UNIT 2

Methods of Psychology

After reading this chapter, you would be able to:

Understand Methods of Psychology

Analysis data quantitatively

Understand Frequency distribution, Evaluation of Central tendency and graphical presentation of data.

Contents

Introduction

Psychology is the study of human behavior and mental processes. You may also become curious to know how Psychologists study human behavior and mental processes, what are different methods that they use to study different aspects of behavior. Sometimes psychologists prepare a set of questions in the form of a questionnaire to collect information about individuals. Sometimes they observe the behavior by going to the places where this behavior naturally occurs. There are variety of ways by which individuals' behavior can be studied. Hence it can be said that there are different ways by which psychologists collect information about other peoples. This chapter will discuss these methods in detail.

Observation method:

In 1913 when Watson established the school of behaviorism, be defined psychology in a new context and was called a t as science of behavior, whose study can be done by using observation method rather than the introspection method.

In this method the observer observes the behavior of an organism or a person. On the basis of his observations prepares a special report. After analysis of the prepared report the observer came to any specific conclusion about the behavior of the organism. To make the observation more objective, observer observes the behavior of the organism in different situations. Sometimes many observers together observe the behavior of an organism. That can be the reason that this method is called as objective observation method. Observes observe both type of behavior i.e. external behavior, like: running, crying, playing and internal behavior, like: change in blood pressure, change in heart rate, etc.

There are two main characteristics of objective observation:

i) Observation is always purposive and intensive. In other words to fulfill some specific purpose the observer pays special focus on any particular aspect of the behavior of a person.

ii) The purpose of observation is to find the relation among different variables by using different rules.

Observations are of three types:

a) Participant observation
b) Non- participant observation
c) Naturalistic observation

Participant observation:

In this type of observation method the observer actively participates in the different activities with the participants in that behavior which he wants to observe. For example; to study the problems of workers of any factory the psychologist may register himself as one of the worker of that factory so that he can face same problems and meanwhile observes the other workers behavior.

Non Participant observation

In this type of observation method the observer does not participate in that behavior which he wants to observe. The observer observes the desired behavior of the participants from the distance. The observation of the participant's behavior under clinical, educational, social and industrial situation is mostly done using this method.

Naturalistic observation

When the observation method is used under natural situation, mostly to observer the behavior of the animals then such type of observation is called as naturalistic observation. Like psychologists observe the behavior of bees, monkeys, ants etc. in their natural habitat.

Merits: Generally it is seen that observes

The merits of the observation methods are as follows:

1. This method elaborated the study area for the psychologists. Introspection method was used only on adults, as a result of which the mental activities of adults could be studied. But observation method can be used on children, adults mentally challenged, disable people, animals, etc. Hence, the use of this method extended the field of psychology.

2. The behavior of more than one organism can be studied at the same time by using this method. Like if a psychologist wants to study the crowd behavior then he can do this very easily by using this method.

3. The statistical analysis can be done easily for the scores obtained from this method because the scores are generally in the form of frequency and percentage. As a result of which the validity of the conclusion obtained from this method increases.

Demerits:

Attitude, prejudice, needs etc may affect his observations. In other words it can be said that observations may become more subjective rather than being objective. In such a situation the results obtained do not hold high reliability or validity.

1. In this method by observing the behavior of an organism observes tries to find out his mental mechanisms. But observer may not find the success every time. for an example: two women of any village meets each other after a long time, to express their love towards each other they may start crying, any observer may come to a conclusion that they must in sorrow so they are weeping, but the fact is they are showing their joy. This example clearly mentions that it is not possible to interpret objectively the actual meaning of any mental mechanism.

2. In this method observation is done under a natural and uncontrolled situation, therefore the results obtained from this method cannot be described in the true cause effect relationship. In a study by Jones& Jones 1928, college students got scared by watching a snake. Here the cause of emotional reaction (fear) is unclear. The shape of snake might aroused the feeling of fear among the students, its crawling could be the reason behind, etc. at the end there is no fix cause which is responsible for the arousal of feeling of fear among the students.

Case Study Method

This is one of the main method in psychology. This method is used by clinical psychologists to identify the pathological symptom and its causes among the persons. That is the reason it is also called as clinical method.

In this method the psychologist to understand the behavior of a person prepares a descriptive history of that person that contains all the incidence of his life, from the pre natal period to till date. That is why this method is also called as case history method.

The main Merits of this method are as follows:

i) Psychologist prepares a separate historical record for each person to find the cause of behavior, therefore an intensive study of a person can be done.

ii) By this method the mental and physical development of a person can be studied. This method helps the psychologist to reveals about

the personal stages a person has gone through in his past life and the influence of those stages in his physical and mental development.

iii) In case study method the base of study is the case description. Therefore the psychologist has full chance to focus on the problems of the person and the cause behind those problems.

Demerits:

i) In case study method the base of studying the behavior is past history, which is completely developed by the informations collected from person's, parents, relatives, friends and relatives. It is generally seen that parents, friends, relatives or neighbours hide those incidents or facts of the person's life due to moral obligations, as a result of which the informations provided by them to the psychologist becomes biased and the study done by using these informations do not remain highly reliable.

ii) There is no appropriate technique in case history method to check the accuracy of the information collected during preparation of case history record.

iii) In this method the psychologist should be trained and have a sound knowledge of conduction of interview and psychological tests. Generally it is seen that this method can be used by normal psychologists. In such case the results and facts obtained are not highly reliable.

iv) In this method if a person with specific characteristics is taken for study than the results obtained cannot be generalized.

Interview

Meaning and characteristics of interview

Generally the face to face conversation between two or more persons to fulfill any specific purpose is called as interview.

