The questions, which are to be asked to the subjects should be to tell what he thinks led up to the scene; to say how it came about; to give an account of what is happening and how are the feelings of the characters in the pictures; and to fell what the outcome will be. The cards are used in various combinations, depending upon age and sex. Some of the cards show male figures, some female figures, some both male and female figures, some figures of ambiguous gender, some adults, some children, and some showing no human figures at all, One card is completely blank and is used to elicit both a scene and a story about the given scene from the storyteller. Although the cards were originally designed to be matched to the subject in terms of age and gender, any card may be used with any subject. There is no time limit, but it is good if the subject is encouraged to continue for as long as five minutes on a picture. It is recommended that testing be followed by an interview to learn the origins of the stories, seeking associations to places, name of persons, dates and specific information. This helps the examiner to clarify the meaning of the stories and to evaluate their significance more reliably. Through this test, the personality of the subjects can be projected and also the examiners or the testers are able to understand the mental level, intelligence, sentiments, creativity of the persons as well as the impact of the environment upon the minds of the person etc. Thus, the subject's accounts are not only a product of his or her personality traits but may be a superficial reflection of the cultural forces (e.g. radio, television, movies, comics, current events, reading materials, internet etc.)

**Validity and Reliability of the Test:** Thematic Apperception Tests are meant to evoke an involuntary display of one's subconscious. There is no standardization for evaluating one's TAT responses; each evaluation is completely subjective because each response ¡s unique. Validity and reliability are, consequently, the largest question marks of the TAT. There are trends and patterns which help identify psychological traits, but there are no distinct responses to indicate different conditions of a patient may or

may not have. Medical professionals most commonly use it in the early stages of the patient's treatment. The TAT helps the professionals to identify a broad range of issues that their patients may suffer from. Even when individual scoring procedures are examined, the absence of standardization or norms makes it difficult to compare the results of validity and reliability research across studies. Specifically; even studies using the same scoring system often use different cards, or a different number of cards. Standardization is also absent amongst clinicians, who often alter the instructions and procedures. In fact, this test is very subjective and it produces varied interpretations.



## 4.7 LET US SUM UP

- Test is necessary for assessing, measuring and evaluating the performance of a person, a situation, an institution and so on.
- The term personality has been derived from the Latin word 'Persona'. Persona means mask. According to the concept of mask, personality was thought to be the effect and influence of an individual wearing a mask.
- Psychologically, personality is the integrated and dynamic organization of the physical, mental, moral, and social qualities of the individual that manifests itself to others in social life.
- Personality is the reflection of the sum total of human behavior. Personality is an area of study that deals with complex human behavior, including emotions, actions, and cognitive (thought) processes.
- There are various techniques and procedural steps that can project the personality of the human beings. Rorschach Inkblot Test and Thematic Apperception Test are the two best and easiest ways or techniques for projecting the personality of the individuals.
- The Rorschach Technique and the TAT are prominent not only in psychology but also in anthropology, sociology, education and psychiatry.
- The Rorschach test is also known as the Rorschach Inkblot Test, or the Rorschach Technique, or simply the Inkblot Test.

- The Rorschach test is a psychological test in which subjects' perceptions of inkblots are recorded and then analyzed using psychological interpretation, complex algorithms, or both.
- Some psychologists use this test to examine a person's personality, characteristics and emotional functioning. It has been used to detect underlying thought disorder, especially in cases where patients are reluctant to describe their thinking processes openly. The Inkblot Test is named after its creator, the Swiss psychologist Hermann Rorschach.
- Rorschach began his experimentation with inkblots as a means of stimulating and testing imagination.
- First time, this technique was used for content analysis but later on Rorschach changed the emphasis from content to determinant analysis.
- The Rorschach test consists often cards.
- Rorschach developed .his test and methods as a practical tool to be applied to clinical cases in the study of unconscious factors in perception and meaning and to reveal dynamic factors of behavior and personality. In this test, it was believed that every performance of an individual is an expression of his or her total personality.
- In the inkblot method, the experienced, skilled and expert clinicians are able to draw remarkably acute and sound inferences from Rorschach protocols; but this is a subjective matter.
- The Thematic Apperception Test (TAT) is a projective psychological test and develops the imaginative capacity of the person.
- Proponents of the TAT assert that a person's responses reveal underlying motives, concerns, and the ways they see the social world through the stories they make up about ambiguous pictures of people. Historically, it has been among the most widely researched, taught, and used of such tests.
- The TAT was developed during the 1930s by the American psychologist Henry A. Murray and lay psychoanalyst Christiana D. Morgan at the Harvard Clinic at Harvard University.
- TAT is a projective method that consists of thirty pictures card.

- The person being examined is told that there is a test of imagination, that he or she is to make up stories to suit himself or herself, and there is no right or wrong responses.
- The pictures are shown at a time. The subject is informed that each card shows a scene.
- There is no standardization for evaluating one's TAT responses; each evaluation is completely subjective because each response is unique. Validity and reliability are, consequently, the largest question marks of the TAT.



## 4.8 FURTHER READING

1) Freeman, Frank S (1965) : Theory and Practice of Psychological Testing, Oxford & IBH Publishing Co. Pvt. Ltd
2) en.wikipedia.org/wiki/Rorschach Test
3) en.wikipedia.org/wiki/Thematic Apperception Test
4) www.wikimedia.org images



## 4.9 POSSIBLE QUESTIONS

**Q 1:** What are the procedures of Rorschach Inkblot Test for projecting the personality? Discuss.

**Q 2:** What are the procedures of Thematic Apperception Test for projecting the personality? Discuss.

**Q 3:** Do you think that Rorschach Inkblot Test and TAT are not valid and reliable? Discuss.

*** ***** ***

# UNIT 5: MOTIVATION AND LEARNING

## UNIT STRUCTURE


5.1 Learning Objectives

5.2 Introduction

5.3 Concept and Meaning of Motivation

5.4 Theories of Motivation

5.5 Experimental Findings on the basis of Level of aspiration

5.6 Experimental Findings on the effect of knowledge of result on performance

5.7 Let Us Sum Up

5.8 Further Reading

5.9 Answer to Check Your Progress

5.10 Possible Questions


## 5.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- Understand the concept and meaning of motivation
- Comprehend the various theories of motivation
- Conduct experiment on level of aspiration
- Conduct experiment on the effect of knowledge of result on performance

## 5.2 INTRODUCTION

In the previous semester, you have come across the key concept of motivation. The previous discussion in psychology must have helped you to comprehend that motivation is the most important variable in the process of learning. Motivation instigates one into action. It is an internal state or condition that activates and gives direction to people's thought, feeling and action. Moreover, it is the key component in the effective management of learning process. In this unit, we will be dealing with the brief concept, meaning and theories of education and various experiment related to

motivation.

## 5.3 CONCEPT AND MEANING OF MOTIVATION

It is well known fact that two elements are required to perform any job. Motivation requires the ability to perform the job, and, the will to do the task from within. Until we do not have internal will to do a job, we will not do it in spite of having the ability to do it. This will depend on how important and satisfying the job is for us and need of the job depends on the utility that we derive from the fulfillment of the job. It, thereby, means that utility determines the objectives of the job.

The word motivation is coined from the Latin word "movere" which means to move. Motivation is defined as an internal drive that activates behavior and gives it direction. Motivation can be broadly defined as the forces acting on or within a person that cause the arousal, direction and persistence of goal-directed, voluntary effort. The term motivation theory is concerned with the processes that describe why and how human behavior is activated and directed. It is regarded as one of the most important areas of study in the field of organizational behaviour. There are two different categories of motivational theories such as content theories, and process theories. Motivation theory is thus concerned with the processes that explain why and how human behavior is activated.

Motivation is that internal psychological process that activates the person to fulfill his needs by achieving the objectives. Until this process is not active in the psychological frame of a person, he will remain sit idle or perform below his ability. According to Maslow (1970), motivation is responsible for growth and development. He stated that the need for satisfaction is the most important sole factor underlying motivation. It is the process of motivation which directs one to achieve various goals.



**LET US KNOW**

According to Maslow (1970), motivation is responsible for growth and development. He stated that the need for satisfaction is the most important sole factor underlying motivation. It is the process of motivation which directs one to achieve various goals.

## 5.4 THEORIES OF MOTIVATION

Theories of motivation occupy an important area of discussion in the field of psychology. There are various theories of motivation. In this section, we will discuss about the important theories of motivation-

- **Instinct Theory:** This theory of motivation was propounded by an English psychologist MC Dougall. He pleaded that every human being has some innate powers of instincts. These instincts work as motives also and influence our behaviour. Under the influence of these instincts relationship between the object and the individual established. Sentiments are aroused as a result of this. These sentiments organized an individual emotional life and bring about stability in his behaviour. Thus sentiments are an important factor behind the force of motivation. He explained the importance of self-respect regarding sentiments. An individual's character is evaluated in terms of the stability of his self-respect. If organization of moral sentiments is more stable than the sentiments regarding the self-respect, the character of the person will be strong.
- **Psychoanalytic Theory (Freud, Young and Adler):** According to the advocator of this theory, conscious play main role in controlling an individual's behaviour. As against unconscious mind there is the role of repression. Repression is the elimination of painful and unhealthy experiences from the conscious mind. Thus, repression is a defense mechanism with the help of which an individual tries to adjust partially. This repression is necessary because as child grows, many of his needs

and feelings are disliked by the people which were earlier liked. When these needs are eliminated from the conscious mind, there are collected into unconscious mind and affect human behaviour indirectly. Sometimes these repressed needs come to the conscious level also when they receive any stimulus from outside. Thus according to these psychologists, human behaviour is influenced by such motives also about which he is totally unaware.

- **Maslow's Need Theory:** Abraham Maslow explained the theories of motivation in 1954 in the perspective of Need. He classified human needs in five level s in a continuum of pyramid.
  - **Physiological Needs:** These include the most basic needs that are vital to survival, such as the need for water, air, food and sleep. Maslow believed that these needs are the most basic and instinctive needs in the hierarchy because all needs become secondary until these physiological needs are met.
  - **Security Needs:** These include needs for safety and security. Security needs are important for survival, but they are not as demanding as the physiological needs. Examples of security needs include a desire for steady employment, health insurance, safe neighbourhoods and shelter from the environment.
  - **Social Needs:** These include needs for belonging, love and affection. Maslow considered these needs to be less basic than physiological and security needs. Relationships such as friendships, romantic attachments and families help fulfill this need for companionship and acceptance, as doe's involvement in social, community or religious groups.
  - **Esteem Needs:** After the first three needs have been satisfied, esteem needs becomes increasingly important. These include the need for things that reflect on self-esteem, personal worth, social recognition and accomplishment.
  - **Self-actualising Needs:** This is the highest level of Maslow's hierarchy of needs. Self-actualising people are self-aware,

concerned with personal growth, less concerned with the opinions of others and interested fulfilling their potential.




