

MA (Sociology)

**SECOND SEMESTER
MASOC 406**



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METHODOLOGY OF SOCIAL RESEARCH

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PART-II

MA [Sociology]

**SECOND SEMESTER
MASOC-406**



RAJIV GANDHI UNIVERSITY

Arunachal Pradesh, INDIA - 791 112

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About the University

Rajiv Gandhi University (formerly Arunachal University) is a premier institution for higher education in the state of Arunachal Pradesh and has completed twenty-five years of its existence. Late Smt. Indira Gandhi, the then Prime Minister of India, laid the foundation stone of the university on 4th February, 1984 at Rono Hills, where the present campus is located.

Ever since its inception, the university has been trying to achieve excellence and fulfill the objectives as envisaged in the University Act. The university received academic recognition under Section 2(f) from the University Grants Commission on 28th March, 1985 and started functioning from 1st April, 1985. It got financial recognition under section 12-B of the UGC on 25th March, 1994. Since then Rajiv Gandhi University, (then Arunachal University) has carved a niche for itself in the educational scenario of the country following its selection as a University with potential for excellence by a high-level expert committee of the University Grants Commission from among universities in India.

The University was converted into a Central University with effect from 9th April, 2007 as per notification of the Ministry of Human Resource Development, Government of India.

The University is located atop Rono Hills on a picturesque tableland of 302 acres overlooking the river Dikrong. It is 6.5 km from the National Highway 52-A and 25 km from Itanagar, the State capital. The campus is linked with the National Highway by the Dikrong bridge.

The teaching and research programmes of the University are designed with a view to play a positive role in the socio-economic and cultural development of the State. The University offers Undergraduate, Post-graduate, M.Phil and Ph.D. programmes. The Department of Education also offers the B.Ed. programme.

There are fifteen colleges affiliated to the University. The University has been extending educational facilities to students from the neighbouring states, particularly Assam. The strength of students in different departments of the University and in affiliated colleges has been steadily increasing.

The faculty members have been actively engaged in research activities with financial support from UGC and other funding agencies. Since inception, a number of proposals on research projects have been sanctioned by various funding agencies to the University. Various departments have organized numerous seminars, workshops and conferences. Many faculty members have participated in national and international conferences and seminars held within the country and abroad. Eminent scholars and distinguished personalities have visited the University and delivered lectures on various disciplines.

The academic year 2000-2001 was a year of consolidation for the University. The switch over from the annual to the semester system took off smoothly and the performance of the students registered a marked improvement. Various syllabi designed by Boards of Post-graduate Studies (BPGS) have been implemented. VSAT facility installed by the ERNET India, New Delhi under the UGC-Infonet program, provides Internet access.

In spite of infrastructural constraints, the University has been maintaining its academic excellence. The University has strictly adhered to the academic calendar, conducted the examinations and declared the results on time. The students from the University have found placements not only in State and Central Government Services, but also in various institutions, industries and organizations. Many students have emerged successful in the National Eligibility Test (NET).

Since inception, the University has made significant progress in teaching, research, innovations in curriculum development and developing infrastructure.

SYLLABI-BOOK MAPPING TABLE

Methodology of Social Research

Syllabi

Mapping in Book

Unit I Research Design and Sampling;

Research Design, Types of Research Design, Sampling: Type, Size and Sampling Error.

Unit II Methods of Data Collection-I

Questionnaire, Schedule, Case Study, Observation

Unit III Methods of Data Collection-II

Interview Method and Content Analysis, Projective Techniques.

Unit IV Scales and Scaling Techniques:

Scaling and its Importance, Nominal Scale, Ordinal Scale, Interval Scale, Ratio Scales, Bogardus Scale and Likert Scale.

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INTRODUCTION

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Research is the search for knowledge or a systematic investigation in order to establish facts. The basic aim of research is to discover, interpret and develop methods and systems to advance human knowledge on diverse scientific matters. Social research refers to the conduction of research on various groups of a society by social scientists. Research methodology refers to the way research can be conducted. It is also known as the process of collecting data for various research projects.

Social research pertains to research carried out by social scientists on various facets of society. Research plays a very significant role in the field of social science. In order to study the importance and relationship between social science and research, social research is conducted or undertaken. The research that attempts to measure, describe, explain and predict the social and economic phenomena or social behaviour of human beings is known as 'social research'.