According to Denzen (1970), "An interview is any face-to- face conversational exchange where one person elicits information from another."

According to Kerlinger (1985), "The interview is face – to –face interpersonal role situation in which one person, the interviewer, asks a person being interviewed, the respondent, questions designed to obtain answers pertinent to research problem."

Types of interview:

On the basis of purpose or function the interview has following types:

1. Clinical Interview
2. Research interview
3. Diagnostic interview
4. Selection interview
5. Focused interview

On the basis of structure interview has two types:

1. Structured Interview
2. Unstructured interview

The description of all the above interview types is as follows:

1. Clinical Interview:

It is also called as Depth Interview and in this type of interview the interviewer shows more interest in study of feelings, motives and inspirations of the person to be interviewed. In this type of interview, the interviewer has prior knowledge about the types of questions he has to ask from the interviewee at the time of interview, which are about the specific feelings, conflicts, incidents etc.

2. Research Interview:

In this type of interview the interviewer on any research problem collects raw data from the interviewee during interview. The main aim of such type of interview method is to prepare detailed information about a proposed solution of a research problem. According to Young (1949), "Such type of researches is usually conducted by those scientists who want to find the instant solution of any specific problems."

3. Diagnostic Interview:

In such of type of interview the interviewer tries to find the possible cause of any specific diseases from the interviewee. This type of interview is use in clinical psychology, where psychologist and patient sits in front of each other and psychologist tries to find the hidden causes behind disease while interviewing the patient. Sociologist also uses this method to diagnose the social problems.

4. Selection Interview:

Selection interview means such type of interview in which interviewer takes interview to select a candidate for any job or position. Here generally interviewer asks such questions which can easily reflect interviewee's attitude, aptitude, abilities etc. The aim of such type of interview is to find out the extent up to which the interviewee according to his attitude, aptitude, experience and qualification is capable for the desired position or job. This type of interview is common in industrial psychology and psychology of administration.

5. Focused Interview:

Focused interview is related to those people or interviewee, who themselves have seen any accident, movie or have heard any special commentary. In such interview stress will be given only to those situations whose analysis has been done before the interview. In such type of interviews, there is an interview guide that contains two things in it. First contains the description of all those areas to be covered during interview. Second contains that hypothesis on the basis of which the data has to be collected. This type of interview is totally dependent on the personal experiences, attitude and emotional reactions of the interviewee about the situation taken for study. Along with this the interviewee has the full liberty to express his views about the situation of the interview.

6. Structured Interview:

Structured interview is that interview in which the interviewer asks the pre framed questions in a fixed sequential order during interview and the responses given by the interviewee are recored into a standardized format. In such type of interview while asking same questions from each candidate the interviewer tries to reach at a certain conclusion. Such types of interviews are also called as formal interview or patterned interview.

7. Unstructured Interview:

In unstructured interview the questions which are to be asked are not predetermined. The interviewer do not asks the questions in any definite order. Truly in this types of interviews it is not decided before that what type of questions and in which sequence the questions are being asked by the interviewer. These responsibilities are completely left on the interviewer and he has to decide what the best is. There is no time limit for this type of interviews. Some topics can be interviewed for a long time while some topics can be interviewed for less time. Black and Champion (1976) commented on structured interview that, "Interview's context remains free or independent from any controlled regulation and conscious constrain".

Advantages and Disadvantages of Interview:

What so ever is the type of interview it has some Advantages and Disadvantages,it is compulsory to throw light on them? After evaluating many review using interview techniques Gorden, (1969) described some advantages of interview techniques, which are as follows:

1. By interview the interviewer collects the desired information in a short time.

2. Interview is a type of technique in which the researcher becomes completely satisfied with the fact that he has made the right interpretation of the responses collected from the respondent.

3. In the interview technique there is flexibility in the questions which allows the researcher to find the intensive information in very less time. If the questions being asked is not understood by the interviewee than there is a facility to repeat the question in the interview technique. Such type of facility is not available in questionnaire method.

4. In this technique it is easy for the interviewer to control the situation, as a result of which the interviewer can ask the appropriate questions from the interviewee and along with this even the interviewee can answer the questions easily.

5. In the interview the interviewer receives some non- verbal cues from the respondent. In other words, the researcher can study the posture and gestures of the interviewee. On the basis of these signs the researcher is able to understand the meaning of the responses given by the interviewer.

Along with these advantages the interview technique has some disadvantages too, which are as follows:

1. The researcher framed a contradiction about the validity of verbal responses, because rarely any interviewee talks in a same way he responded during interview in his real life interaction. Therefore the decisions made on the behalf of verbal responses are not much valid.

2. It is seen that because of many other reasons the interviewer is not able to pay full attention to the responses made by the interviewee. Like if the interviewer is tired then he won't be able to record the responses correctly. In such a situation it is not possible to come on worth conclusion.

3. The interview contains the quality of subjectivity in it. Generally it is seen that the interviewer reaches to the interview with some preassumphons, expectations, and pre imagations. On the basis of this subjectivity the interviewer starts framing some necessary judgments, descriptions etc about the interviewee, because of which the reliability of the scores decreases.

4. Cicourel (1964) said that the interview context do not remain constant from one interview to the another. Sometimes the interview gets over with a calm environment but sometimes it gets over with a rude environment. As a result there occurs a difference in interview context and it becomes hard to come on any conclusion after the data collected from different interviewers.

5. Black and Champion (1976) said that, "The interviewing context is as free of regulation and conscious constraint as possible". When many interviewers study a same problem then generally they interpret the information

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drawn from same interviewee in different styles. Some rates the same person at positive while the other rates the same person negative. As a result of which it becomes impossible to reach on any fix conclusion.