**Figure: 5.1: Maslow's Theory of Motivation**

**Image Source:** https://upload.wikimedia.org/wikipedia/commons/thumb/3/33/MaslowsHierarchyOfNeeds.svg/1200px-MaslowsHierarchyOfNeeds.svg.png

- **Social Theory**

  The social theory is of two types-

  - **Cultural Pattern Theory (Mead and Benedict):** According to this theory, behaviour of a person is influenced by the respective culture in which he lives. For example, individuals of those castes which have strict controlling system on their members become foolish, dry and short tempered when they grow. On the contrary, the castes in which children are behaved affectionately, they manifest considerate behaviour when they grow. Thus, behaviour is very much influenced by the pattern of rearing of a person. In the classroom situation, a teacher can motivate his students by his own behaviour.
  - **Field Theory ( Kurt Lewin):** According to this theory, the behaviour of an individual is not determined by his qualities or personality traits but all those forces which act between an individual and his environment. Thus, there is a close relationship between an individual and his environment. In the classroom situation a child can be motivated by creating an environment suitable to the child.

- **Drive Theory:** This theory is somewhat similar to need theory of Maslow.

According to this theory an individual is driven to act when certain biological needs create some inner tension which is called drive. Thus drive is the primary cause of motivation.

The drawback of this theory is that it is helpless to explain why an individual. In the absence of inner drive behaves in a particular situation due to the effect of his environment as is explained by the social theory of motivation.

- **Incentive Theory:** According to this theory, external incentives such as rewards, monetary benefits, promotion in the social status etc. can also motivate an individual to act in a certain direction.
- **Expectancy Theory:** According to this theory an individual is not actually getting any reward or monetary benefits but the expectation of getting such a reward or benefits can motivate him to do the job in the best manner possible. In the field of games, a sportsman can be motivated to perform his best by giving him some incentive not at present but in the future.
- **Learning of Behaviour Theory (Clark Hall):** According to this theory an individual's behaviour depends on the satisfaction or dissatisfaction of his needs. When his needs are satisfied, his psychological tensions are reduced and he retains the reaction of his learnt behaviour. When his organic needs are satisfied, he learns to link the social conditions with his primary needs and retains that particular behaviour.
- **Motivation Hygiene Theory (Fredrick Herzberg):** This theory was indoctrinated in the field of industry and commerce first. Herzberg interviewed farmers, account officers, nurses and house wives in Pistbarg University in 1966 and propounded this theory

  According to this theory motives enhance the efficiency by providing comforts and satisfactions to the pupils. Motives keep them delighted by increasing their achievement on one hand and pupils get satisfied by their motives on the other. This in turn enriches learning.
- **Operant Conditioning Model of Motivation:** This model was presented by Skinner. It suggests that behaviour would change by the consequence of that very behaviour. If the result of a particular behaviour is satisfactory,

it will be automatically reinforced and repeated in future. Reinforcement is given from outside also for the recurrence of desired behaviour.

Thus, this model does not give importance to the inner motivation of the individual. It ignores drives and needs of learners as well. Level of aspiration is also ignored by this model. This model is rather based on the observable and measurable overt behavioural responses which are modified slowly by giving proper reinforcement.

According to this model the desirable behaviours are first identified. Then conditions are created for the occurrence of these behaviours. And finally, once they occur, reinforcement is given for the recurrence of these behaviours.



**CHECK YOUR PROGRESS**

**Q 1:** What is meant by Motivation?

.....

**Q 2:** Who was the originator of Instinct Theory of motivation?

.....

**Q 3:** What is the basic fact of Drive theory?

.....

**Q 4:** Operant Conditioning Model of Motivation was presented by-

.....

**Q 5:** What are the needs of human according to Maslow?

.....

## 5.5 EXPERIMENTAL FINDINGS ON THE BASIS OF LEVEL OF ASPIRATION

**Level of Aspiration:**

Aspiration tells us about "What to achieve". Aspiration is inspirational and emotional in nature as it influences us to perform and our emotions are

tied with our performance we aspire for. Level of aspiration is defined as the level of future performance in a familiar task which an individual knowing his past performance in that task explicitly undertakes to reach. Basically, it is an individual's future expectation or goal. It is important to note here that the concept of level of aspiration was first introduced by Dembo in the year 1931. It is a motivational concept which refers to the process of setting a goal by an individual in the activity to be performed. The level of aspiration points out at defensive reactions taken when failure is faced. Generally failure leads to more variable performance and aspiration is more likely to result in psychological withdrawal from the particular task. An experiment on the level of aspiration is discussed in the following part.



**CHECK YOUR PROGRESS**

**Q 6:** Who introduced the concept of level of aspiration?

.....

.....

**Experiment on Level of Aspiration**

**Title:** Level of aspiration

**Objectives:** To study the goal setting behaviour of the subject

**Hypotheses:** Level of aspiration is higher than that of attainment/ goal setting behaviour of the subject is above attainment.

**Materials:** i) Code list

ii) Ten sheets containing numerical symbols randomly arranged

iii) Stop Watch

iv) Wooden screen

v) Stationary Articles

**Subject: Name:**

Age:

Sex:

**Educational Status:**

Date:

Time:

Place:

General Condition of the Subject:

Mental State: Normal

Physical Condition: Good

**Preparation of the Material**

A code list consisting of a set of 12 numerical symbols from 1 to 12 each corresponding a particular alphabet is to be prepared. Ten trial sheets containing the numbers 1 to 12 but the sequence change from sheet to sheet in a random order.

**Code list**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S | P | G | J | F | H | K | T | B | L | A | C |

**Trial Sheets (10 Nos) Numbered 1 to 10**

| 6 | 3 | 10 | 12 | 2 | 9 | 11 | 4 | 8 | 1 | 5 | 7 |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Procedure:**

After necessary arrangements were made the subject was invited to the laboratory room and given the following instructions-

"I will expose a code list containing numbers from 1 to 12, each number representing a particular alphabet for only 1o second. You will have to memorize the corresponding number and alphabet. After that I will present a sheet bearing random arrangement of the numbers 1 to 12 and you will have to substitute as many letters in the blank spaces below the number, which you will have to complete within 20 seconds. Ten sheets one after the other will be presented following the similar procedure. Do you follow me? Can I start the experiment?

After giving the instructions the experimenter started with the experiment. The code list was exposed for only 10 seconds to the subject. Trial sheet were presented and subject was instructed to substitute as many alphabets he/she could for 20 seconds. After completion of the first sheet by the subject, the experimenter informed him/her the number of letters

correctly substituted in the trial. From the next trial, the experimenter asked the subject as to how many letters he/she could be able to substitute. This becomes subject's aspiration. After every trial the experimenter informed the subject about the attainment level. Subject's attainment and aspiration were recorded from trial to trial in the record sheet. After the experiment was completed the subject thanked for co-operating and after taking the introspective report was allowed to leave.

The goal discrepancy was found out i.e., discrepancy between subject's attainment in a given trial and the aspiration in the next following trial. The attainment discrepancy was also found out. The difference between Subject's aspiration in a given trial and subject's attainment in that trial is called attainment discrepancy.

For all the 10 trials attainment discrepancy and goal discrepancy scores were calculated along with the positive + and - Negative sign which revealed directly the subject's success or failure in achieving the goal. This also shows whether the subject's goal setting behavior is below or above the level of attainment. Worksheet depicting the positive (+) and negative (-) and zero discrepancies were prepared.

**The result:**

The result of the experiment were shown in record sheet no 5.1 and 5.1. Graphical representation of the attainment and goal discrepancies presented in the Figure no 5.2

**Record Sheet 5.1**

**Subject's Aspiration and attainment from trial to trial and discrepancy Scores**

| Trial | Aspiration | Attainment | Discrepancies | |
|---|---|---|---|---|
| | | | Attainment | Goal |
| 1 | | 1 | | +3 |
| 2 | 4 | 3 | -1 | +3 |
| 3 | 6 | 4 | -2 | +3 |

| | | | | |
|---|---|---|---|---|
| 4 | 7 | 6 | -1 | +4 |
| 5 | 10 | 9 | -1 | +1 |
| 6 | 10 | 9 | -1 | +2 |
| 7 | 11 | 10 | -1 | +2 |
| 8 | 12 | 11 | -1 | +1 |
| 9 | 12 | 11 | -1 | +1 |
| 10 | 12 | 11 | -1 | |

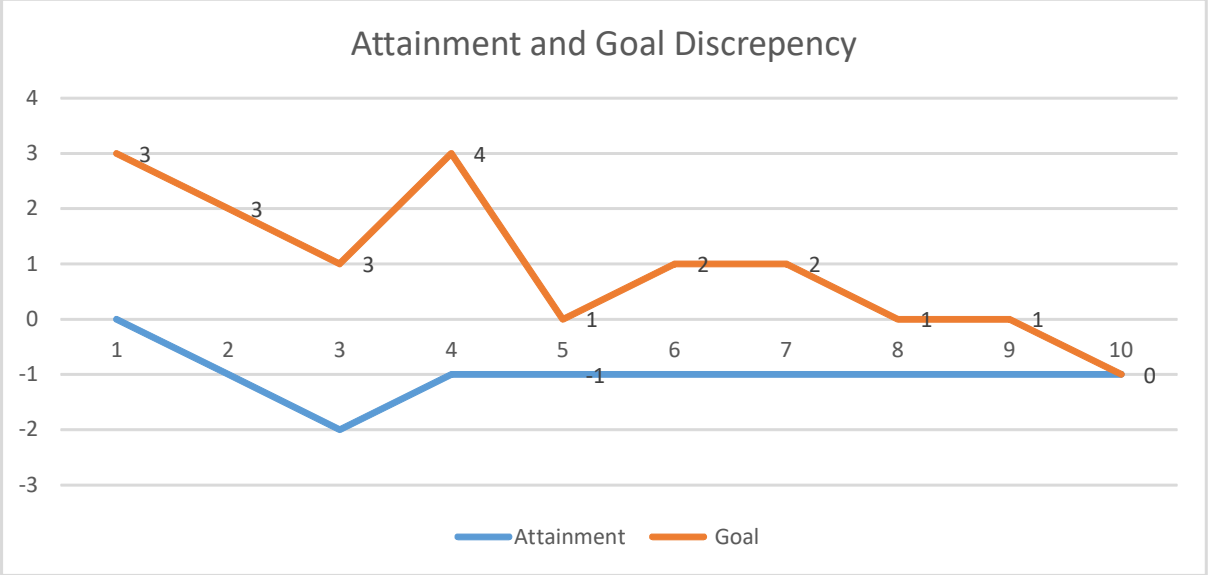



**Figure 5.2: Graphical Representation of Attainment and Goal Discrepancy**

**Record Sheet 5.2**

**Positive, Negative and Zero Discrepancy**

| Condition | Direction | | |
|---|---|---|---|
| | + | - | 0 |
| Goal | 9 | 0 | 0 |
| Attainment | 0 | 9 | 0 |

**Observation/ Discussion:**

Out of the ten (10) attainment discrepancy scores nine were negative which indicates failure on the part of the subject in attaining the goal. Only one 1 out of 10 was positive. The subject failed nine times to achieve the goal. Regarding Goal discrepant, scores, out of 10, nine was positive which depicts the subject' goal of each trial was higher than attainment. This revealed that subject was not influenced by actual experiences of goal attainment. Irrespective of previous experience of success or failure the subject kept aspiration level above the attainment. This support our hypotheses that there is a tendency to set one's goal above one's attainment.

