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HOW PSYCHOLOGISTS STUDY?

*I*n the previous lesson you have learnt about the nature of psychology, what psychologists do, different branches of psychology, etc. Now you can well understand the important place which psychology has acquired among various disciplines. Today there is considerable interest among common people, policy makers, students, professionals and businessmen and women in learning about psychology as a discipline. As we know, psychology is the scientific study of brain, mind and behaviour, and psychologists conduct their studies by using scientific methods. In this lesson you will study about the various methods, techniques and tools that psychologists use in their research and study.

OBJECTIVES

After studying this lesson, you will be able to:

- describe the goals of psychological studies and research;
- explain basic and applied aspects of research;
- familiarize with different methods used by psychologists;
- explain the steps involved in conducting experiments;
- know the different tools used by psychologists; and
- understand the uses of statistical analysis in psychological studies.

2.1 GOALS OF PSYCHOLOGICAL STUDIES AND RESEARCH

As a science, psychologists try to understand the nature and functioning of behaviour and experience. They try to answer questions regarding various psychological processes like memory, thinking, learning, perception, intelligence etc. In doing so the researcher or investigator adopts a scientific perspective. They make efforts to develop knowledge of phenomena in such a manner that can fulfil the requirements of science. Here, science refers to a method of systematic inquiry which is based on unbiased observation. In this way scientific knowledge becomes available for scrutiny by any person who wants to understand and verify the same. This is why scientific knowledge is made available to all.

In everyday life our observations are often biased by our likings or dislikings. In fact, we accept what others say and our casual impressions become part of our personal understanding which may be wrong or right. In contrast, a scientist relies only on the observations which are not influenced by personal preferences but are free from such biases. Similarly, scientific knowledge is not anybody's personal property. You must have heard about scientific journals. If you get a chance to go through a journal you will find that the way a scientific study is conducted is fully described or documented. In other words, the knowledge is public and open to any one who wants to have access to it. The documentation of research is useful for another purpose. Such a study can be replicated by any person who wants to conduct the study himself or herself.

Finally, the scientific study is objective. It is supposed to be free from subjective factors and it is seen, observed or experienced in the same way by each and everyone who follows the given method.

Psychologists have accepted scientific method and try to generate knowledge which stands well on the above mentioned criteria of science. As scientists they try to achieve the following goals regarding the objective of their study.

1. **Description:** The first step towards gaining understanding is to obtain a proper or systematic description of the phenomenon under study. It determines the range and boundary of the phenomena.
2. **Explanation:** Explanation means statement of the factors which determine the phenomenon under study. In other words, one may say that explanation provides the factors which make something happen. Thus, when a psychologist shows that practice leads to change in behaviour he or she is explaining learning.
3. **Prediction:** Once we are able to get the explanation of some phenomena we are in a position to tell or predict what will happen under certain circumstances.

The ability to make prediction is based on systematic analysis of the various causal factors. The presence or absence of those factors can help one to tell what will happen in future.

4. **Control:** The ability to predict provides the knowledge necessary to bring the change that is desirable. For instance, use of polio vaccine prevents the occurrence of polio. Similarly practising yoga or relaxation can be used to improve health and quality of life of the people. Thus knowledge can be used to produce results desired by the user of knowledge. This, however, is possible only when we have scientific knowledge.

INTEXT QUESTIONS 2.1

1. Fill in the blanks

(a) Science is a method of _____ inquiry which is based on _____ observation.

(b) Science is public or which can be _____ with other person and it can be _____.

(c) Scientific study is _____.

2.2 BASIC AND APPLIED RESEARCH

To get indepth study of research, Psychology has considered mainly the basic and applied research. Let us know more about basic and applied research. Any study or research begins with a question or problem that we want to answer or solve. Such problems are of various types. One broad way to classify these problems is to put them in "basic" and "applied" categories. Basic research deals with developing understanding, theory building and testing of a theory and applied research deals with solving real life problems. It may be noted that the line demarcating these two types of research is very thin. Also, there can be movement from theory to application or from application to theory.