Survey Method:

There are certain psychological problems which if a psychologist tries to study taking a small sample then he can't do that in a proper and scientific manner. To study such problems it is compulsory to have a large sample and must include persons from different sections of the society. To study the attitude towards child rearing practices in society, to study the pre marital sexual relationships, to study the problems generated because of drug abuse, these are some of the problems which needs a large sample that must be the representative of all the sections of the society. Therefore to study these type of problems psychologists uses survey method.

Merits and demerits of survey method:

The major merits of this method are as follows:

1) The major merit of this method is that using the scores for many persons can be collected in less time.

2) As persons under study belong to different sections of the society therefore the conclusions drawn from these studies have a property of generalization. In other words conclusion drawn from this method can be considered as true from many people, means survey method has high external validity.

The demerits of survey methods are:

1) This method cannot be used on infants.

2) There seems to be a contraction about validity on the data collected for any problem using this method. For example the informations collected through postal questionnaire are true; one can't say it for sure. It might possible that the answers us given by someone else rather than the expected person. It is also possible that the person might answer only few questions rather than the complete questionnaire. Therefore it can be said that the survey method has less validity. Inspite of these demerits this method is used very much by psychologists.

Experimental Method:

The main and scientific method of psychology is experimental method. The method whose base is an experiment is called experimental method. Generally the sequential study or observation of any behavior or mental process under any controlled state is called the experimental method. This is clear from this definition that in experimental method the behavior is studied under controlled conditions. The study of behavior is done through variables. A Variable is any event, situation or quality of a person which is changeable. The scientific meaning of variable is any situation, incident or a quality of a person that can be measured and is quantitatively changeable. Like – age, increment, fatigue, etc. are the examples of variable, which can be measured and are quantitatively changeable.

In any psychological experiment there are mainly three types of variables – Independent variables, Dependent variables, and Relevant or Control variables. Those variables which can be manipulated by the experimenter and whose effect can be seen on other variable is called controlled variable.

Variable about which an experimenter wants to make any predictions after experiment is called as dependent variable. This is called as dependent

variable because change takes place in this variable is completely dependent on manipulations done in independent variables.

Generally in psychological experiments some variables are there whose effects are controlled by the experimenter. Because he don't want to study their effect on dependent variables this type of variables are called as relevant variable or extraneous variables or controlled variables.

We can understand the relationship between dependent variable, independent variable and controlled variable by this example. Suppose if an experimenter wants to study the effect of reinforcement on learning, then it is clear he wants to prediction about learning process by this experiment. Therefore learning is an example of dependent variable, reinforcement is an independent variable because he will make manipulations in independent variables and he will see the effect of this manipulation on dependent variable i.e. process of learning.

Merits of experimental methods are as follows:

1) In experimental methods the study of variables associated with behavior and mental processes of any organisms are done under controlled conditions (mostly in laboratories) as a result of which the conclusion contains highest internal validity. Because of this quality experimental method is different from other methods as it is not possible to have this much control on situations in other methods. Atkinson, Atkinson & Hilgard(1983) said that, " The capacity to have precise control on variables makes experimental method different from other methods of observations."

2) The experiment method has a quality of replication. The experimenter clearly mentions the research design, no. of subjects, manipulation in independent variables, etc. So if the other experimenter has any doubts about the findings of prior experimenter than he can repeat the experiment to check the findings.

3) Experiment method is very objective because the experimenter has to use a particular method in a special way. Therefore he cannot make any bias or prejudice etc. As this technique is objective therefore the obtained data can be analyzed qualitatively and quantitatively.

4) In experiment method the manipulation of the variables can be done easily therefore the experimenter can study the psychological problem into many ways.

Demerits of experimental method:

1) The main demerit of experimental method is that the controlled situation of an experiment is not related with reality rather it is an artificial situation. Therefore it has very less connection with real life situation. Hence the generalization of conclusion obtained from experimental method is not possible. Morgan, King & Robinson (1981), expressed their views in this same way, "The conclusions obtained from experiment are only limited till artificial experimental situation and its generalization is not possible for real or natural situations in any behavior".

2) Some special types of demerits are naturally present in an experimental method. The experimenter bias and sampling bias are two types of important biases. In the experimenter bias the result and observation process is affected by the expectations of the experimenter. The sampling bias means that the sample is not representative. Sometimes it

is seen that the experimenter selects the sample according to the availability , a result of which these sample do not represent the group about which the prediction were made prior to the experiment. Sometimes it is also seen that the experimental and controlled groups are not equivalent. Therefore the results obtained do not remain much valid and reliable.

3) Some experiments can be administered on the animals only, but can't be on humans. This results in the limitation of the scope of field study. For an example if there is any experiment in which any body part like any specific part of brain has to be removed or operated to see its effect on behavior, than it will be inhumane to do this experiment on any human and more over no human will be ready for being a subject. But it is easy to do such an experiment with animals. The results obtained after experimenting on animals can be generalized on human beings, yet there remains much possibility of errors.

Inspite of these limitations experimental method is considered as a scientific method in experimental psychology. Today there is no validity of those theories and facts which has less or no experimental support.

Introspection Method:

Introspection means internal observation. In other words when the person himself observes his own feelings then it is called as introspection. This technique was invented by William Wundt and Titchner who established the school named Structuralism.

These people called the psychology as a science of conscious experience and said that introspection should be the only technique to study conscious experiences. They defined three elements of conscious experiences which are: Sensation, Feeling and Image. If a person expresses his conscious experiences in form of these facts then this type of expression of feeling will be called as introspection. For an example if a person saw a dead man on the road, then some specific thoughts will come in his conscious experience whose description is as follows:

"Seeing the dead body of a person made me feel sad and same kind of an incident also happened yesterday in front of my home where somebody killed a person of same age."