**Introspective Report:**

"At the beginning difficulty was experienced but with each successive trial it became easier to memorize most of the letters correctly".

## 5.6 EXPERIMENTAL FINDINGS ON THE EFFECT OF KNOWLEDGE OF RESULT ON PERFORMANCE

**Effect of knowledge of result on performance**

The positive influence of knowledge of result on learning and performance is one of the best established findings in the research literature. When results are given after the performance, it tends to give cues to the learner and well motivation to carry on the task further. Otherwise, when the learner knows that result would not provide to him/her, they lack motivation as they find to do or complete task. The learners sometimes leave the task incomplete as they find it boring as they are not getting any kind of information about it. Experiments have been made on effect of knowledge of result on performance. One such experiment is discussed here-

**Experiment on the effect of knowledge of result on performance**

**Title:** **Knowledge of Result**

**Objective:** To make a study of the effect of the subjects knowing the results of performance upon

Successive performance in similar tasks

**Hypothesis:** Knowledge of result functions as an incentive to improvement in performance.

**Materials:** i) Four sheets of paper with two vertical lines of parallel dots (100 mm apart at a distance of 20 mm)

ii) A sharpened soft pencil

iii) A ruler

iv) Opaque goggles (for blindfold)

v) Response Sheet

**Subject:** Name: XYZ

Age:

Sex:

Educational Status:

Date:

Place:

Time:

**Condition:**

The experiment to be conducted under two conditions: Condition A and Condition B

Condition A: Without Knowledge of Result (WKR)

Condition B: Knowledge of Result (KR)

**General Procedure:**

In condition A (WKR) the Experimenter covers the line drawn by Subject in order to withhold the knowledge of result. In condition B (KR) Subject can see his/her performance before he takes position for drawing the next line blindfolded. The ABBA design to be followed as

| WKRI | KRI | KRII | WKRII |
|---|---|---|---|
| 10 | 10 | 10 | 10 |

The task of the Subject is try to draw 100 mm lines without the aid of vision.

Subject sits at a table with a soft lead pencil in his writing hand. Experimenter places the response sheet before Subject. Experimenter points to the response sheet and tells Subject that he will be asked to draw 100 mm lines from the starting point blindfolded. Experimenter than places

goggles on Subject. Experimenter gives the following direction-

**Procedure for Condition A**

"I will place your pencil on the starting point. When I release your hand and say 'All right' push your pencil forward from yourself to make a line that you judge to be 100 mm long and perpendicular to the base line. This is to be drawn free hand. Ten trials will follow"

Experimenter gives no information to Subject concerning the accuracy of his drawing. At the start of each trial Experimenter guide Subject's pencil to the starting point and says 'All Right' as he releases Subject's hand. During each trial E holds the response sheet in place and before each trial he moves the paper enough so that the next starting point is directly in front of Subject. After 10 trials the goggles are removed.

**Procedure for Condition B**

When Subject is blindfolded and ready (repeat the above instructions). Then add-when you finish each line I will give the following information. I will say 'too short' if the line is more than ½ inch short, 'a little short' if it is ½ inch or less short. I will say 'a little long' if it is more than ½ inch long, if it is exactly 100 mm long I will say 'Correct'. Here 20 trials to be taken.

Here Experimenter gives information to Subject concerning the accuracy of his drawing. Here Subject is allowed to see the line drawn immediately, however not allowed to see the previous lines.

Ten more trials to be taken WKR II. Procedure to be followed as in WKR-I (condition I). After all 40 trials experimenter thank the Subject for cooperating.

Next the length of lines in mm drawn by the subject in WKR and KR trials the mean length, mean error and difference in error to be computed.

**Result**

The result of the experiment is shown in Record Sheet 5.3 (showing the length of lines in mm drawn by the subject with knowledge of result and without knowledge of result) and in Record sheet 5.4 the mean length, mean error and difference in error in mm between WKR and KR trials are presented.

The results are also to be depicted graphically. The WKR trials and the KR trials are graphically displayed in Figure 5.3. The Error curve is depicted graphically in Figure 5.4

**Record Sheet No-5.3**

**Length of lines in mm with and without knowledge of result**

| Trial | WKR | Trial | KR | Trial | KR | Trial | WKR |
|---|---|---|---|---|---|---|---|
| 1 | 85 | 11 | 87 | 21 | 99 | 31 | 98 |
| 2 | 83 | 12 | 90 | 22 | 94 | 32 | 96 |
| 3 | 92 | 13 | 92 | 23 | 96 | 33 | 96 |
| 4 | 90 | 14 | 96 | 24 | 97 | 34 | 91 |
| 5 | 88 | 15 | 98 | 25 | 104 | 35 | 94 |
| 6 | 83 | 16 | 98 | 26 | 102 | 36 | 92 |
| 7 | 85 | 17 | 100 | 27 | 98 | 37 | 94 |
| 8 | 88 | 18 | 99 | 28 | 100 | 38 | 94 |
| 9 | 90 | 19 | 101 | 29 | 102 | 39 | 88 |
| 10 | 87 | 20 | 96 | 30 | 99 | 40 | 92 |
| | 871 | | 957 | | 991 | | 935 |

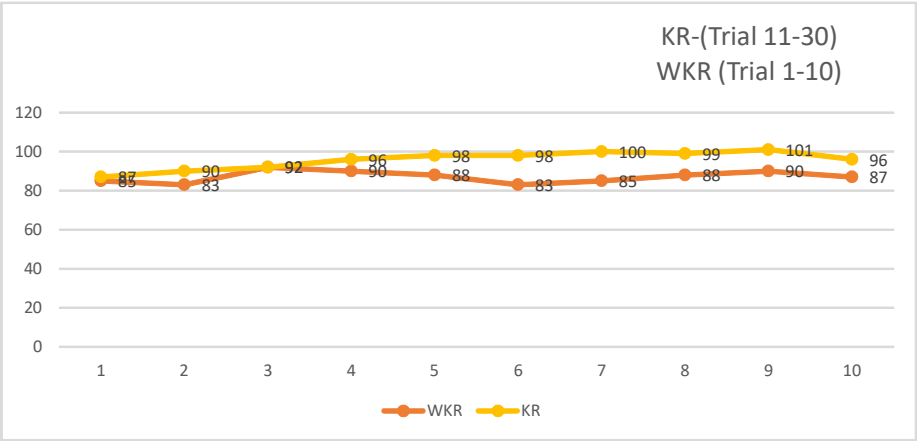



***Figure5.3: Graphical Representation of the length of line drawn in WKR trials and the KR Trial***

**Record Sheet 5.4**

**Mean length, Mean Error, Difference in Error between WKR and KR trials**

| **Mean** | **A WKR I** | **B KR I** | **B KR II** | **A WKR II** | **Total** | |
|---|---|---|---|---|---|---|
| | | | | | **WKR** | **KR** |
| Length | 87.1 | 95.7 | 99.1 | 93.5 | 90.3 | 97.4 |
| Error | -12.9 | -4.3 | -0.9 | -6.5 | -9.7 | -2.6 |
| Difference | 8.6 | | 5.6 | | 7.1 | |

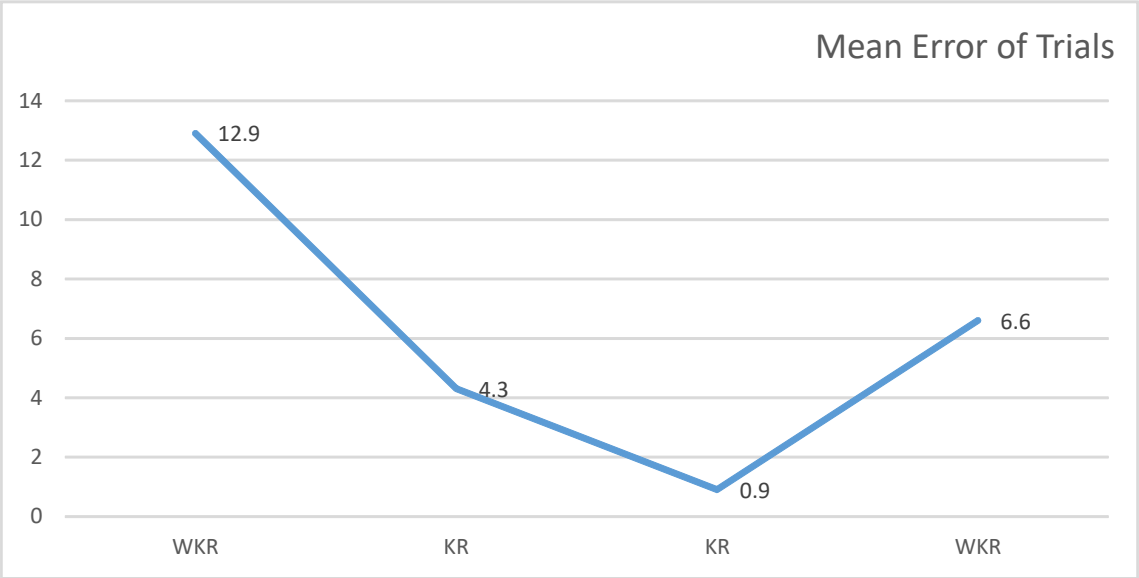



**Fig. 5.4- Graphical representation of the Mean Error for the four sets of Trials**

{**The Mean length** is found out by dividing the total with the number of trials-

871/10=87.1

957/10=95.7

991/10=99.1

935/10=93.5

The **total Mean Length** is found out by dividing the mean WKR I and WKR II ÷ 2 (87.1+93.5/2)=89.5 and KRI +KRII/2 (95.7+99.1/2)=97.4

**The error is** found out by subtracting the mean length with the length of the line taken. As in this experiment the length of the line was 100mm) therefore the error is found out by therefore the error found out by

100-87.1= -12.9

100-95.7= -4.3

100-99.1= -0.9

100-93.5= -6.5

**The total error** is found out by

Error WKR I+WKR II÷2 (-12.9+-6.5/2= -9.7)

Error KR I+ KR II÷2 (-4.3+-0/9/2= -2.6)

**Again, the difference** is found out

WKR I - KR I ( - 12.9 -4.3 = 8.6)

WKR II - KR II ( -6.5 -0.9= 5.6)

**Total Difference** is found out

WKR-KR (-9.7 -2.6= 7.1)

From the Record sheet 5.4, it is clear that the amount of error is 2.6 mm when KR is provided and it is 9.7 mm when it is withheld which is more than the former. Thus we can accept our hypotheses that Knowledge of result functions as an incentive to improvement in performance



**LET US KNOW**

Knowledge of results improves performance as accuracy increases when the subject is informed of the amount of error. Knowledge of Result serves two purposes-

1. It enables the subject to evaluate his efficiency and to change his responses in the direction of greater accuracy.
2. It adds to the satisfaction in reaching a goal. One tends to repeat rewarded behaviour and to be motivated to seek great success in the task. On the other hand, if after considerable learning of a skill knowledge of result is removed, accuracy of performance drops rapidly.