Methodology of social research is the science of studying how research is conducted scientifically. It helps to understand both the products as well as the process of scientific enquiry. A research process involves selection and formulation of a research problem, research design, sample strategy or sample design, as well as the interpretation and preparation of research report. Research can be undertaken in the form of descriptive/survey research, applied or fundamental research, quantitative or qualitative research, conceptual or empirical research, and other types of research.

A few important factors in research methodology include the validity and reliability of research data and the level of ethics. A job is considered half done if the data analysis is conducted properly. Formulation of appropriate research questions and sampling probable or non-probable factors are followed by measurement using survey and scaling techniques. This is followed by research design that may be experimental. This book deals with scientific and social research; concept, theory and fact; research design and sampling; methods of data collection; and scales and scaling techniques.

This book, *Methodology of Social Research*, is written in a self-instructional format and is divided into five units. Each unit begins with an Introduction to the topic followed by an outline of the Unit Objectives. The content is then presented in a simple and easy-to-understand manner, and is interspersed with Check Your Progress questions to test the reader's understanding of the topic. A list of Questions and Exercises is also provided at the end of each unit, and includes short-answer as well as long-answer questions. The Summary and Key Terms section are useful tools for students and are meant for effective recapitulation of the text.

UNIT 1 RESEARCH DESIGN AND SAMPLING

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Structure

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1.0 INTRODUCTION

A research design is a conceptual framework for conducting research. It is a blueprint for collecting, measuring and analysing data. There are several types of research designs depending on the type of research study being conducted. The quality of a good research design depends on the extent of its flexibility, efficiency and economy. Research design is also determined by adhering to certain basic principles of research design, such as the randomization principle and the local control principle. It involves the technique of determining the methods of data collection and the ways in which the research work should be performed, giving due consideration to time and cost constraints. A research design is a predefined part of a research study. It is a statement that clearly defines the problem for which the research is being done.

The main aim of research is to discover principles that have universal application. Generally, research in education includes all such assumptions that are based on a large number of samples/units/objects. It would be impractical if not impossible to test or observe each unit of population under controlled conditions in order to arrive at principles having universal validity. A 'population' is any group of individuals/units that have one or more characteristics in common which are of interest to the researcher, for a particular research. A 'sample' is a small percentage of the larger group who are selected for research. A sample can be statistically explained as being a subset of a population. The sample will be able to give an idea of the characteristics of the larger group from where

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it has been drawn. It is possible to make deductions about the larger population on the basis of the sample.

For selecting a sample, it is necessary to have a sampling frame. After defining a population and listing all the units, a researcher selects a sample of units from the sampling frame. Sampling design refers to a definite plan for obtaining a sample from the sampling frame. It refers to the technique or procedure, which a researcher adopts in selecting some sampling units from where inferences about population are drawn. An error in statistics is the difference between the value of a statistic and that of the corresponding parameter. These errors arise due to chance differences between the members of population included in the sample and those not included. This unit discusses the concept of research design, sample, methods of sampling, sampling design and sampling errors.

1.1 UNIT OBJECTIVES

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

- Discuss the concept of research design and its features
- Explain the important concepts related to a research design
- Evaluate the types of research design
- Assess the sampling method of samples in research
- Explain the types of sampling
- Analyse the concept of sampling errors and the effect of biasness on a research programme

1.2 RESEARCH DESIGN

Research design is a structure that gives an outline of the overall research work. It is the result of better planning and implementation of a good strategy. Different authors have given different definitions of a research design. According to Kerlinger, research design is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance. Bernard Phillips defines research design as the blueprint for collection, measurement and analysis of data.

The decisions that you need to take to formulate a research design should be based on the following questions:

- What is the research all about?
- Why is the research being conducted?
- What kind of data is required for the research?
- From where can the data be obtained?
- How much time will the research take?
- What is a sample research design?
- How should the data be analysed?
- What is the style of report preparation?

A research design helps a researcher to organize ideas and check for flaws and inadequacies in the collected data. It involves the following elements:

- A statement that clearly defines the problem for which the research is being done.
- Procedures and techniques for gathering the information required for research design.
- Methods that need to be implemented for processing and analysing the data required for research design.