According to Tichner (1890), the success of introspective method depends on following things:

1) The person who wants to introspect himself shouldn't have any prejudice or feeling bias.

2) The person who wants to introspect himself should have full control over his attention process.

3) The person who wants to introspect must be physically and mentally fresh. There shouldn't be any feeling fatigue or boredom.

4) The person who wants to introspect must have interest in introspection and should have calm temperament.

Merits:

Introspection method has following merits:

1) The study and analysis of mental processes of a person like his feelings, wishes, etc can be done properly by using introspection method. Some mental problems can be studied only through introspection method. Like: if an experimenter wants to see the role of mental images in thinking process then he has to study this problem using introspection method.

2) The introspection method is a type of self

observation. Without creating any mental pressure if this method is applied to reach towards any scientific conclusion about the mental processes then there is no other better method than introspection.

3) Introspection method is the very first and old method of psychology. Using this method psychologist differentiated psychology as an experimental subject from philosophy. Therefore it can be said that introspection method helped psychology to achieve an experimental status.

Demerits:

The demerits of introspection method are as follows:

1) The psychologists pointed out the biggest demerit of this method, as it is very personal and subjective. Whatever a person says in introspection report it must be accepted. It is also possible that he must be feeling something else and he is doing something else, for example if a person feels sad after seeing a dog, but rather telling this same feeling he can say that he is feeling happy to see the dog. This makes clear that in this method there is a lot of space for subjectivity. This decreases the importance and validity of this method.

2) There are some feelings whose study is not possible using introspection method. Because the person is aware of them but can't express these feelings verbally. Like: if a person while eating radish is forced to tell the feelings about the taste of radish then it will become hard to tell that what type of langue or words he will choose to tell his feelings. Possibly he may not express his feelings properly. Some

psychologist don't accept this as a problem of introspection method rather considered it as a problem of language. But the reality is that any of the scientific method becomes unscientific if there is any language problem in it. This proves that introspection method is not scientific.

3) The introspection method can't be used on animals, birds, small children and mentally challenge persons because these people can't study their real feelings and can't even express them in form of language.

4) In introspection method there is the same person who feels and expresses the expressions. Therefore the same person has to work double at the same time. All the persons can't study the mental processes while doing dual job. If some people do this then it won't be considered as scientific because there are some mental processes whose experience and observation is not possible at a time.

Measure of central tendency:

In general terms the meaning of central tendency is to lean towards the centre but in statistics the meaning of central tendency is leaning of any scores of any frequency distribution towards the center. Like in biological traits there is the tendency to tend towards the average of the frequency distribution. For example, the children of short parents attain more height than their parents while the children of long height parents attain short height than their parents. According to Chaplin (1975), "The representative value of scores is called as central tendency." Reber and Reber(2001), also supported this definition.

Measure of central tendency:

The central tendency can be measured by three measures. These three measures are: The mean, The median, The mode.

Mean :

The mean is the one of the measure of central tendency. It has three types: Arithmetic mean, Harmonic mean, Geometric mean. Here Arithmetic mean is related with our context. Therefore we are going to discuss its meaning, utility, characteristics and methods of calculation.

Arithmetic Mean:

Generally the average value of anything is called its mean. When the total of all the scores is divided by the no of scores (N) then the result obtained will be the Arithmetic Mean. Ex. 5 students obtained following scores in an intelligence test: 100, 105, 95, 90 and 80.

The total of these scores will be (100+95+90+80=470), when this total will be divided by number of scores i.ie. 5 then the result will be 94 (470/5). Therefore the Arithmetic mean of scores of the five students will be 94.

Properties of Arithmetic Mean: Before the calculation of arithmetic mean the brief description of its properties is important:

1) The main property of mean is that it directs towards the center of the frequency distribution. It reflects those value which is equal or nearby equal to the center of the frequency distribution. When the frequency distribution is balanced then the mean value is exactly the center of the frequency distribution. More is the imbalance in frequency distribution more will be the distance of mean from the center of the frequency distribution.

2) The one of the main characteristic of mean is that it tells whether the distribution is normal or not. When the frequency distribution is normal then the mean lies in the center and there is no difference in mean, mode and median.

3) Change in any of the score of the frequency distribution will change the mean value.

4) One of the properties of mean of any frequency distribution is that it is a balancing point of any distribution. The scores above this are called as positive deviation and scores below this point are called as negative distribution.

5) As compare to median and mode the mean holds more sampling stability. The main cause of this is the increase or decrease in the sample size doesn't have much effect on the mean.

Uses or Merits of the mean:

As a measure of central tendency for frequency distribution the mean has many utilities:

1) Mean gives the knowledge about the average of any distribution or group. It indicates the standards of distribution or a group.

2) The one of the uses of mean is that on the basis of mean comparison of two groups or distribution is possible. If mean of scores for girls and boys of any standard are calculated separately than it will give an idea that who is better according to the context of achievement.

3) The utility of mean can be seen in relation with other statistic calculating methods. Like for calculating S.D., A.D., t-Test, correlation, etc. mean plays important role.

4) According to Garret(1981), out of three measures of central tendency i.e. mean, mode, median the mean holds more stability. Therefore where stable measure is required in measures of central tendency then the use of mean seems to be more important.

Demerits or limitations of the mean:

There are following demerits:

1) The severe demerit of this is that the extreme observations have a deep effect on mean.

2) The determination of mean us not possible either by observation or by graphic method.

3) Those qualitative qualities whose quantitative analysis is not possible, the analysis of such qualities is not possible through mean, but can be possible through median. Like study of qualities like honesty, beauty etc.