## 5.7 LET US SUM UP

After going through this unit, it can be summarized as-

- The word motivation is coined from the Latin word "movere" which means to move.
- Motivation is that internal psychological process that activates the person to fulfill his needs by achieving the objectives.
- The Instinct theory of motivation was propounded by an English psychologist MC Dougall. According to this theory, every human being has some innate powers of instincts. These instincts work as motives also and influence our behavior.
- According to the Psychoanalytic Theory advocated by Freud, Young and Adler, conscious play main role in controlling an individual's behavior.
- Abraham Maslow explained the theories of motivation in 1954 in the perspective of Need.
- The social theory is of two types- Cultural Pattern Theory and Field Theory.
- According to the drive theory an individual is driven to act when certain biological needs create some inner tension which is called drive.
- There are some other theories of motivation such as- Incentive Theory, Expectancy Theory, Learning of Behaviour Theory etc.
- Level of aspiration is defined as the level of future performance in a familiar task which an individual knowing his past performance in that task explicitly undertakes to reach.
- The positive influence of knowledge of result on learning and performance is one of the best established findings in the research literature
- Experiment made on level of aspiration helps us to know that level of aspiration is higher than that of attainment/ goal setting behaviour of the subject is above attainment.
- Experiment made on effect of knowledge of result helps us to know that Knowledge of result functions as an incentive to improvement in performance.

## 5.8 FURTHER READING

1) R.S. Woodworth: Experimental psychology
2) S M Mohsin: Experiments in Psychology
3) Saikia Rasul Lutfun(2018): Psychological and physiological Experiments in Education.

## 5.9 ANSWER TO CHECK YOUR PROGRESS

**Answer to Q. No 1:** Motivation can be broadly defined as the forces acting on or within a person that cause the arousal, direction and persistence of goal-directed, voluntary effort. The term motivation theory is concerned with the processes that describe why and how human behavior is activated and directed.

**Answer to Q. No 2:** English psychologist MC Dougall was the originator of Instinct Theory of motivation.

**Answer to Q. No 3:** The basic fact of drive theory is that an individual is driven to act when certain biological needs create some inner tension which is called drive. Thus drive is the primary cause of motivation.

**Answer to Q. No 4:** Operant Conditioning Model of Motivation was presented by Skinner.

**Answer to Q. No 5:** Maslow classified human needs in five level s in a continuum of pyramid-- Physiological Needs, Security Needs, Social Needs, Esteem Needs and Self-actualizing Needs.

**Answer to Q. No 6:** Dembo introduced the concept of level of aspiration in the year 1931

## 5.10 POSSIBLE QUESTIONS

**Short Questions** (Answer each questions in about 150 words)

**Q 1:** Define motivation.

**Q. 2:** Discuss the primary theories of motivation.

**Q 3:** What is meant by level of aspiration?

**Q 4:** What is Social theory of motivation?

**Long Questions** (Answer each questions in about 300-500 words)

**Q 1:** Describe Maslow's Hierarchy of Needs in detail?

**Q 2:** Conduct an experiment on the effect of knowledge of result on performance.

*** ***** ***

# UNIT 6: PROBLEM SOLVING

## UNIT STRUCTURE


6.1 Learning Objectives

6.2 Introduction

6.3 Concept of Problem Solving

6.4 Different Approaches to Problem Solving

6.5 Experimental findings on Problem Solving

6.6 Let Us Sum Up

6.7 Further Reading

6.8 Answer to Check Your Progress

6.9 Possible Questions


## 6.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- understand the concept of problem solving
- get acquainted with various approaches of problem solving
- perform various experiments on problem solving

## 6.2 INTRODUCTION

In our day-to-day life, we come across various situation. Some situation are pleasing and some are very disturbing, leading to various problems. While dealing with our daily life activities, we may face different problems ranging from finding out small lost things in the house to planning for our future Career. As such, we all must possess the cognitive ability to deal and face with that problem. In psychology, problem solving is an important area of study. Problem solving refers to active efforts to discover what must be done to achieve a goal that is not readily attainable. It the main functions of directed thinking. Here in this unit, we will discuss about the concept and different approaches of problem solving and will deal with various experiment related to problem solving.

## 6.3 CONCEPT OF PROBLEM SOLVING

In cognitive psychology, the term problem-solving refers to the mental process that people go through to discover, analyze, and solve problems. Problem solving is the act of defining a problem which involves the process of determining the cause of the problem, identifying, prioritizing, and selecting alternatives for a solution and implementing a solution. Problem solving is part and parcel of our daily life. Every day we solve a number of problems ranging from simple to complex. Some problems take little time where as some take much time to solve. We look for alternative solutions if do not get the right kind of resources to solve the problem in hand. In the case of solving any type of problem our thinking becomes directed and focused and we try to use all the resources, both internal and external which means support and help of others to arrive at the right and appropriate decision. Problem solving is hence, directed thinking focused towards dealing with a specific problem. This thinking has three elements: the problem, the goal, and the steps to reach the goal. ***Solso (2009)*** described **problem solving** as thinking that is directed towards solving of a specific problem that involves both the formation of responses and the selection among possible responses.

**Types of problems:**

According to **Jim Greeno (1978),** there are three types of problems-

- **Problems of inducing structure:** It requires people to discover the relations among numbers, words, symbols, or ideas. The series completion problems and the analogy problems are examples of problems of inducing structure.
- **Problems of arrangement:** It requires people to arrange the parts of a problem in a way that satisfies some criterion. The parts can usually be arranged in many ways, but only one or a few of the arrangements form a solution.
- **Problems of transformation:** It requires people to carry out a sequence of transformations in order to reach a specific goal

**Again, Garnham (1988) said about two problems-**

- **Adversary problems-** Adversary problems involve two or more people pitting their wits against each other, as in chess. Game-playing is a special kind of Problem Solving, in which the problem is to find a winning strategy or the best current move.
- **Non-adversary problems-** Most problems fall into the non-adversary category, in which another person is only involved as the problem setter.

Psychologists described problem solving in the form of a cycle. The cycle consists of recognizing or identifying the problem, defining or representing the problem mentally, developing a solution strategy, organizing the knowledge about the problem, allocating the mental and physical resources for solving the problem monitoring his or her progress towards the goal, and evaluating the solution for accuracy.



**LET US KNOW**

Problem solving is directed thinking focused towards dealing with a specific problem. This thinking has three elements: the problem, the goal, and the steps to reach the goal.



**CHECK YOUR PROGRESS**

**Q 1:** State the definition of problem solving as given by Solso.

.....

.....

**Q 2:** What are the types of problem as classified by Garnham?

.....

.....

**Q 3:** What is Problem solving cycle?

.....

.....

**Obstacles in problem-solving**

Solving problem is not a very easy process. Problem is itself is an obstacle. There are a number of different obstacles that can interfere with one's ability to solve a problem quickly and efficiently or lead to another problem. Researchers have found out and described a number of mental obstacles which can be identified as below-

- **Assumptions:** When dealing with a problem, people often make assumptions about the constraints and obstacles that prevent certain solutions.
- **Functional fixedness:** This refers to the tendency to view problems only in one's customary way. Functional fixedness prevents people from fully seeing all of the different options that might be available to find a solution.
- **Irrelevant information:** While trying to solve a problem, it is important for the person to distinguish between information that is relevant to the issue and irrelevant data that can lead to faulty solutions. When a problem is very complex, the easier it is to focus on misleading or irrelevant information.
- **Mental set:** A mental set is the tendency people have to only use solutions that have worked in the past rather than looking for alternative ideas. A mental set can often work as a heuristic, making it a useful problem-solving tool. However, mental sets can also lead to inflexibility, making it more difficult to find effective solutions. Another name for mental set is Einstellung. Often called a problem solving set, Einstellung refers to a person's predisposition to solve a given problem in a specific manner even though there are "better" or more appropriate methods of solving the problem. The Einstellung effect is the negative effect of previous experience when solving new problems. In the later section, experimental study will be discussed on Einstellung set.



**LET US KNOW**

A mental set is the tendency people have to only use solutions that have worked in the past rather than looking for alternative ideas.

A name for mental set is Einstellung. Often called a problem solving set, Einstellung refers to a person's predisposition to solve a given problem in a specific manner even though there are "better" or more appropriate methods of solving the problem



**CHECK YOUR PROGRESS**

**Q 4:** What is Einstellung mental set?

.....

.....

## 6.4 DIFFERENT APPROACHES TO PROBLEM SOLVING

Human problem-solving has been a continuing concern of psychologists and they have developed different ways of investigating it. There are different approaches to problem solving. Some of them are discussed here-

- **GESTALT APPROACH TO PROBLEM SOLVING:** Gestalt psychologists emphasized the importance of the whole as more than a collection of parts. Their main postulate stated that 'the whole is more than the sum of its parts'. In regard to problem solving, they held that insight problems require problem solvers to perceive the problem as a whole. Max Wertheimer (1945) wrote about productive thinking, which involves insights that go beyond the bounds of existing associations. In solving insight problems, one have to break away one's existing associations and see the problem in an entirely new light. There is a

very famous study in which they used a chimpanzee by the name of Sultan. They placed a chimpanzee in an enclosure with a few boxes. At the top of the cage, just out of reach, was a bunch of bananas. After the chimpanzee unsuccessfully tried to jump and to stretch to reach the bananas, he showed sudden insight. He realized that the boxes could be stacked on top of one another to make a Structure tall enough to reach the bunch of bananas.