In practice, applied research involves development of technology to solve specific problems that are faced in personal, familial, health, organizational and environmental areas. In fact many new branches of psychology have emerged which are predominantly applied in nature. This emphasis is so attractive that many universities offer courses in applied psychology or its various specialized areas.

The distinction between basic and applied studies in psychology may be indicated as follows. The basic research focuses on providing theoretical understanding. It offers understanding in terms of principles and laws which are not confined to

limited circumstances or persons. In contrast, applied research has a narrow goal of solving a very specific problem. It is concrete in its orientation and confines itself to a limited condition.

Today psychological knowledge is growing in basic as well as applied directions and there is mutual give and take between the two. The scope of psychology is expanding in a big way to contribute to the enhancement of quality of life of the people. For instance, developing an intervention program to help children with learning disability or for people suffering from anxiety is applied research.

2.3 EXPERIMENTAL METHOD

In simple language an experiment may be defined as observation under conditions which we can control and vary. Experimental method is generally preferred above other methods, because of its ability to understand the causal factors. An experiment is concerned about the study of relationship between changes in antecedent conditions and the corresponding changes in the consequents. The experimental method helps psychologists establish cause-and-effect relationship between these two sets of conditions which are usually considered as variables. To understand it let us take an example.

Suppose a teacher wants to know if recitation method will aid retention (of a poem) than silent reading? She will proceed as follows:

Forming a Hypothesis: To answer a problem the teacher has a question or problem in which effect of one thing (recitation method) on the other (retention) has to be explored. On the basis of her previous knowledge and researches, the experimenter (E) forms a hypothesis. In present case the teacher states a possible answer to the problem. She may hypothesize that the recitation method is better for retention of a poem. To verify the hypothesis she will undertake an experiment.

Identifying Independent and Dependent Variables: In order to understand the experimental method, one must be familiar with the concept of variables. "Variable is any measurable attribute of objects, things or beings". Quantitatively measured variables are age, intelligence, number of trials, sex, religion, caste etc. The E is concerned with two main kinds of variables:

- **independent variable (IV), and**
- **dependent variable (DV).**

An independent variable is manipulated by the E (e.g. method of learning is the IV in the present case) in order to understand its effect on some chosen aspect of behaviour.

Effects of IV are observed on the DV e.g. retention in the present example. In other words, dependent variable is the consequent variable on which the effect is to be observed.

While studying the effect of IV on DV the relationship is often influenced by a number of factors present in the environment. Such relevant variables need to be controlled by the E. The E plans the experiment using two groups i.e., experimental and control. The experimental group receives the treatment of IV and control group performs in the absence of the IV. These two groups are supposed to be similar in all respects except the treatment of IV.

Sampling of Participants: The next step is to decide the population to be selected for the study and deciding on the method of selecting a sample. For example, if one wants to take the students of 10^{th} class for the experiment she can not possibly go to all the schools. So she decides to take equal number of students of 10^{th} class of one school. A sample represents the whole population. One has to decide which type of sampling method should be used. Random sampling is considered to be the best method because in this way of sampling all members of population have equal probability of selection.

Control of Extraneous Variables: There is a possibility that some other variables, like age, gender, etc., may affect retention. All these variables have to be controlled. In order to do so the E selects participants of similar intelligence, age and gender. Experimenter may use a number of techniques to control the unwanted extraneous variables. Some of them are as follows:

1. ***Matching:*** The participants are matched on their characteristics.
2. ***Elimination :*** An unwanted variable may be controlled by elimination (e.g., noise).
3. ***Constancy of conditions:*** If elimination is not possible, the condition may be made constant for the entire duration of experiment.

Planning (designing) the Experiment: The E will select group of students, divide them in half and give them same material (poem in this case) to memorize. One group is instructed to read the material silently. This group is called the "control group". The other group recites the poem loudly for the same amount of time. This group is the "experimental group". Retention of both the groups will be compared.