4) The other problem with mean is that if there is no sufficient information about the data than the mean obtained can be wrong. Like: suppose Ram scored 45 in first semester, 50 in second semester and 55 marks in third semester. Shyam scored 55 in first semester, 50 in second semesters and 45 in third semesters. The mean for both was found 50. On the basis of which it can be concluded that achievement of Ram and Shyam is equal. But this conclusion is wrong because the progress of Ram increases in every semester where decrease can be seen in Shyam's

Calculation of Arithmetic Mean:

The mean can be calculated in two situations which are as follows:

a) The mean from ungrouped Data: The meaning of ungrouped data is that when the scores are different rather being in the form of frequency table. The method of calculating mean for such scores is to add all the scores and then divided by the number of scores (N) then the result obtained will be the mean. The formula for calculating mean is:

$$M = \frac{\sum X}{N}$$

Where M= Mean $\sum$ = sum of scores N= Number of scores

Example: The scores obtained by 10 students in a psychology examination which are as follows; 45, 55,35, 60, 70, 52, 45, 62, 67, 68.

This is an ungrouped data. To calculate mean all these scores must be added and divided by 10.

Number of students	Scores obtained(X)
1	45
2	55
3	35
4	60
5	70
6	52
7	45
8	62
9	67
10	68
$M = \frac{\sum X}{N} = \frac{559}{10} = 55.9$	X=559

Mean from Grouped Data:

Grouped or organized scores are those scores which are presented in form of frequency distribution table.

There are two methods to calculate mean from grouped data :

1) Long Method:

Long method is also called as actual mean method. The formula for calculating mean by this method is as follows:

$$M = \frac{\sum fx}{N}$$

Where M= Mean

$\sum$ =Sum of

f= Frequency

X= Midpoint of the class interval N= total no. of frequency **Example:**

Scores obtained by 60 university students in an achievement test, calculate the mean.

Class Interval	Mid point	F	Multiplication of Frequency and mid point
C.I.	X	F	(fX)
57-59	58	1	58
54-56	55	1	55
51-53	52	6	312
48-50	49	12	588
45-47	46	7	322
42-44	43	9	387
39-41	40	8	320
36-38	37	5	185
33-35	34	4	136
30-32	31	6	186
27-29	28	0	0
24-26	25	1	25
		N=60	$\sum$ fX= 2574

Mean=2574/60 = 42.90

Short Method:

The second method to calculate mean is called as short method. It is called short method because it is easy to calculate mean by this method and it takes less time.

Formula to calculate mean is as follows:
M= AM +Ci

Where

M= Mean

AM= Assumed Mean

C= Correction

i= Size or length of class interval

Correction C can be calculated like this:

$$C = \frac{\sum fx}{N}$$

Where C= correction $\sum$ = Sum of fx'= multiplication of frequency and assumed mean from deviation

N= number of frequency

Example:

Class intervals	Mid point	freq-uency	Deviation from AM	Multiplication of AM and frequency
C.I.	X	f	x'	fx'
57-59	58	1	5	5
54-56	55	1	4	4
51-53	52	6	3	18
48-50	49	12	2	24
45-47	46	7	1	7
				-58
AM 42-44	43	9	0	0
39-41	40	8	-1	-8
36-38	37	5	-2	-10
33-35	34	4	-3	-12
30-32	31	6	-4	-24
27-29	28	0	-5	0
24-26	25	1	-6	.6
		N=60		.60

$\sum$ fx= 58 - 60 = -2

M=A.M.+ci,

$$C = \frac{\sum fx}{N}$$

i = 3

therefore,

M=43+(-.03× 3)

=43+ (-.90) = 43 -.90 =42.91

Median :

(What is Median, Mdn)

The second measure of central tendency is called median. Median is that point of any distribution above which 50 percent lies and below which

50 percent lies. According to Downine and Heath (1959, 1970), "Median is that point of any distribution where equal scores lies at each end."

This can be made clear by an example. Suppose the scores of 7 students in history are as follows: 60, 45, 55, and 65,70,48,59. Now these scores can be arranged in ascending order: 45, 48, 55, 59, 60, 65 and 70 out of these scores 59 is the number below which there lies three scores 55, 48 and 45 and above which there lies three scores 60, 65 and 70. At last 59 will be considered as median.

Properties of the Median:

Before calculating median it is useful to know its properties.

1) The one of the properties of median is that it also directs towards the center like mean. That is why both of them are called the measures of central tendency. On the basis of this property both of them are inseparable.

2) The other important property of median is that it direct towards that point of distribution where there is equal number of scores below and above that point. On this point median is different from mean. Because mean indicates the average only.

3) Any changes in any score of distribution do not bring any change in median. Like: 4, 5, 6, 7,8. Where 6 is the median.

4) The one of the properties of median is that it indicates that point above and below which lies equal scores. But it does not pay stress on the importance of the distance. Like: 10, 25, 33, 35 and 39 where 33 is the median above which lies two scores 10 and 25 the difference between these two is 15. While there are two scores below this point i.e., 35 and 39, the difference between these two scores is 4.

This much imbalance can't be seen in mean. Therefore on this basis these two measures are different from each other.

5) According to Garret(1981), there is less sampling fluctuation in median, but it is more as compared to mean.

Uses of median:

There are following uses of median:

1) The one of the uses of median is that the exact midpoint of any distribution can be determined by median. Therefore when the midpoint of any distribution is needed than it is important to calculate median.

2) Median provides the knowledge about which score is affecting the central tendency and what is its location?

3) Only median is the central tendency which is used to measure the qualitative qualities. Like: finding average intelligence, average beauty, etc.