According to the Gestalt theory, problem solving can be either productive or reproductive. Reproductive problem solving draws on previous experiences whereas productive problem solving involves insight and restructuring of the problem. Reproductive problem solving could he a hindrance to finding a solution, since a person may fixate on the known aspects of a problem and so be unable to see novel interpretations that might lead to a solution. They explained results from extended unconscious leaps in thinking, greatly accelerated mental processing, or some kind of short circuiting of normal reasoning processes.

- **BEHAVIORISTS APPROACHES TO PROBLEM SOLVING:** According to behaviorists problem solving occurs first, with the help of trial and error method. Thorndike conducted a series of experiments with cats which have been already discussed in your previous semester. These cats were kept in a cage which had been closed with a latch and he placed food outside the cage. The food or the stimulus elicited a number of responses. The purpose or the problem here was to open the latch of the cage and get the food. These responses varied from hitting, crying, and scratching to efforts to manipulate the latch. However, it was only when the right response was made that the cat was able to open the latch and reach the food. Once successful, the cat was able to learn the right S-R connection and then tried to generalize this to other similar situations. Hence once an organism is successful in solving the problem, it tends to associate it with similar problems and generalizes the methodology used, to solve the similar types of problems. As it becomes part of their habit, problem solving tends to improve.

## 6.5 PSYCHOLOGICAL EXPERIMENT ON PROBLEM SOLVING

As stated above, problem solving refers to a state of desire for reaching a definite goal from a present condition that is not directly moving toward the goat or is far from it. Problem solving requires more complex logic for finding a missing description of conditions or needs the identification of steps toward the goal.

Problem Solving has two major domains: i) mathematical or logical problem solving, (ii) and personal problem solving.

Further problem solving occurs when moving from a given state to a desired goal state is needed for either living or an artificial intelligence system. Problem solving is described by the psychologists in the form of a cycle (Hayes, 1989). The cycle Consists of recognizing or identifying the Problem, defining or representing the problem mentally, developing a solution strategy, organizing the knowledge about the problem, allocating the mental and physical resources for solving the problem, monitoring his or her progress towards the goal, and evaluating the solution for accuracy. Some of the experiment related to problem solving are discussed here-

**EXPERIMENT No. 6.5.1**

**Introduction:**

Raven's Progressive Matrices is often referred to simply as Raven's Matrices or RPM is a nonverbal group test typically used in educational settings. It is usually a 60-item test used in measuring abstract reasoning and regarded as a non-verbal estimate of fluid intelligence. It is the most common and popular test administered to groups ranging from 5-year-olds to the elderly. It is made of 60 multiple choice questions, listed in order of difficulty. This format is designed to measure the test taker's reasoning ability, the educative ("meaning-making") component of Spearman's g (g is often referred to as general intelligence). The tests were originally developed by John C. Raven in 1936.

**Title:** **Verbal Test of Reasoning**

**Objectives:** To assess the performance using a standardized test of reasoning.

**Apparatus and Material Used:**

(i) Raven's standard progressive matrices test booklet,

(ii) Response sheet

(iii) Manual

**Subject :** Name: XYZ

Age:

Sex:

Educational Status:

Date:

Time:

Place:

**Description of the materials:**

This is a non-verbal test of mental ability on the pattern of Raven's progressive matrices. There are five subtests: A, B, C, D and E. Each of these subtests measures an individual's capacity to apprehend meaning figures, presented for observations. Each of these tests contains a number of items, 60 questions in all. These have been classified into 4 parts consisting of 15 questions each. Every part is to be completed in 15 minutes. The whole test is to be completed in one hour. An individual's total score provides an index of his/her intellectual ability, irrespective of his/her other characteristics.



**LET US KNOW**

Raven's Progressive Matrices is often referred to simply as Raven's Matrices or RPM is a nonverbal group test typically used in educational settings.

It is the most common and popular test administered to groups ranging from 5-year-olds to the elderly. It is made of 60 multiple choice questions, listed in order of difficulty. This format is designed to

measure the test taker's reasoning ability, the educative ("meaning-making") component of Spearman's g (g is often referred to as general intelligence).

**The tests were originally developed by John C. Raven in 1936.**

**Procedure:**

The experimenter should make the subject comfortable and talk to him/her nicely establish good rapport and make him/her the purpose of experiment. As soon as the subject is ready, the experimenter should give **the following instructions:**

'There are 60 items in this booklet. Each item has 4possible answers, but only one of them is correct. You have to choose the correct answer and enter its serial number in the response sheet at the appropriate place. All 60 items are classified into 4 parts: I, II, III, and IV. Each part is to be attempted in 15 minutes. The total time for the whole test is 60 minutes. Read directions of each part carefully before starting to attempt the items of that part'.

**Precautions to be taken:**

- The subject should be seated comfortably.
- The room should be physically sound
- After each attempt one minute's rest should be given.
- The environment should be kept calm and quiet.

**Scoring:** The scoring can be done by superimposing a stencil as scoring key. The individual scores on this test is tile total number of problems that a subject has answered correctly.

This score is the index of his intellectual ability.

**Introspective Report:**

Here the experimenter will ask the subject to give his experiences during the experiment in terms of difficulties, boredom, motivation, emotions, feelings and distractions.

**Results:**

The results are to be reported in a tabular form.

**Table 6.1 Results Parts**

| Parts | I | II | III | IV | Total |
|---|---|---|---|---|---|
| Raw scores | | | | | |

The interpretation of the scores is done as per the norms given in the manual. The results of the subject should be on the basis of his scores and introspection report.

**Conclusion/ Observation:**

With the help of the test manual, the performance scores of each individual child on the test of mental ability can be categorized.

**EXPERIMENT NO:-6.5.2**

**Title:** **Outline Puzzle Problem**

**Objective:** To study the progress of the problem solving task of aperson in an outline puzzle having directional habit in outlining.

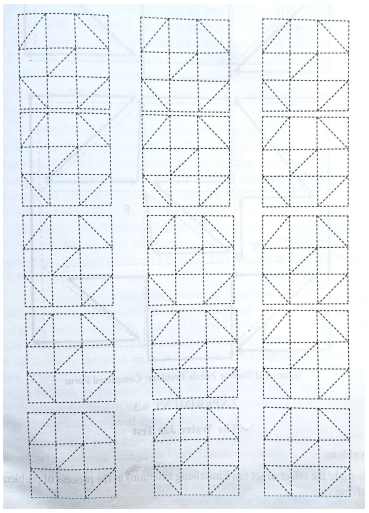
**Hypotheses:** Those with some background in puzzles shall have impact on their performance

**Apparatus and Material Used:**

(i) A set of 15 outlines, and

(ii) stop watch

**Description of the materials:** The outline is a square with dotted lines and within the square there are nine small squares in dotted lines. This outline was designed by Tinker and Raker (1938).



Procedure: The experimenter should make the subject comfortable and talk to him/her nicely establish good rapport and make him/her the purpose of experiment. The subject should be seated in well illuminated room in front of an appropriate height of table. As soon as the subject is ready, the experimenter should give the following instructions:

'There are 15 outlines in this sheet. You are to begin from point 'S' (the experimenter should point to it. Your task is to trace over all the dotted lines in the drawing without removing your pencil from the sheet, without retracing or without going back on the line and without crossing any line you have already drawn. If you are blocked on one drawing leave it, and at once you should begin tracing on the next outline. Like this you must do two successive errorless tracings. Now ready"

**Precautions to be taken:**

- The subject should be seated comfortably.
- The environment should be kept calm and quiet.

**Scoring:** The experimenter at once should start the stop clock to run and note down the subject's starting point on each outline. The problem is considered solved when the participant can make two successive errorless tracings.

The experimenter should record the total time from staring the first outline to the end of the two successive errorless tracings. Experimenter must note down the behavior pattern of the subject and all the remarks that seem to be pertinent for the experiment.

**Introspective Report:**

Here the experimenter will ask the subject to give his/her experiences during the experiment in terms of difficulties, boredom, motivation, emotions, feelings and distractions.

**Results:**

The results are to be reported in a tabular form in terms of the time taken by the subject to make two successive errorless tracings in seconds and present it in Table 6.2. The number of trials he/she has taken to solve the problem are collection of the group data are presented in Table 6.3.

Experimenter are to state whether the subjects has solved the problem or not by using 15 outlines working out the mean time and trials for the group.

**Table 6.2**

**Showing the Individual Data in the Outline Puzzle Experiment**

| Time taken for two successive errorless tracings | No. of trials taken for solution | Observations |
|---|---|---|
| | | |

**Table 6.3**

**Showing the Group Data in the Outline Puzzle Experiment**

| S. No. | Name | Time taken for two successive errorless tracings (seconds) | No. of trials | Problem solved or not |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
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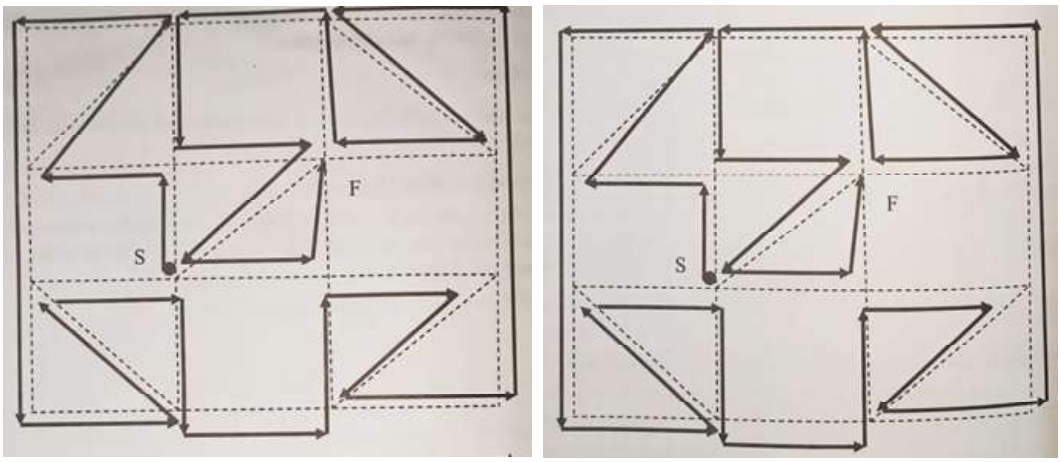
In the discussion part, answers to following questions are to found out-

- In the group, how many of them have solved the problem and how many have not?
- Who are those taken the longest time and who are those shortest time?
- Who has solved the problem in minimum number of trials?
- What is the mean time and trail and how many were above, and how many were below the mean?
- Who are those who solved the problem quickly and who are those did not?
- What is the background of those persons who have solved it in a short time with few trails additionally?
- What are the factors influencing in the successful solution of the problem, whether it is qualification, gender, sex or socio-economic status or experience in some other task?
- What is the background of those who could not solve the problem?