Verifying the Hypothesis: If the experimenter finds a significant difference in the amount retained by the two groups, she may infer that recitation method is better for retention of poems. These findings will prove the hypothesis.

Limitation of Experimental Method: The experimental method is very powerful

for gathering scientific data. But it also has limitations. The findings obtained from this may not apply to natural situations. Sometimes an experiment might prove unethical or dangerous. In some situations, experiment may interfere with behaviour that is measured.

INTEXT QUESTIONS 2.2

State whether following statements are True or False

(1) Experiment is observation under controlled condition. True/False

(2) Independent variable is not manipulated. True/False

(3) Experimental group receives the treatment of IV. True/False

(4) Control group may be different in its properties than experimental group. True/False

2.4 NON-EXPERIMENTAL METHODS

Experimental method is the preferred method in psychology because it has greater precision but many a times we face problems that cannot be subjected to experimental manipulation. Behaviour of people in a crowd cannot be brought to the laboratory, neither it can be understood why a child breaks things in the class through experimental method. Such situations require different methods. Some of these non-experimental methods are described below:

Observation: Observation is the starting point for all sciences. It is a study of spontaneous occurrences, at the time they occur. But simply observing may not be enough. One should know what one wants to observe. Otherwise a lot of data may be missed. In psychological studies we use **naturalistic** as well as **controlled observation**. Also, there is another kind of observation which is called **participant observation** in which the observer observes by being a part of the group.

Introspection: To introspect means to look within. This is the oldest method in psychology. It is a very important method to understand the feelings of pain, happiness, fatigue etc. If some persons go to see a movie they may have liked the movie which others may have disliked ; but they can understand the emotional response of liking only by looking within. In introspection, attention is directed inwards to find out what is happening at the experiential level. For example, you meet a school mate after years, you greet him by shaking hands – an act of friendly behaviour but inside you may not feel happy to meet him because he had bullied you in the class.

Survey: It is for the study of social problems such as incidence of alcoholism, popularity of certain careers, causes of unsuccessful marriages. People cannot be manipulated to observe these problems. Psychologists go into the field with prepared list of questions and interview schedules to a group of people. They may want to know how many people are buying a certain brand of tooth paste. The surveyor may sometimes face problems like refusal of people to answer, biased answers, misleading answers etc. A carefully conducted survey provides information about the trend in a particular area of concern.

Case History: 'Case history' is a detailed compilation of data about a single individual. A psychologist may gather complete history, from infancy to present period in order to understand a person's behaviour. This method is often used to study abnormal behaviour, behaviour of criminals, problem children or even to study the developmental changes in personality. The focus is on the assets as well as the weaknesses of the person concerned.

Correlational Research: It is used to find out the relationships between two sets of factors/variables. We may use this method to find out the relationship of intelligence with scholastic achievement, or religiosity with spiritual well-being, language skills with examination performance etc. The strength of relationship can be represented by a correlation coefficient, which ranges from – 1.00 to + 1.00. A positive correlation indicates that as the value of one variable increases the value of the other also increases. A negative correlation tells that as the value of one variable increases, the value of other variable decreases. Correlational research can not demonstrate cause-and-effect relationship. But it gives new insights about the phenomena under study.

INTEXT QUESTIONS 2.3

1. What is an independent variable?

   _____

   _____

   _____

2. List the goals of psychology as a science?

   _____

   _____

   _____

2.5 PSYCHOLOGICAL TOOLS

While undertaking studies psychologists use a variety of tools to collect relevant data. These tools or instruments are of various kinds and are used for various purposes. Memory Drum and Tachistoscope are frequently used in studies of memory and perception. Similarly EEG, ECG, PET, GSR, MRI, FMRI, etc. are used in the study of neuro-psychological functioning. These electronic and electrical gadgets help to make the presentation of stimuli and recording of responses. Tape recorders and video recording are also used. Apart from these, there are paper-pencil tests used to measures to access various psychological attributes. Let us discuss basic various tools:

1. **Questionnaires and Interview Schedules:** In order to elecit information from people psychologists and other social scientists use questionnaires which are mailed or interview schedules which are presented by the researcher himself or herself in person. The questions may be open ended or closed ended. The open ended questions provide freedom to the respondent to answer the way he/she likes but closed ended questions have fixed answers and the respondent is required to choose out of the given responses. Preparation and use of these tools is an art and demands proper training. Interviews are used in many settings (e.g., clinical, personnel selection, research) and present a situation of social interaction. A good interviewer encourages the respondent to open up and share his or her views in clear terms.

2. **Psychometric Tests:** As a learner of psychology it is essential to be familiar with intelligence tests, personality tests, aptitude tests, interest inventories and many other similar psycholgical tools. They provide measurement of individual differences. A test is a standardized measure of sample of behaviours and attributes. These tests are used to determine the status of the person being assessed on an attribute, relative to the community of people on which the test has been standardized. In order to be useful the tests must have several features. (see box 2.1)

Box 2.1: Characteristics of psychological tests

Reliability: It refers to the consistency of a test. In order to be dependable a test must yield similar results on different occasions. Thus if a person is found to be above average in intelligence today he or she shall also show the same level of intelligence after 3 months. If the scores are similar then we may say that the test is reliable. This is called **retest-reliability**. There is another kind of reliability which is called **internal consistency** which indicates the degree to which the different items of a test are related to each other.

Validity: A test is valid if it measures the same property for which it has been prepared. Thus a test of intelligence is valid if it measures intelligence (and not interest or personality). For this purpose we relate the scores on the test with some external criteria.

Norms: Norms refer to the scores obtained by a group which works as a reference point. We do not know the zero value of psychological attributes. Therefore, absolute measurement is not possible. **The score of a test is meaningful in the context of scores obtained by other persons. A psychological test score is a relative score.** It is therefore necessary to develop norms for tests. They help to interpret test scores.

Standardization: Standardization is mainly concerned with establishing collectiveness of the tool in various conditions. This is carried out by finding validity, reliability and objectivly of the tools. In other words standardization also includes establishing ways and conditions for administering the test (e.g., time, instruction, scoring, interpretation). It is systematically done and described in the test manual. It helps to obtain meaningful data.

3. **Projective Tests/Techniques:** This includes a variety of tasks which are unstructured or ambiguous. The performance of a person on these tasks cannot be used in any direct manner. The performance is viewed as projection of the psychological attribute under consideration. In other words these tests provide indirect assessment of the psychological property and the investigator interprets the obvious behavioural expression or performance. Thus what a person says or does is not accepted at its face value. The hidden meaning is more important than what is apparent. Some of the famous projective tests include **Rorschach Ink Blot Test and Murray's Thematic Apperception Test (TAT).** In the first test a person is shown a set of ink blots and is required to identify what the blot represents or what are various objects that are seen. The responses obtained from a person are used to discover his/her personality. This test is frequently used in clinical setting. The TAT consists of a set of pictures and the respondent is required to write about the pictures. These stories are then interpreted to understand the personality of the person.

2.6 ETHICAL CONSIDERATION IN PSYCHOLOGICAL STUDIES

Psychological studies are done with human beings. It is therefore necessary to follow certain principles so that no harm is done to the participants. Some of the accepted principles are as follows:

1. ***Informed consent:*** The investigator can conduct a study on other persons only after obtaining their prior permission to do so.
2. ***Confidentiality:*** The findings of research remain confidential and are not disclosed with anybody.
3. ***Debriefing:*** If some kind of manipulation or deception has been done in the study the researcher has the duty to clarify that to the participants after completing the study.
4. ***Right to withdraw:*** The participants have a right to withdraw from the study if they desire to do so.
5. ***Responsibility:*** The researcher has to bear the responsibility of any harm done to the participants during the course of study.