Demerits or limitations of the median:

Inspite of many uses or advantages still the median has some demerits which are as follows:

1) For ungrouped data when the number of scores is even then it is not possible to find out median. Because on calculating the average of two scores of middle the real median can't be calculated, as the median can lie anywhere between these two scores.

2) As median is a positional average therefore it do not depends on every item of the distribution.

3) Median holds less stability as compare to mean.

4) Fluctuation of sampling is more in case of median as compare to mean specially in small samples.

Calculation of Median:

Median can be calculated in two situations:

1) The Median from ungrouped data: Those scores which are not arranged in frequency table are called as ungrouped data. In this condition the scores can be arrange either in ascending order or in descending order. And the middle score is considered as median.

Formula for calculating median:

$$Mdn = \frac{(N+1)}{2}$$

Here, Mdn= Median

N= number of scores

For example:

$$Mdn = \frac{(5+1)}{2} = \frac{6}{2} = 3$$

2) The Median from grouped data:

When N is large then median can be calculated by arranging or organizing the scores. Grouped data is that data which is arranged in frequency distribution. In such condition the following formula will be used to find median.

$$Mdn = L + \left(\frac{\frac{N}{2} - F}{fm}\right) \times i$$

Here, Mdn= Median ,

L= exact lower limit

$\frac{N}{2}$ = half of the sum of scores

F= frequency

fm= class interval of that frequency where the median exsits.

i= Size of interval

Example: There are number of steps involved to calculate the median from grouped data please

consider the following data to understand the steps:

Class interval	Frequency
55-59	1
50-54	1
45-49	0
40-44	2
35-39	3
30-34	7
Mdn 25-29	17
20-24	6
15-19	7
10-14	0
5-9	4
0-4	2
	N= 50

$$Mdn = L + \left(\frac{\frac{N}{2} - F}{fm}\right) \times i$$

Now,

$$\frac{N}{2} = \frac{50}{2} = 25$$

L=24.5

F=19

fm = 17

i= 5

therefore,

Median

$$= 24.5 + \left(\frac{25-19}{17}\right) \times 5 = 24.5 + \frac{6}{17} \, 5$$

$$= 24.5 + \frac{30}{17} = 24.5 + 1.76 = 26.26$$

Mode

The score or number which is repeated maximum times in a frequency distribution is called as mode. Like: 15, 11, 20, 11, 17, 11, 21, 15, 12, and 11. Here 11 is repeated many times i.e. it is considered as the mode.

Reber and Reber (2001), defines the mode as, "In statistics the mode is that measure of central tendency which helps to reveal the midpoint of the frequency whose having highest scores which describe measure"

Properties of the mode:

1. The one of the properties of mode in case of ungrouped data the number which is reapeated by maximum times will be the mode.
2. In case of grouped data it gives the knowledge about that class interval whose frequency is the highest.
3. Mo is the symbolic representation for mode.
4. There are two types of mode: one is crude mode and other is true mode. When the mode is calculated on the basis of observation then it will be called as crude mode. When the mode is calculated using mode calculating formula then it will be called as calculation mode.

Uses or merits of the mode:

Out of three measures of central tendency the merits of mode are limited. It is not so useful as mean or median but has some merits.

1) Whenever we want to know that score or number which is repeated maximum times in any ungrouped data then only mode will be helpful.
2) When the frequency is bimodal or multimodal then mode will be of more use then mean or median.
3) When a rough idea about the central tendency is required in less time then use of mode becomes necessary.
4) The mode is not affected by the distant observations. On this basis it is better than median.

Demerits or limitations of mode:

Inspite of many merits mode have some demerits too:

1) The rigid definition of mode is not possible.
2) The mode doesn't provide any help in further mathematical treatment.
3) The mode gets more affected by the sampling fluctuations as compared to mean, and median.
4) The stability which is found in mean can't be finding in median or in mode.

Calculation of mode:

The mode can be calculated in two situations:

The Mode from ungrouped data:

It is easy to calculate mode from ungrouped data. It can be calculated by observing the data. Therefore such type mode is crude mode. Suppose 15, 13, 18, 25, 20, 18,22, 18, 23,and 28. Here by observing the ungrouped data it become clear that 18 comes maximum times hence it is considered as mode in this ungrouped data.

The mode from grouped data:

When the data is in grouped form in that case both crude mode and true mode can be calculated. The crude mode can be calculated on the basis of observations. The class interval whose frequency is highest is considered as mode.

Class interval	Frequency	Midpoint x	Fx
85-89	1	87	87
80-84	2	82	164
75-79	3	77	308
70-74	4	72	432
65-69	5	67	402
60-64	10	62	620
55-59	5	57	285
50-54	5	52	260
45-49	3	47	141
40-44	2	42	84
35-39	0	37	00

30-34	1	32	32
	N=45		$\sum x=2815$

The formula for calculating true mode from grouped data is:

First method for calculation of mode:

3 median- 2 mean

Second formula for mode:

$$M_0 = L + \frac{fm_1}{fm_1 + fm_2} \times i$$

Here ,

M_0 = Mode

L= exact lower limit of that class interval whose having the highest frequency.

fm_1 = the frequency just above the class interval whose having the highest frequency.

fm_2 = the frequency just below the class interval whose having highest frequency.

i= Size or the length of the class interval.

$$M_0 = L + \frac{fm_1}{fm_1 + fm_2} \times i$$

L= 59.5 , fm_1= 6, fm_2 = 5, i= 5

Therefore the mode will be:

$= 59.5 \left(\frac{6}{6+5} \right) \times 5$

$= 59.5 \left(\frac{6}{11} \right) \times 5$

$= 59.5 + \frac{30}{11}$

59.5+ 2.73 = 62.23 ans

Frequency Distribution:

Meaning of frequency:

The number of happening of any incidence is called as frequency. Chaplin (1975) defined frequency as, "The number of repetition of any incident is called its frequency."