After getting all these answers, experimenter are to compare the results with some of the earlier studies made on problem solving behavior.

**Conclusion/ Observation:**

Those with some background in aforementioned puzzles shall have impact on their performance in this experiment




*Solution of Outline Puzzle Problem: Completed Form*

**EXPERIMENT NO: 6.5.3**

**Introduction:**

When problem solvers have a mental set, they fixate on a strategy that normally works well in solving many problems but that does not work well in solving a particular problem. We have discussed about mental set. One such name for mental set is Einstellung. Often called a problem solving set. Einstellung refers to a person's predisposition to solve a given problem in a specific manner even though there are "better' or more appropriate methods of solving the problem. The Einstellung effect is the negative effect of previous experience when solving new problems. The Einstellung effect has been tested experimentally in many different contexts. The most famous example is the Luchins' water jar experiment, in which subjects were asked to solve a series of water jar problems. After solving many problems which had the same solution, subjects applied the same solution to later problems even though a simpler solution existed (Luchins, 1942). It was found that subjects used methods that they had used previously to find the solution even though there were quicker and more efficient methods available. The experiment throws light on how mental sets can hinder the solving of novel problems.

**Title:** **The Water Jar Test**

**Objective:** To study the effect of set (an Einstellung situation) in the process of problem solving.

**Hypothesis:** Exposure to a specific way of problem solving will interfere with problem solving in a novel situation.

**Material used:**

i) A set of 10 problems in the form of a table

ii) Stop watch, pencil

iii) Erasure.

**Subject:** Name:

Age:

Sex:

Educational Status:

Date:

Time:

Place:

**Description of the materials:**

This Jar problem was designed by Abraham Luchins (1942). 10 set of problems were given in each 3 imaginary water jars with the capacity to hold different, fixed amount of water is provided.

**Experimental Design:**

*Independent variable:* Exposure to problem solving.

*Dependent variable:* performance in a novel problem solving situation.

**Procedure:** In the experiment, subjects will be divided into two groups. First group contains subject 1 and subject 2. The second group contains subject 3 and subject 4. The First group will be given five practice problems (no.1 to no.5), followed by 5 critical test problems (no. 6 to no. 10). The second group will not be given the five practice problems (no. 1 to no. 5). All of the practice problems and some of the critical problems have only one solution, which was 'B minus A minus 2*C'. For example, one is given Jar A holding 21 units of water, B holding 127, and C with 3. If an amount of 100 units must be measured out, the solution is to fill up Jar B and pour out enough water to fill A once and C twice.

The experimenter should make the subject comfortable and talk to him/her nicely establish good rapport and make him/her the purpose of experiment. The subject should be seated in well illuminated room in front of an appropriate height of table. The subjects are given the following problem that you have 3 water jars, each with the capacity to hold a different, fixed amount of water; figure out how to measure a certain amount of water using these jars. Two subjects are given all the ten problems. While other two subjects are given problems staring from no.6 to no.10 which means they have to solve only 5 problems. For each subtest, the complete time is recorded by the examiner.

As soon as the subject is ready, the experimenter should give the following instructions:

"Imagine that you have three jars, A, B, and C. In each of seven problems the capacity of the three jars is listed. You must use the three jars in order to obtain the amount of liquid specified in the "Goal" column. You may obtain the goal amount by adding or subtracting the quantities listed in A, B, and C. Time of completion will be noted. So be quick. Now ready. Go".

**Precautions to be taken:**

- The subjects should be matched in terms of demographic details.
- The experiment should be conducted in a calm and quiet atmosphere.
- The tasks which the subjects are to perform should be matched in terms of difficulty level.
- A proper rapport should be established with each subject before the experiment is conducted.
- Clear instructions should be given and all doubts should be clarified.
- The time taken by each subject should be recorded meticulously.

**Scoring:** The experimenter at once should start the stop clock to run and note down the subject's starting point on each sub problem. For each sub problem, give score of 1 if correct and score of O if incorrect. The scoring key is provided in the Table 6.4. Experimenter need to note down the behavior pattern of the subject and all the remarks that seem to be pertinent for the experiment.

**Introspective Report:**

Here the experimenter will ask the subject to give his/her experiences during the experiment in terms of difficulties, boredom, motivation, emotions, feelings and distractions. The subject may also add their experiences of mental sets in their day-to-day life to explain the experiment more discreetly.

**Results:**

The results are to be reported in a tabular form. Based on the findings the hypothesis should either be rejected or accepted.

**Table 6.4**

**The water Jar Problem**

| Problems | Capacity of Jug A | Capacity of Jug B | Capacity of Jug C | Desired Quantity | Strategies |
|---|---|---|---|---|---|
| 1 | 21 | 127 | 03 | 100 | B–A–2C |
| 2 | 14 | 163 | 25 | 099 | B–A–2C |
| 3 | 18 | 043 | 10 | 005 | B–A–2C |
| 4 | 09 | 042 | 06 | 021 | B–A–2C |
| 5 | 20 | 059 | 04 | 031 | B–A–2C |
| 6 | 23 | 049 | 03 | 020 | B–A–2C<br>A–C |
| 7 | 15 | 039 | 03 | 018 | B–A–2C<br>A+C |
| 8 | 28 | 076 | 03 | 025 | B–A–2C<br>A–C |
| 9 | 18 | 048 | 04 | 022 | A+C |
| 10 | 14 | 036 | 08 | 006 | B–A–2C<br>A–C |

**Table 6.5**

**Table to be provided to the Subject**

| Problems | Capacity of Jug A | Capacity of Jug B | Capacity of Jug C | Desired Quantity | Response (Strategy) | Time Taken (seconds) | Scoring |
|---|---|---|---|---|---|---|---|
| 1 | 21 | 127 | 03 | 100 | | | |
| 2 | 14 | 163 | 25 | 099 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3 | 18 | 043 | 10 | 005 | | | |
| 4 | 09 | 042 | 06 | 021 | | | |
| 5 | 20 | 059 | 04 | 031 | | | |
| 6 | 23 | 049 | 03 | 020 | | | |
| 7 | 15 | 039 | 03 | 018 | | | |
| 8 | 28 | 076 | 03 | 025 | | | |
| 9 | 18 | 048 | 04 | 022 | | | |
| 10 | 14 | 036 | 08 | 006 | | | |

**Table 6.6**

**Table to be provided to the Subject**

| Sub Problems | Subject 1 | Subject 2 | Subject 3 | Subject 4 |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |

Appropriate graphs and figures to illustrate the results of the two groups should be drawn.

**Discussion/ Observation:**

The experiment throws light on how mental sets can hinder the solving of novel problems.

One of the critical problems is called the extinction problem (number 6). The extinction problem is a problem that can be solved using either the previous Solution B - A - 2C or A - C. In order to answer the extinction problem correctly, one has to solve the problem directly and generate a novel solution. An incorrect solution to the extinction problem indicates the presence of the Einstellung effect (the set effect). The problems after the extinction problem again had two possible solutions. These post-extinction problems (no.7 to no. 10) helped determine the recovery of the subjects from the Einstellung effect.

The critical problems can be solved using this solution (B - A - 2C) or a shorter solution (A -C or A + C). For example, subjects are instructed to get 18 units of water from jars with capacities 15, 39, and 3. Despite the presence of a simpler solution (A + C), subjects in the first group tend to give the lengthier solution in lieu of the shorter one. Instead of simply filling up Jars A and C, most subjects from the experimental group preferred the previous method of B -A -2C, whereas virtually the entire second group uses the simpler solution. Time taken by the first group and second group for the sub problems 6 to 10 is compared to observe the effect of set in the experiment.

The results of the water jars experiment illustrate the concept of Einstellung. The majority of the first group subjects adopted a mechanized state of mmd and relied on mental sets formed through previous experience. However, the first group subjects would have been more efficient if they had employed the direct method of solving the problem rather than applying the same solution from previous examples.

Experimenter are to find out and state the influencing factors in the successful solution of the problem, whether it is qualification, age, gender or socio-economic status or experience in some other task as well as to find out the background of those who could not solve the problem. After compare the results with some of the earlier studies made on the effect of

set on problem solving behaviour experimenter can state whether he/she is able to observe anything new in the results.

**Conclusion:**

Conclusion will be made on the compared performance of first and second group in solving sub-problem number 6 to I O with regard to time taken and strategy applied to find out the solutions to the problems.



**CHECK YOUR PROGRESS**

**Q 5:** Who designed Jar problem?

.....

.....



## 6.6 LET US SUM UP

After going through the unit, it can be summarized as-

- Problem solving is the act of defining a problem which involves the process of determining the cause of the problem, identifying, prioritizing, and selecting alternatives for a solution and implementing a solution
- Problem solving is directed thinking focused towards dealing with a specific problem. This thinking has three elements: the problem, the goal, and the steps to reach the goal.
- There are a number of different obstacles that can interfere with one's ability to solve a problem quickly and efficiently or lead to another problem. Some of them are- Assumptions, Functional fixedness, Irrelevant information and Mental set
- There are different approaches to problem solving. Two important are- Gestalt approach to problem solving and behaviorists' approaches to problem solving
- According to the Gestalt theory, problem solving can be either productive or reproductive. Reproductive problem solving draws on previous experiences whereas productive problem solving involves insight and

restructuring of the problem.

- According to behaviorists problem solving occurs first, with the help of trial and error method.
- By the experiment on Verbal Test of Reasoning through use of Raven's standard progressive matrices test booklet, one's mental ability can be understood.
- On the basis of experiment through Outline Puzzle Problem, problem solving task an individual and the factor influencing it can be identified.
- The experiment on The Water Jar Test helps us to know that exposure to a specific way of problem solving will interfere with problem solving in a novel situation.



## 6.7 FURTHER READING

1) R.S. Woodworth: Experimental psychology
2) S M Mohsin: Experiments in Psychology
3) Saikia Rasul Lutfun(2018): Psychological and physiological Experiments in Education.



## 6.8 ANSWER TO CHECK YOUR PROGRESS

**Answer to Q. No 1:** Solso (2009) described problem solving as thinking that is directed towards solving of a specific problem that involves both the formation of responses and the selection among possible responses

**Answer to Q. No 2:** Garnham (1988) classified problems in two way-

- **Adversary problems-** Adversary problems involve two or more people pitting their wits against each other, as in chess. Game-playing is a special kind of Problem Solving, in which the problem is to find a winning strategy or the best current move.
- **Non-adversary problems-** Most problems fall into the non-adversary category, in which another person is only involved as the problem setter.