The overall research design can be divided into the following four parts:

- (i) **Sampling part:** It includes the method of selecting items that are to be observed for the research study.
- (ii) **Observational part:** It includes the conditions under which you need to make observations.
- (iii) **Statistical part:** It is based on the number of items that need to be observed and the analysis technique to be used for the analysis of gathered data.
- (iv) **Operational part:** It involves the techniques that help to implement the items specified in the sampling, statistical and observational designs.

Need for a Research Design

Before starting the research process, the formulation of an efficient and appropriate research design is important. A research design is significant as it has the following advantages:

- It helps in the smooth functioning of various research operations.
- It requires less effort, time and money.
- It helps to decide the methods and techniques to be used for collecting and analysing data.

The researcher needs to consider the following factors before creating a research design:

- Source of the information
- Skills of the researcher and his coordinating staff
- Problem objectives
- Nature of the problem
- Availability of time and money for the research work

Features of a Good Research Design

A good research design is characterized by flexibility, efficiency and low cost, but it has many other features too. On the basis of the description of the design, a research design has the following features:

- It states the sources and types of information required for solving the problem for which the research is being carried out.
- It is a strategy for indicating the approach to be adopted for gathering and analysing data.
- It includes performing research work according to time and budget constraints.
- It minimizes preconception and maximizes the reliability of collected and analysed data.
- It minimizes experimental errors in an investigation.
- It provides various aspects for dealing with a problem.

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A research design depends to a large extent on the type of research study that you are conducting. If the research study is exploratory, then major emphasis is on the discovery of ideas. So, a research design should be flexible to implement the different aspects of a phenomenon. However, when the purpose is to obtain an accurate description of a research study, the design that maximizes reliability of the collected data is considered to be a good design. The availability of time, money, skills of the research staff and the method of obtaining information must be considered while creating experimental design, survey design and sample design.

Steps in Research Designing

The steps in a research design primarily depend on the type of research being conducted. The steps involved in a research process are as follows:

- Preparing the research question or problem
- Assessing the available literature
- Creating hypotheses
- Constructing the research design
- Collecting data
- Analysing the data
- Interpreting the results
- Writing the research report

The fourth step, i.e., constructing the research design, involves three subordinate steps, which include the process of creating a research design. The three subordinate steps can further be explained as follows:

- **Identifying variables:** This involves identifying the variables to be studied and determining their types. The most common types of variables are dependent, independent, controlled and other variables. Dependent variables are items such as responses of subjects and outcomes of survey or criterion variables. Independent variables, on the other hand, are those, which are explanatory or predictor variables.
- **Formulating functional definitions:** Here, the researcher explores the possibilities and the ways in which the variables can be operationalized.
- **Selecting design for data analysis:** This is the preliminary step of data collection, and hence, involves determination of what design option to choose for analysing the data being collected.

1.2.1 Important Concepts Related to a Research Design

There are several important concepts related to research design that helps in understanding the use and control of the variables involved in the research. The various concepts related to research design are:

- **Dependent and independent variables:** Variables involved in research can take different quantitative values. For example, variables like weight, height, income can take different quantitative values. A dependent variable depends on other variables or is the result of some variable. Whereas, the variable that is antecedent to the dependent variable is known as an independent variable. For example, if weight is dependent on age, then weight is a dependent variable and age is an independent variable.