Today it is a common practice to have Ethics Committees which examine ethical aspects of research before it is undertaken by the researcher.

The use of tests in clinical setting is made for certifying people in terms of mental disorders. It should be done with proper care and by trained persons only. It should not be misused.

2.7 NEED OF STATISTICS IN PSYCHOLOGY

Statistics is a branch of mathematics. It deals with collection, classification, description and interpretation of quantitative data. In psychology, statistics is used for:

- **describing behaviour,** and
- **predicting behaviour**.

When the statistics is used for describing behaviour, descriptive statistics is used. When it is used for explaining behaviour, inferential statistcs is used.

Descriptive statistics are the numbers which are often used to describe a variable. The major descriptive statistics are the measures of central tendency (mean, median mode), measures of variation, and correlation.

Inferential statistics are used in experiments or investigations which are designed to make generalization about population on the basis of a sample. There are many inferential statistics. 't' test is one of those.

Functions of Statistics

Statistics serve many purposes. Important ones are as follows:

(i) Data and information can be presented briefly and precisely.

(ii) Results obtained are more accurate and objective.

(iii) Analysis of data is made more scientific.

(iv) General conclusions can be arrived at.

(v) Comparative studies are made possible.

(vi) Relationship between two or more variables can be investigated.

(vii) Prediction about behaviours can be made.

2.8 SOME BASIC STATISTICAL CONCEPTS

When a large set of data is collected, it is usually presented in a condensed form in a frequency distribution table making it more meaningful and understandable. Frequency distribution table is the primary stage of statistical analysis.

Frequency Distribution

Suppose you have given a test to the class of 25 students and obtain the following scores:

10, 7, 6, 5, 5, ,6, 8, 9, 3, 6, 8, 7, 4

8, 9, , 5, 7, 4, 9, 6, 6, 11, 10, 8, 9, 8, 3

In the above distribution of scores the highest score is 11 and lowest score is 3. Thus the entire group has scored in between these two limits. The above data can be presented in the form of a Table where the scores and the frequency of their occurrences are shown. The Table shows that maximum numbers of students are in the score range of 6 – 8.

A tally mark (I) is used for one score and tallies are done in a duster of 5 scores. The fifth tally mark cuts the first four tally with a slauting line (/). These clusters helps us in counting large numbers.

Table 2.1: *Ffrequency Distribution*

Score	Tally	Total	Score	Tally	Total	Score	Tally	Total
3	II	2	6	~~IIII~~	5	9	IIII	4
4	II	2	7	III	3	10	II	2
5	III	3	8	~~IIII~~	5	11	I	1

Methods which are used to summarize the characteristics of the data are called measures of central tendency. These are the measures that depict the tendency of the distribution of scores. Let us study about them.

(a) Mean: Mean is the most popular and important measure of central tendency. It is also known as 'arithmetic mean'. For psychological research, mean is very useful because it provides the basis for calculating other statistics like standard deviation and correlation and describes the summary characteristics of the variables measured.

For instance, you must have noticed that whenever any Cricket Series is played people stick to their T.V. sets. Very often in the second part of the match a caption occurs on the TV screen as 'Run Rate' — Present and Run Rate — Expected. The Run Rate is the average score per over.

The mean is the weighted average of all the raw scores. It is computed by totalling all the raw scores and then dividing by the number of scores together. For example if we have the 7 scores like: 10, 20, 20, 40, 50, 10, 10

The mean can be computed with this method:

N (Number of scores) = 7

$10+20+20+40+50+10+10 = \frac{160}{7} = 22.86$

The mean (M) represented by $\bar{X}$ (pronounced as "X bar")

Individual score is denoted by "X"

Total number is denoted by "N".

(b) Median: The median is the value that divides a group of scores into two equal parts, one part comprising of all values greater and the other comprising of values less than the median. Median is a positional average and is not affected by the magnitude of scores. It is easy to understand and calculate.