What is frequency distribution?

Frequency distribution is the method by which the frequency can be represented in form of number. Here frequency can be distributed on the basis of range of scores or according to the class, which indicates the number of occurrence of any incident in any class. According to Chaplin (1975), "The frequency distribution gives an idea about the number of incidents in any class interval or range."

According to Reber and Reber (2001), "The meaning of frequency distribution is classification of the distribution on the frequency of repetition of scores in according to class or category."

Therefore according to the comfort and convenience the distribution of the frequencies in different categories or classes in form of table is called as frequency distribution. On this basis the frequency distribution is different from probability distribution, because here the total is always 1.00.

Need or importance or advantage of frequency distribution:

Why there is need of frequency distribution? What is the necessity? In other words what is the utility? The answer of these questions is as follows:

1) The first importance of frequency distribution is that the scores obtained will become organized. Until the scores are in there basic form they remains unorganized. And when there are settled in frequency distribution table they become organized.

2) The second utility of this is that the scores obtained through this are more meaningful and useful. Until the scores are in their basic form they are not much clear, not much meaningful. But when they are arranged in a frequency distribution table they become more presentable, organized and meaningful.

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3) The third utility of frequency distribution is that it clarifies the nature of the basic scores. Until the scores are in their basic form their nature remains unclear, but when they are organized in frequency distribution table their nature becomes clear.

How to make frequency distribution table?

The three types are as follows:

1) Absolute frequency distribution.
2) Cumulative frequency distribution
3) Proportional frequency distribution

Absolute frequency distribution:

In this type of frequency distribution the frequency is presented in form of number. There are many utilities of this type of frequency distribution:

1) It is an easy frequency distribution.
2) This makes clear that how many times a score has come in any class interval.
3) The total of all the frequencies is equal to number of scores. The main problem of this type is that it doesn't indicate about the proportion of the frequency in any class interval.

1		3
Class Interval	Tally	Frequencies
80-84		1
75-79		2
70-74		4
65-69	|||||	5
60-64	|||||		6
55-59	||||| |||||	10
50-54	||||| ||	7
45-49	|||||		6
40-44		4
35-39		3
30-34		2
N= 50		

Cummulative Frequency Distribution:

In this type of frequency distribution scores are arranged by using exact method in absolute frequency distribution table. After this cummulative frequency of each class interval is decided.

1		3	4
Class Interval (C.I.)	Tally	Frequencies	Cumulative frequency (c.f.)
79.5-84.5		1	50
74.5-79.5		2	49
69.5-74.5		4	47
64.5-69.5	|||||	5	43
59.5-54.5	|||||		6	38
54.5-59.5	||||| |||||	10	32
49.5-54.5	||||| ||	7	22
44.5-49.5	|||||		6	15
39.5-44.5			4	9
34.5-39.5		3	5
29.5-34.5		2	2
N=50			

Proportionate Frequency Distribution:

Scores are also distributed like absolute frequency distribution in this type of distribution. After this for each class interval a parallel frequency equal to the real frequency has been calculated. This tells that each frequency is in which proportion. Like same percentage of frequency can be calculated.

1	2	3	4
Class Interval	Frequencies	Proportionate	Percentage
80-84	1	.02	2.0
75-79	2	.04	4.0
70-74	4	.08	8.0
65-69	5	.10	10.0
60-64	6	.12	12.0
55-59	10	.20	20.0
50-54	7	.14	14.0
45-49	6	.12	12.0
40-44	4	.08	8.0
35-39	3	.06	6.0
30-34	2	.04	4.0

	N=50	1.00	100.0%

Linear presentation
(Graphical Representation: Nature and type)

Graphical representation means to present scores or data in form of graph. It can be form of curve or figure. By curve or figure the relationship between the scores becomes clear. According to Reber and Reber (2001), graphical representation is called as graph, which can be in form of lines, curves and graphs which represents the relationship between the variables.

From the above table four things become clear about graph:

1) Graph represents the real data.
2) The represented data and scores can be used for statistical or clinical purpose.
3) Graph can be represented sometimes in terms of line, curves or shapes.
4) Graph reflects the relationship between these three forms i.e. line, curve and shape.

Advantages of graphical representation:

i) It becomes easy to understand frequency distribution by graph.
ii) It becomes easy to understand the relationship between the two or more variables.
iii) It becomes easy to understand the nature of data by graphical representation.
iv) By the help of graph it becomes easy to show the effect of independent variable on independent variable.
v) By the help of graph the informations regarding statistical measures like median and mode can be found easily.

Limitations:

The following are the limitations of the graphical representation:

1) There are certain rules for making graph. Those people who don't hold the knowledge about these rules are not able to make graphs.
2) There are many types of graphs available which are used according to the requirement of the problem. Hence which type of graph is to be used in which situation, it becomes difficult to decide.
3) It is not possible to have correct numerical value through graph.
4) Illusionary effects can be seen due to the instability when two graphs showing the relation between the two variables were prepared using the same base.