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- **Extraneous variables:** Independent variables that are not a part of research, but still affect the dependent variables are known as extraneous variables. For example, if a researcher identified that a relationship exists between a student's self-concept and achieved marks in a particular subject, then self-concept is an independent variable and achieved marks is a dependent variable. Intelligence may affect the achieved marks in a particular subject, however it is not related with the study undertaken. So, intelligence may be termed as an extraneous variable.
- **Control:** It is used to minimize the effect of extraneous variables, and in experimental research, it is used to restrain the experimental conditions. A good research design should minimise the effect of extraneous variables.
- **Confounded relationship:** When extraneous variables affect dependent variables, the relationship between the dependent and independent variables is known to be confounded by the extraneous variable.
- **Research hypothesis:** When scientific methods are used to test a prediction or hypothesised relationship, then it is known as research hypothesis. This study must contain at least one dependent and one independent variable.
- **Experimental and non-experimental hypothesis-testing research:** When testing the research hypothesis is the main purpose of research, then it is known as hypothesis-testing research. Research done for independent variables is known as experimental hypothesis-testing research, and research in which dependent variables are used is known as non-experimental hypothesis-testing research.
- **Experimental and control groups:** In an experimental hypothesis-testing research, when a group is represented for standard conditions of research design, then it is known as control group. Whereas, when a group is represented for some specific conditions, it is known as the experimental group.
- **Treatments:** When the experimental and control groups are tested under different conditions, then it is known as treatments. For example, if you need to check the quality and impact of three fertilizers on the yield of a crop, then the fertilizers will be referred to as three treatments.
- **Experiment:** Experimentation is the process of examining and verifying the hypothesis related to some research problem. An experiment can be absolute experimentation or comparative experimentation. For example, if you need to test the impact of fertilizers on the yield of a crop, then it is absolute experimentation, whereas when you need to test the impact of one fertilizer as compared to other fertilizer, then it is known as comparative experiment.
- **Experimental unit:** It is the pre-determined block where different treatments are used for research. Therefore, experimental units should be selected carefully.

1.2.2 Basic Principles of Research Design

A research design is always based on some principle. Ronald A. Fisher has classified three basic principles of research design, which are:

- Replication
- Randomization
- Local control

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1. **Replication principle:** In this principle, an experiment is repeated more than once, thereby, applying each action in more than one experimental unit. For example, to examine two varieties of flowers, one needs to divide the varieties of flowers in two parts. First variety is grown in one part and the second in another part, and then a conclusion is drawn. This application can be done repeatedly in several parts of the field. The result obtained after applying this principle is more reliable than without applying the replication principle. Thus, this principle increases the accuracy with which its main effects and interactions can be estimated. The main disadvantage of the replication principle is the computational problem.
2. **Randomization principle:** The randomization principle protects the research design from extraneous factors while conducting an experiment. It indicates that the experiment must be designed or planned in such a way that unrelated factors can be included as possibilities. For example, if we grow one variety of flowers in the first part of a field and another variety in the second part, then there is a possibility that soil fertility of both parts of the field may be different. In such a situation, the result may not be realistic, therefore, the randomization principle should be applied, by giving the result based on some random sampling technique. This principle estimates the experimental errors in the research work in a better way.
3. **Local control principle:** It is also an important principle in which extraneous factors are measured and then eliminated from the experimental error. The experiment is planned in such a manner that a two-way analysis of variance can be performed. For example, to apply the control principle, the field should be divided into several blocks. Each block is first divided into parts equal to the number of treatments and then the treatments are randomly assigned to these parts. In each block, the extraneous factors are fixed to measure the variability, which is caused in the two-way analysis of variance. The variability due to extraneous factors can be eliminated from the experimental error using the local control principle.

1.3 TYPES OF RESEARCH DESIGN

Several research designs are classified on the basis of the study performed in the research. These research designs can be listed as follows:

- Research design in exploratory research studies
- Research design in descriptive studies
- Research design in quantitative studies
- Research design in qualitative studies
- Research design in experimental research studies

1.3.1 Exploratory Research Design

Exploratory research design is also known as formulative research design. In this research design, a specific subject is investigated. It helps in generating a set of hypotheses or research-based questions that can be used at a later stage. The three methods that are applied for explorative research studies are as follows:

- **Surveying the literature:** It is the simplest method for formulating the research problem in which along with new literature, previous hypotheses are reviewed and evaluated for future research.

Check Your Progress

1. What is a research design?
2. List the advantages of a research design.
3. How has Fisher classified the principles of research design?

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- **Experience survey:** It is a type of research that involves practically experienced persons in the research work. For such a survey, people with more innovative ideas are carefully selected as respondents and then the investigators interview the respondents. Thus, experience survey enables the researcher to concisely define the problem. This survey also provides information about the practical possibilities for different research works.
- **Analysis of insight-stimulating examples:** It includes an intensive study of selected instances of a phenomenon. In this method, the attitude of the investigator, intensity of study and ability of the researcher are required to unify the diverse information of the problem.