**Answer to Q. No 3:** Psychologists described problem solving in the form of a cycle. The cycle consists of recognizing or identifying the problem,

defining or representing the problem mentally, developing a solution strategy, organizing the knowledge about the problem, allocating the mental and physical resources for solving the problem monitoring his or her progress towards the goal, and evaluating the solution for accuracy.

**Answer to Q. No 4:** Einstellung refers to a person's predisposition to solve a given problem in a specific manner even though there are "better" or more appropriate methods of solving the problem

**Answer to Q. No 5:** The jar problem was designed by Abraham Luchins (1942).



## 6.9 POSSIBLE QUESTIONS

**Short Questions** (Answer each questions in about 150 words)

**Q 1:** What is meant by problem solving?

**Q 2:** What are the types of problem solving?

**Q 3:** Mention three obstacles to problem solving.

**Q 4:** Write notes on behaviourist approach to Problem solving.

**Long Questions** (Answer each questions in about 300-500 words)

**Q 1:** Distinguish between gestalt approach and behaviourist approach to problem solving

**Q 2:** Explain the concept of mental set. Conduct an experiment on mental set using Water Jar Test.

*** ***** ***

# UNIT 7: PSYCHOLOGICAL DRAWING AND LABELLING

## UNIT STRUCTURE


7.1 Learning Objectives

7.2 Introduction

7.3 Structure and Functions of the Human Brain

7.4 Structure and Functions of the Human Eye

7.5 Structure and functions of the Human Ear

7.6 Let Us Sum Up

7.7 Further Reading

7.8 Possible Questions


## 7.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- Explain the structure and functions of the human brain;
- Describe the structure and functions of the human eye;
- Discuss the structure of the human ear.

## 7.2 INTRODUCTION

Every part of the human body is very important for maintaining a healthy and balanced life. The human brain, eyes as well as the ears are intimately related with the physiological as well as psychological functions like memory, perception, attention etc. Here, in this unit we are going to discuss the structure and functions of the human brain, ear and ear.

## 7.3 STRUCTURE AND FUNCTIONS OF HUMAN BRAIN

**TITLE: THE HUMAN BRAIN**

**OBJECTIVE:**

To study the different parts of the human brain and their functions.

**MATERIALS:**

Paper, pen, pencil, scale, eraser etc.

**STRUCTURE OF THE BRAIN:**

The brain is a highly developed and enlarged portion of the central nervous system contained with the skull. It is situated in cortex formed by the bones of the skull.

The structure of the brain is well presented by three types of membranes namely -

1) External cover,
2) Central cover,
3) Internal cover.

The brain or the 'Encephalon' within the skull consists of -

1) The Cerebrum
2) The Cerebellum
3) The rid-brain
4) The Medulla Oblongata
5) Pons Verolli

- **THE CEREBRUM:** The cerebrum is the upper part of the brain consists of two hemisphere called cerebral hemisphere separated by a fissure with a layer of gray matter called cerebral cortex. The connecting bridge is called corpus cortex. There are folds and furrous in the cerebrum called the convolutions and fissures of the brain.
- **THE CEREBELLUM:** The cerebellum is a small centre of nerve is located at the back of the head. It is a wedge sharped body situated below the kinder part of the brain.
- **THE MID-BRAIN:** The mid-brain or the inter brain is situated between the cerebrum and cerebellum. It formed the base of the brain. It contains the thalamus which is internally connected with emotions and hypothalamus.
- **THE MEDULLA OBLONGATA:** The medulla oblongata is the prolongation of the spinal cord, which contains the nerve cells and fiber tracts connecting the cerebrum. It is a swelling part and seems to be like a ball that connects the brain with the spinal cord.
- **PONS VEROLLI:** It is a thick bundle of fibers that connects the two halves to the cerebellum with the cerebrum and the medulla oblongata.

It forms a bridge in the between the vital parts of the brain.

Brain is the chief centre for corresponding the receptive and the reactive and the sensory and motor - activities of the organism. In other words, mental activity or behavior is internally connected with the brain.

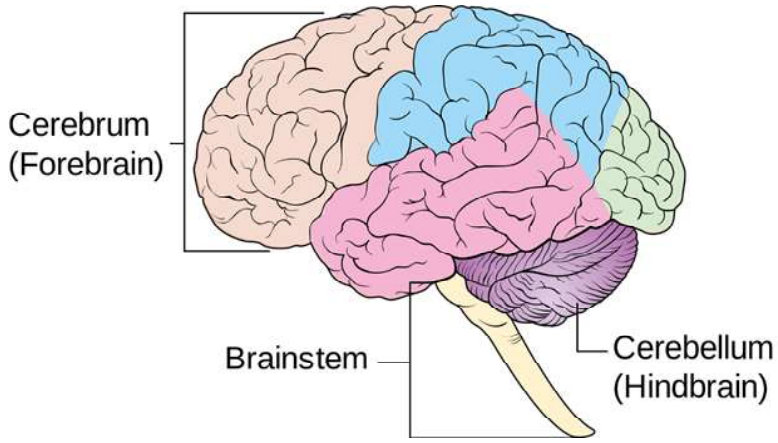
The functions of the cerebellum are the co-ordination of muscular movement and the maintenance of the balance of the body. It controls, co-ordinates and balance movements such as working, sitting etc. It preservers the equilibrium of the body.

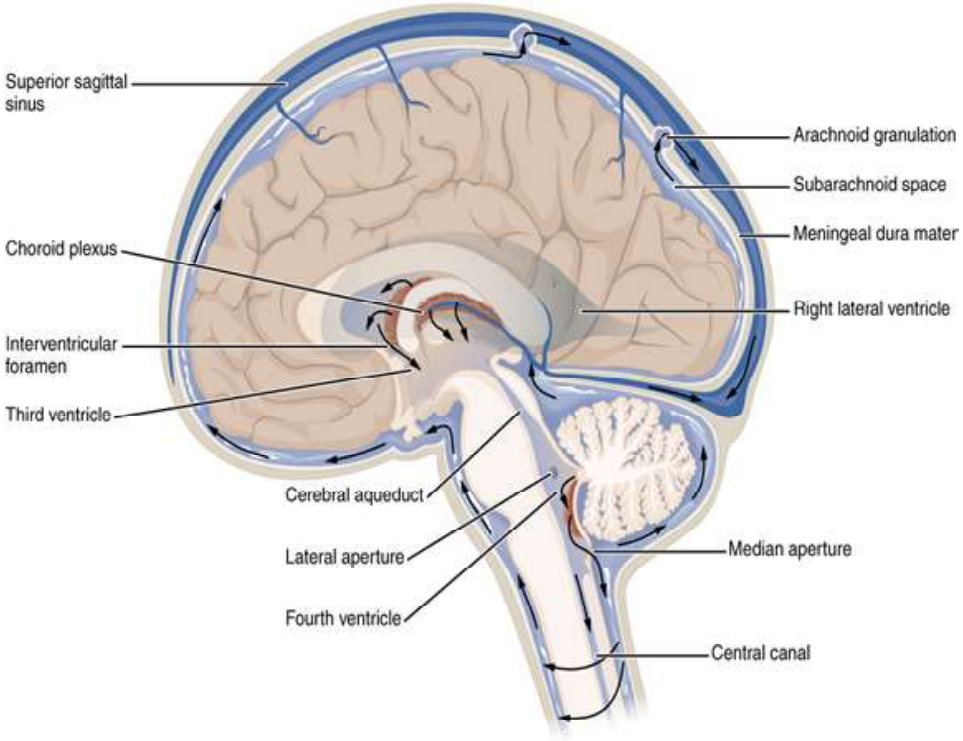
The cerebrum is a seat of higher mental control. It controls various human physical sensations like taste, touch, smell, hear and sight etc. Each labs deals with a special mental function of acceptable labs deals with a special mental functions of the spinal cord.

The mid-brain regulates complex movements which do not require reference to the higher power of cerebral cortex. It is intimately connected with emotion and control their functions.

The medulla oblongata is like a connector between the spiral cord and the brain. It controls circulation, swallowing etc. It severs as the path way for impulses passing between the brain and the spiral cord.

The Pons Verolli is the chief receiver of the incoming impulses. It serves as the relay station sending into the cerebrum, different impulses that it receives. All sensory impulses pass through it, to the higher power of cerebral cortex






## 7.4 STRUCTURE AND FUNCTIONS OF HUMAN EYE

TITLE: THE HUMAN EYE (Recpter for sight)

**OBJECTIVE:**

To study the different parts of the human eye, the receptor for sight and describe their functions.

**MATERIALS:**

Paper, pen, pencil, eraser, scale etc.

**STRUCTURE OF THE HUMAN EYE:**

The eye is the small sense organ of sight. The eye ball is the peripheral organ of sight and is situated in the cavity of the orbit, the walls of which serve to protect it from injury. The eyeball comprises of three coats. These coats are -

- The fibrous coat consisting of the sclera behind out the cornea in the front,
- The vascular pigmented coat comprising from behind forward the choroid, ciliary and iris,
- The nervous coat termed as retina.

The following constitute the important parts of the eye namely -

- Sclera,
- Cornea,
- Aqueous Humor,
- Iris,
- Pupil,
- Lens,
- Vitreous Humour,
- Ratina,
- Choroid, and
- Optic nerve.