Types of Graph and graphical methods:

1) Frequency polygon
2) Histogram

Polygon
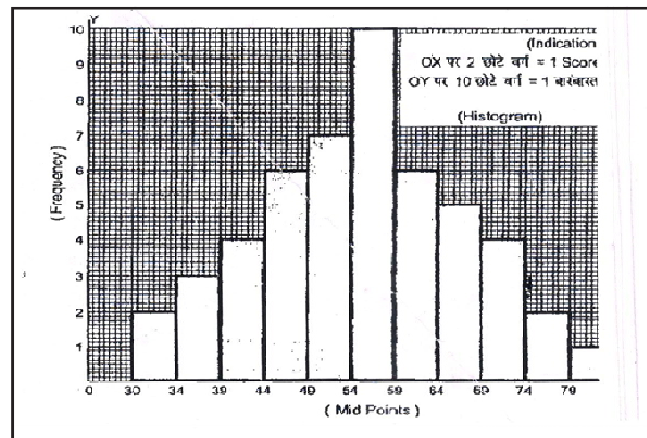
1) Frequency polygon:

To present frequency distribution the simplest method is frequency polygon. Polygon means figure with many edges. It is always uneven, because the curve is drawn according to the frequency distribution. It contains two lines- horizontal line and vertical line. The vertical line is called as abscissa. And the vertical line is called as ordinate. As same abscissa is called as X-axis and ordinate is called as Y- axis. The point where both the lines meet is called as 'O' origin.
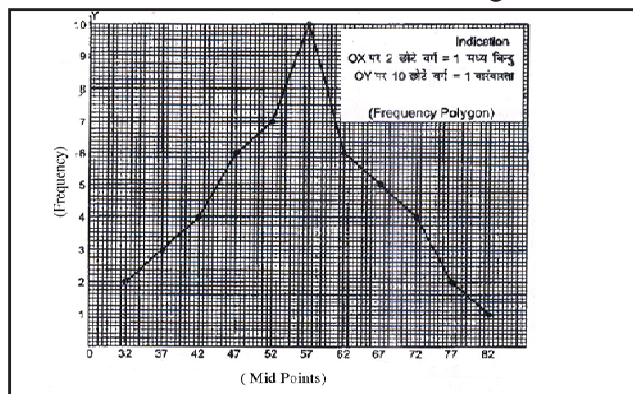
2) Histogram:

Histogram is a graphical method by which frequency distribution can be represented. In this each frequency is represented in a rectangle over its class interval. That is why sometimes it is called as a rectangular graph. According to the Chaplin (1975), "Histogram is a type of co graphical representation of frequency distribution. In which representation of every frequency is done by using a bar. The height of this bar will be proportional to the frequency of that class interval."

It is clear from the above discussion that there are some differences in histogram and frequency polygon. The common part is that both of them are graphical methods, which can be used to represent frequency distribution. Second similarity is that in both the methods midpoint is written on the midpoint of X-axis and f (frequency) is written on Y- axis. But the difference in both the methods is that in frequency polygon the frequencies are represented on mid- point of the class interval, while in histogram the frequencies are represented on full class interval. Second difference is that in histogram the representation of class interval is in the form of rectangle, where the base is the size of the class interval and whose height is proportionate to the frequency of the class interval. But this quality cannot be found in polygon. Third difference is that histogram is more useful than frequency polygon because the nature of frequency distribution is much clear in the base of histogram. But the comparison of two or more frequency distribution is possible in polygon not in histogram. Because different frequency distributions could be made on a single polygon, as this is not possible in histogram.

This can be made clear by seeing the following example:

There is the same procedure of making histogram as that of polygon. Here also all the steps are included which were discussed before at the time of frequency polygon. Therefore there is no relevance of repeating those steps here again. The important thing to remember is that here the points should be joined in such a way so that it will form a rectangle shape.

Important terms:

Observation, clinical, interview, case study, introspection, central tendency, mean, median, mode, frequency distribution, frequency.

Important points:

In the present chapter methods of psychology and measure of central tendency are discussed.

Invigilation method is also called as observation method. In this method the observer studies the behavior of the organism or person.

The case study method is used in clinical psychology to identify the symptoms of any disease and the cause responsible for it.

Generally the conversation between two or more persons for any specific cause is called as an interview.

Survey method, experimental method,

introspection method are the basic psychological methods.

The measure of central tendency are- Mean, Mode, Median.

In the present chapter frequency distribution, linear presentation, graphical presentation, frequency polygon and histogram are discussed.

For practice:

1. The meaning of frequency is:
   a) Scores
   b) No. of repetitions of scores
   c) Multiple of scores
   d) None of these

2. Which of the method is not suitable for absolute frequency distribution?
   a) Exclusive method
   b) Inclusive method
   c) Exact method
   d) None of these

3.) Which is the formula for range?
   a) (H-L) + 1
   b) (H+ L) -1
   c) (H-L)
   d) NONE OF THESE

4) The symbol of size of class interval is:
   a)Y   b)X   c)i   d)p

5) Which of the following is a graphical method?
   a) Frequency polygon
   b) Histogram
   c) Bar diagram
   d) All the above

Very short answers:

1. Mention types of observation method.
2. Mention the types of interview on the basis of their purpose.

3. Which are the measures of central tendency?
4. Write the formula to find mean of the grouped data.

Short answers type:

1. What do you mean by central tendency? Throw light upon the different central tendencies.
2. What is the base for taking assumed mean for ungrouped data?
3. Describe the formulas to find median and mode.
4. Which of the formula is used to calculate mode from bimodal scores?

Long answers:

1) Find the mean of the following frequency distribution:

Class Interval	f
23-25	1
20-22	4
17-19	5
14-16	7
11-13	10
8-10	6
5-7	4
2-4	3
	N=40

2) Which of the measure of central tendency is more stable and reliable? And why?
3) In which situations it is useful to use geometric mean?
4) When to use the harmonic mean? What is its limitation?
5) Throw light upon the merits and demerits of the central tendency and describe when to use them.

Answers to Multiple Choice Questions:

1(b) 2 (d) 3(a) 4(c) 5(a)