Thus, in exploratory research study, the applied method needs to be flexible, regardless of the type of the method, so that the different aspects of the problem can be considered. In exploratory research design, the following considerations are kept in mind:

- A small sample size is used.
- The data requirements are unclear.
- General objectives are considered, rather than specific objectives.
- No definite suggestions are made after research analysis.

1.3.2 Descriptive Research Design

A descriptive research study describes the characteristics of a particular problem or an individual or a group. Descriptive studies include specific predictions concerned with the study, facts and characteristics of an individual, a group or situations. Most of the social research is based on descriptive research studies. In descriptive studies, the questions related to 'what', 'why', 'where' and 'who' needs to be answered.

The following steps must be followed while designing a descriptive study:

- **Formulating the objectives of the study:** This step specifies the objectives to ensure that the collected data is related to the study, otherwise the research will not provide the desired result.
- **Designing the data collection methods:** This step helps to select the method, that is, observation, questionnaires, interview or examination of records, for collecting the data.
- **Processing and analysing the data:** The data collected for research study must be processed and analysed. This includes analysing the data collected through interviews and observations, tabulating the data and performing statistical computations.
- **Reporting the researched data:** For reporting the findings, the layout should be well planned, and presented in a simple and effective style.

In descriptive studies, the following considerations should be kept in mind:

- The phenomenon under study should be described.
- The data may be related to the behavioural variables of the respondent.
- The recommendations are definite.
- The objectives should be specific, data requirements should be clear and large samples should be used.

1.3.3 Diagnostic/Conclusive Research Design

A conclusive research design is more structured and formal than an exploratory research design. It is based on large representative samples, and the data obtained is subjected

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to quantitative analysis. The aim of conclusive research is to examine specific relationships and test specific hypotheses. To achieve these objectives, the researcher needs to clearly specify the required information. In this research, the findings are considered to be conclusive in nature as they are used as inputs for managerial decision-making. The two categories of conclusive research designs are descriptive and causal. Descriptive research designs can further be either cross-sectional or longitudinal.

This design requires a clear specification of 'when', 'where', 'who', 'what', 'why', and 'how' of the research. Its main purpose is to describe the characteristics or the function of the research. Some of the conditions in which this research can be recommended are:

- To make a specific forecast
- Discovery of associations among variables
- Estimates of the proportions of a population that have some specific characteristics
- To describe the characteristics of product, group, organization or market.

Unlike exploratory research, the descriptive research design is marked by a specific hypotheses, clear statement of the problem, and detailed information needs. Generally, descriptive research follows surveys, panels, secondary data analysis and observation methods and can be classified into cross-sectional and longitudinal research.

Cross-sectional research: This is the most frequently used research design in business research and involves information collection from a given sample of population elements, and that too only once. They may be either *multiple cross-sectional* or *single cross-sectional*. In single cross-sectional designs, only one sample of respondents is drawn from the target population, and the information from this sample is obtained only once. This design is also referred to as sample survey research design.

In multiple cross-sectional design, there are two or more samples of respondents, and the information from each of the sample is obtained only once. Often, information from different samples is obtained at different times over long intervals. Multiple cross-sectional designs allow comparisons at the aggregate level but not at the individual respondent level. Because a different sample is taken each time a survey is conducted, there is no way to compare the measures on an individual respondent across surveys. One of the special interest, multiple cross-sectional design is cohort analysis, which consists of a series of surveys conducted at appropriate time intervals, where the cohort serves as the basic unit of analysis. A group of respondents who experience the same event within the same time interval is referred to as a 'cohort'.

Longitudinal research design: Unlike cross-sectional research design, a fixed sample(s) of population elements is measured repeatedly on the same variable. In other words, the same objects are studied over time and the same variables are measured. In contrast to the cross-sectional design, which provides a snapshot of the variables of interest at a single point in time, a longitudinal study gives a series of pictures that provide an in-depth view of the situation and the changes that have taken place over time. Sometimes, the term panel is used interchangeably with the term longitudinal design. A panel consists of a sample of respondents who have agreed upon giving information at specific intervals over an extended period.