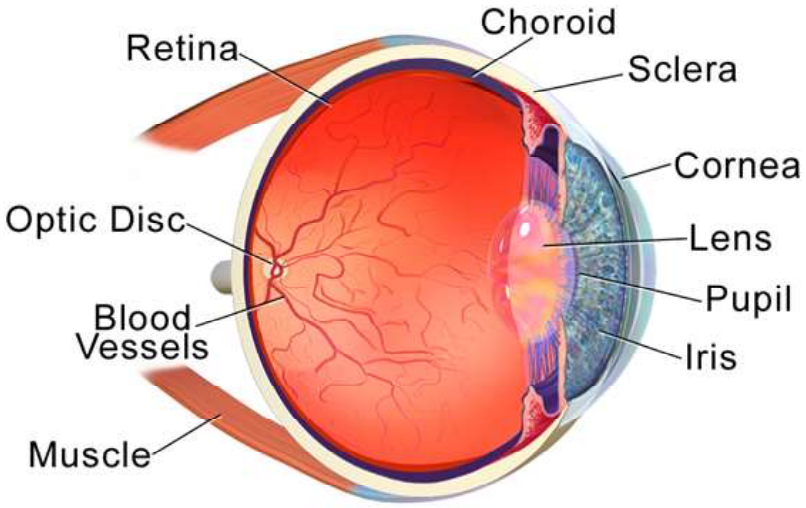
**DESCRPITION:**

- **SCLERA:** It is a firm membrane which serves to maintain the form of the eyeball. Its external surface is white. Its inner surface is brown. The sclera is formed of white fibrous tissue intermixed with fine elastic fibers.
- **CORNEA:** It is the anterior projecting and transparent part of the external coat which performs the major part of the refraction of the rays of light entering the you. It is convex anteriorly and projects as a flattened dome in front of the sclera. It allows transmission of light.
- **AQUEOUS HUMOUR:** It is a jelly like material which is transparent. It fills up the space between the cornea and crystalline lens. It maintains the eyeball's shape. It is a solution of sugar, protein and salt in water, which helps to refract the light and produce image of the retina.
- **IRIS:** The iris is a thin circular contractile disc, suspended in the aqueous Humour between the cornea and the lens and performed a little to the nasal side of its centre by the circular aperture of the pupil. The iris regulates the quality of light that passes into the eyeball.
- **PUPIL:** In the centre of the iris, is an entrance called the pupil which admits light into the eye to form an image on the retina. The size of the pupil becomes small in bright light and large in poor light.
- **LENS:** The lens is a circular bi-convex transparent body enclosed within a capsule. The lens is behind the iris. The size of the lens can be altered by contraction of relaxation of ciliary muscles which helps to

accommodate light in different distances.

- **VITREOUS HUMOUR:** This is a jelly like substance. It is a solution of salt, sugar and protein in water. It contributes to maintain the normal shape of the eyeball.
- **RETINA:** The retina is a delicate neural membrane which is specially adopted for the reception of light stimuli. Retina consist of layers of those the innermost layer which is composed of Rods and Cones is most important. Rods are sensitive and are stimulated by dim light, distinguishing black, white and shades of grey. Cones are stimulated by bright light only
- **CHOROID:** The choroid is a thin highly vascular membrane of dark brown or chocolate color, lining the posteriors 5-6th of the eyeball. It is pierced behind the optic nerve and is firmly adherent to the sclera. It prevents reflection of light by absorbing the surplus rays. It is supplied with blood vessels which provide oxygen and fluid to the eye in abundance.
- **OPTIC NERVE:** The nerve fibers from the receptor cells i.e. Rods and Cones pass across the front of the retina and all leaves at one point to form the optic nerve. It carries stimuli from the eye to the brain.

  Image formation and vision are the main function of the eye. The eye admits light troughs, which is regulated by the construction of the iris. The light passes through the cornea and the lens which is adjusted to focus the light on the face of the retina and produces as photo-chemical reaction in the rods and cones of retina from which serve impulses proceed to the brain. The cones are sensitive to both light and colour while rods are receptive for responses are very clean light and darkness. The impulse which is physical in nature transforms itself into a psychological phenomenon mainly vision.




**Anatomy of the Eye**

## 7.5 STRUCTURE AND FUNCTIONS OF HUMAN EAR

**TITLE: THE HUMAN EAR (Receptor for sound)**

**OBJECTIVE:** To study the different parts of the human ear and to describe its function.

**MATERIALS:** Paper, pen, pencil, eraser, scale etc.

**STRUCTURE OF THE HUMAN EAR AND FUCTION**

The ear is a sense organ for sound, they are responsible for converting sound waves into nerve impulses and sending them to the brain.

The ear or organ of ear is divisible into three parts-

- The external ear
- The middle ear or tympanic cavity
- The internal ear or labyrinth.

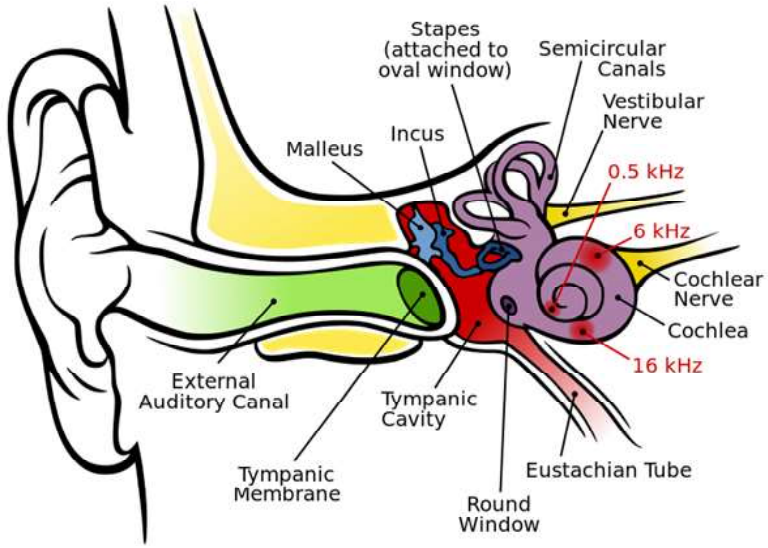
The different parts of the human ear with their functions are given below -

**STRUCTURE AND FUCTION**

- **PINNA:** It is a visible part of the external ear. It is an irregular funnel shaped flap of cartilage covered with skin. The function of pinna is in helping in conduction of sound waves through the external auditory canal and to concentrate and direct the vibration into the ear.

- **SEMI-CIRCULAR CANAL:** The semi-circular canal are three in number. Two of them are vertical and the third is horizontal. Each bone canal contains within it a membranous canal at the end of each is a swelling or an elevation known as Ampulla. The function of the semi-circular canals is to maintain the equilibrium of the body and also detected any turning movements of the head in any direction.
- **COCHLEA:** In shape, it resembles a snail's shape. It is a coiled structure in the inner ear. It contains the fluid compartment. The cochlea senses both loudness and pitch and sends impulses to the brain by a nerve.
- **INNER EAR OR LABYRINTH:** This part of ear is a membranous structure called the 'labyrinth'. It contains liquid called the 'Endolymph' and 'Perilymph'. The labyrinth is a specially coiled structure. The inner ear is concerned with dual functions of maintain equilibrium and hearing.
- **MIDDLE - EAR OR TYMPANIC:** The middle ear is an air filled cavity which lies just beyond the ear drum and is surrounded by bone. In the cavity of the middle ear. There are three small bones known as -
  - Hammer bone,
  - Anvil Bone,
  - Stripes Bone.

  The main function of the middle ear is to control the vibration which are transmitted to the inner ear.
- **EUSTACHIAN TUBE:** It is about 1 1/2 inches long leading to the middle ear to the throat. When one is swallowing the Eustachian tube is close or open. The function of the tube is to equalize air pressure on either side of the ear drum.
- **EXTERNAL EAR OR AURICLE:** It is a short tube leading to the ear drum from the pinna. The walls of the outer ear contain glands which secret a fluid (wax). The hairs in the outer tube helps to keep out dust particles and foreign bodies.




## 7.6 LET US SUM UP

- The human body is a combination of various parts like brain, ear, nose, eyes, teeth, leg, hand, glands etc.
- Among the different parts of the body, most importantly the human brain, eye and ear are related with our physiological and psychological functions.
- The structure of the brain is well presented by three types of membranes namely -
  - External cover,
  - Central cover,
  - Internal cover.
- The brain or the 'Encephalon' within the skull consists of -
  - The Cerebrum
  - The Cerebellum
  - The rid-brain
  - The Medulla Oblongata
  - Pons Verolli
- The eye is the small sense organ of sight. The eye ball is the peripheral organ of sight and is situated in the cavity of the orbit, the walls of which serve to protect it from injury.

- The eyeball comprises of three coats. These coats are -
  - The fibrous coat consisting of the sclera behind out the cornea in the front,
  - The vascular pigmented coat comprising from behind forward the choroid, ciliary and iris,
  - The nervous coat termed as retina.
- The ear is a sense organ for sound, they are responsible for converting sound waves into nerve impulses and sending them to the brain.
- The ear or organ of ear is divisible into three parts-
  - The external ear
  - The middle ear or tympanic cavity
  - The internal ear or labyrinth.



## 7.7 FURTHER READING

1) Saikia, Lutfun Rasul (1997): Psychological and Statistical Experiments in Education, Saraighat Printers, Guwahati.
2) https://en.wikipedia.org/?title=Ear
3) www.wikimedia.org



## 7.8 POSSIBLE QUESTIONS

**Q 1:** Draw the structure of human brain.

**Q 2:** Draw the structure of human ear.

**Q 3:** Draw the structure of human eye.

Q **4:** Explain the different parts of human brain.

**Q 5:** Discuss the functions of human ear.

**Q 6:** Mention the different important parts of human eye.

*** ***** ***



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|---|
| **Name of the Paper:**<br>**Course Code:** |

**Centre for Internal Quality Assurance (CIQA)**
**Krishna Kanta Handiqui State Open University**
**City Office, Housefed Complex, Guwahati- 06**

***Learner's Feedback on Course***

Dear Learner,

Regarding the course as mentioned above, we would like to know your opinions and comments so as to improve the quality of self learning materials in future. Please respond to the following statements by ticking the number you feel most reflect your opinion. After completion of the additional comments, please detach the page and send/mail the same to us at the address given below.

**The Director, Centre for Internal Quality Assurance, KKHandiqui State Open University**
**Housefed Complex, Dispur, Guwahati- 781006**
**(E-mail id: ciqa@kkhsou.in)**

1. Approximately how many hours did you spend for studying the units in the course? | | | |
2. Please give your opinions (by √ mark) to the following items based on your reading of the block:

| Sl. No. | Statements | Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| I. | The SLMs of the course fulfil the learning objectives set out in the beginning of each unit | | | | | |
| II. | The units of the SLM could satisfy my academic needs and expectations | | | | | |
| III. | The Unit writers have excellent knowledge about the course contents | | | | | |
| IV. | Language and contents of the units were presented at a level which I could readily understand | | | | | |
| V. | Ample opportunity for participation in the activities provided in the units | | | | | |
| VI. | Used enough Illustrations (Diagrams, tables etc.) for conceptual clarity | | | | | |
| VII. | Quality of content is engaging, relevant, and up-to-date | | | | | |
| VIII. | The self check questions are very helpful | | | | | |
| IX. | The Possible/model questions and the answers to check my progress have benefited me a lot | | | | | |

**Additional Comments:** *(Please feel free to provide your open comments)*

1. Which aspects of the SLM, according to you, worked well?

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2. What sort of changes/improvements do you feel KKHSOU could implement to improve the overall quality of the SLM?

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***Thank you for taking the time to complete this form.***

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