Example: The median for the following scores is 25 :

12, 20, 23, 23, **25**, 26, 28, 35, 40

There are four scores below 25 and four above scores above 25.

(c) Mode: The mode is that score which occurs maximum number of times in a given series of scores. The word mode has been taken from French language which means fashion, hence mode is the most frequent or 'popular' number. The mode in the following scores is 20:

10, 15, **20, 20, 20**, 35, 35

It is easiest to calculate. Mode is frequently used in business, weather prediction, fashion etc.

(d) Correlation: Correlation is a method of numerically showing how closely related are any two sets of variables. In a large number of instances two variables always tend to fluctuate in the same or in the opposite direction. When it is found that a relationship exists it is called "correlation". When scores in one variable change in the same direction as those in the other or in the inverse direction — correlation (relationship) is said to exist.

The score through which the psychologists express the relationship between two variables is called the **coefficient of correlation**. It is an index which indicates the quality as well as quantity of relationship. With the variables three possible relationships are possible — positive, negative and zero/no relationship.

Magnitude of correlation ranges between – 1.00 to + 1.00. The range of correlation, coefficients can be interpreted in the following ways:

Co-efficient	**Relationship**
.00 to + .20	negligible
+ .21 to + .40	low
+ .41 to + .60	moderate
+ .61 to + .80	high
+ .81 to + .99	very high
+ 1.00	perfect

This is a range of positive correlation. Similar range exists for negative correlation, which means scores in one variable change with the other in inverse direction.

INTEXT QUESTIONS 2.4

1. What are the measures of the central tendency?

_____

_____

_____

2. What is correlation?

_____

_____

_____

3. How is statistics helpful?

_____

_____

_____

Inferential Statistics

When an experiment is specifically designed to measure the causal effects between two or more variables, inferential statistics are used. The main purpose of inferential statistics is to draw conclusion/results on the basis of treatment and interpretation of data. There are many types of inferential statistics like 't' test, F-test etc are used for this purpose.

WHAT YOU HAVE LEARNT

- The goals of psychological studies are: descreption, explanation, prediction and control.
- Basic research is related to developing theories and applied research deals with problem solving.
- Experiment helps to find the cause and effect relationship. It is observation under controlled conditions.
- An experiment has various parts. It starts with a hypothesis which is the possible explanation. Variables are measurable attributes of objects and people which the experimenter observes, manipulates, and controls.
- There are various steps in the experimental method which have to be followed. They are stating the problem, forming of hypotheses, sampling, design of the study, material, controls, instructions, results and discussion, and generalization.
- Non-experimental techniques are used to obtain descriptions of behaviour.

Some of the techniques are observation, surveys, case study, introspection, correlation etc.

- The psychological tools include questionnaire and interview, psychometric test, projective test/technique.
- Statistics is used by the psychologists to judge the significance of research results.It is of two types: descriptive and inferential. The descriptive statistics deal with summarizing the data and inferential deal with drawing conclusions about population on the basis of sample.
- Statistical methods which are used to summarize the characteristics of the data are called measures of central tendency. Mean, median, mode and correlation are frequently used descriptive statistics.

TERMINAL EXERCISE

1. What are the goals of doing psychological studies?
2. What are the different steps in planning an experiment?
3. What are the tools used by psychologists in understanding human behaviour?

ANSWER TO INTEXT QUESTIONS

2.1

1. (a) systematic, unbiased (b) shared, replicted, (c) objective

2.2

1. True
2. False
3. True
4. False

2.3

1. A variable that has been manipulated by the experimenter to know its effect on dependent variable
2. Descreption, Explanation, Prediction, Control

2.4

1. Mean, median, mode
2. Correlation is a method of numerically showing the relations between two variables.
3. refer to section 2.8 to frame your answer.

HINTS TO TERMINAL EXERCISE

1. Refer to section 2.3
2. Refer to section 2.4
3. Refer to section 2.6