Causal research design: This research design is used to obtain the evidence of cause-and-effect (causal) relationships. Like descriptive research design, causal research design also requires a plan and structure and is most appropriate for the following purposes:

- To understand cause (independent) variables and effect (dependent) variables of the phenomenon
- To determine the nature of the relationship between cause and effect variables to make predictions about the effect

In this design, causal (independent) variables are manipulated in a relatively controlled environment, in which the other variables that may affect the dependent variable are controlled or checked as much as possible. The effect of this manipulation on one or more dependent variables is then measured to infer causality. The main method of causal research is experimentation.

1.3.4 Experimental Research Design

Experimental research design is usually applicable when we are determining the cause and effect relationship or deriving the cause and effect inferences in any experimental research study. Experimental research design is instrumental in answering some of the important psychological questions that are based on the concept of what causes what.

The objective of experimental research design is to establish the cause and effect relationship between variables. The four types of variables related to experimental research design are as follows:

- **Independent variables:** These signify conditions or measures in the experimental design that can be changed.
- **Dependent variables:** These variables can be measured and signify the effect or result in the experimental design.
- **Control variables:** Control variables are those which remain constant in the experimental design.
- **Random variables:** Random variables are those which can vary their values in different conditions in the experimental design.

There are many variations in experimental designs, which are created to achieve different results and resolve different problems. We can define the simplest form of experimental design by creating two similar groups, which are equivalent to each other in all respects, except for the fact that one group will receive the treatment and another group will not receive the treatment. The group that receives the treatment can be termed as the treatment group and the group that does not receive the treatment can be termed as the comparison or control group.

The formation of two similar groups that are equivalent to each other is ensured by randomly assigning people or participants into two groups from a common pool of people or participants. The success of the experiment is based on the concept of random assignment of people into two groups. However, as two people can never be exactly similar, in the experimental design, we refer to the idea of probability and say that two groups are probabilistically equivalent or equivalent in the probabilistic ranges.

The randomized assignment of participants in an experiment helps in validating the experimental design. Validating the experimental design ensures that the outcome of an experiment is accurate and right. Validating an experimental design includes two factors:

- Internal validity of experimental design
- External validity of experimental design

Prior to validating the experimental design, the reliability of the experimental design should also be established. The reliability of an experiment can be verified by checking if the same result is obtained by repeating the experiment a few more times.

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Internal validity of experimental design: Internal validity refers to the accurate or true value in an experimental design. It helps in checking if the change in the values of independent variables affects the value of dependent variable. This means, checking whether the alternative hypotheses have been removed. Internal validation also answers whether the experimental research design leads to the true statements or not. Internal validity is the focal point for the cause and effect relationships in the experimental designs. It is useful to determine if a research method will lead to an output or the condition where an output would occur. This can be explained by the following proposition:

- If X is given, then Y will happen or
- If the treatment is introduced, then the outcome will occur

As there may be other factors other than the treatment, which might have led to the occurrence of outcome, it has to be ensured that the occurrence of output is dependent on the introduction of the treatment and not on any external factors present in the experimental design. Therefore, a cause and effect relationship can be shown with the following two propositions:

- If X is given, then Y will happen or
If the treatment is introduced, then the outcome will occur
- If X is not given, then Y will not happen or

If the treatment is not introduced, then the outcome will not occur.

With these two propositions, the programme can be isolated in an experimental design from any external factor that might cause the output. This validation ensures the causal effectiveness of the experimental design, which implies that if the treatment is introduced, outcome occurs and if it is not introduced, outcome will not occur.

External validity of experimental design: External validity refers to the assessment of the generalized manner of the experimental design. This means, validating the common applicability of result or outcome of the experimental design in the real world. Generally, the experimental designs are difficult to carry out in the real world, as they tend to invade the personal lives of people. Due to this, artificial conditions are set up so that the reliability and validity of the causal relationships can be determined. Therefore, to ensure internal validity in an experimental design, the general application of the result in the context of real world has to be limited. This implies that the external validity has to be minimised to attain internal validity in an experimental design.

Feasibility of Experimental Design

The success of any experimental design is based on its feasibility or viability, which will prove the outcome of research study to be powerful and accurate. However, in most of the scenarios, the research study involves the subjects related to human behaviour or social sciences, which might hamper the progress of research study. Also, other factors like time and conditions should be taken care of while gathering information, as they contribute to less than perfect situation for the research study.

The feasibility of an experimental design can be ensured by the following two approaches:

- The confounding variables, as many as possible, should be controlled to remove or lower the errors that might occur while making the assumptions.
- All the possible threats to external or internal validity should be neutralized.

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Controlling the confounding variables

The confounding variables should be addressed and controlled in any experimental research and experimental design to ensure accurate information. The confounding variables can be controlled by using the randomization technique or by implementing the pre-testing and post-testing methods on both the treatment and control groups. This controlling process helps in ensuring valid results, both internally and externally.

Controlling the threats to external and internal validity

External validity applies to such situations, where the outcome of the research and experimental designs are observed in the real world in a generalized manner. Whereas, internal validity applies to the experimental situations. The importance of external and internal validity can be understood by the concept of the common saying—garbage in, garbage out. This implies that if we start working on a design with errors, the result of the design will also contain errors. Therefore, the threats to the external and internal validity should be controlled to ensure accurate and desired results.

The feasibility of an experimental design is essential for its success. The success of an experimental design mainly includes generalization of experimental design in the real world. However, the level of controlling of the confounding variables and threats to external and internal validity may affect the generalized nature of the experimental design. As the level of controlling increases for any design, the level of difficulty for performing the research study on that design also increases.

Hypothesis of Experimental Design

While working on an experimental design, various hypotheses are considered at different stages of the experimental research study. The experimental research begins with identifying the outcome of the experimental research, which is called 'research hypothesis'. This implies that there is an effect and this effect is due to the independent variables. You may also consider the possibility that there is no effect of independent variables on the dependent variables and that the variations in the result are due to the unknown and uncontrollable factors. The first step in the experimental research is to eliminate the unknown and uncontrollable factors or null hypothesis. This will help in gaining confidence in the research hypothesis.

If there is a change in the result of experimental research and that change is not due to the unknown and uncontrollable factors, then the change may be due to the independent variables or the factors like, confounding variables. However, these changes or effects may be caused by many other factors such as alternative hypotheses.

Following are the types of hypotheses that are used in the experimental design:

- **Research hypothesis:** According to this hypothesis, the results in an experimental design are due to the independent variables.
- **Null hypothesis:** According to this hypothesis, the variations in the results in an experimental design are due to the unknown and uncontrollable factors and there are no variations in the given treatment or input.
- **Alternative hypothesis:** According to this hypothesis, the results in an experimental design are not due to the independent variables, but due to other factors. Various types of alternative hypothesis are as follows:
 - **Subject effect, selection effect:** This hypothesis states that the results coming from an experimental design are due to the systematic variations in

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- the research participants or research subjects, which are assigned different conditions. This problem can be resolved by randomly assigning the participants to the respective groups in the experimental research setting.
- o **History effect:** This hypothesis states that the results in an experimental design are due to the factors outside the scope of the experimental research. This problem can be resolved by exposing the participants to similar situations every time the experiment is performed.
- o **Maturation effect:** This hypothesis states that the results of an experimental research occur due to the changes within the subject by the time of completion of the experimental research. The maturation effect comes in any research method that identify the dependent variable over a period of time or in a research method where the independent variables are used repeatedly. This problem can be resolved by performing the experimental research with the participants over the same period of time.
- o **Experimenter expectancy effect or experimenter bias:** This hypothesis states that the results in an experimental research design are influenced by the expectations and actions of the experimenter. This means that while working on any research methodology, the researchers tend to produce results they have thought of. This results in overlooking any drawbacks, minor tempering with the data collection or any influence on the research participants. This problem can be resolved by assigning independent experimenters or by having objective measurements.
- o **Demand characteristics or Hawthorne effect:** This hypothesis states that the results in an experimental design are due to the expectations of the participants in the research setting and resultant actions of their expectations to the participants, which in turn influences the participants' performance. It is called 'Hawthorne effect' as the series of experiments were performed in a manufacturing plant in Hawthorne, Ohio. It was found that the performance of workers in the manufacturing plant increased, when the desired changes were made in their unit. The workers perceived these changes as expectations of the management for a better performance from them. Also, these changes convinced the workers that they are being monitored closely.
- o **Testing effect or reactivity:** This hypothesis states that the results in an experimental design are due to the processes of data collection. This involves performing an experiment based on the knowledge and output of the previous experiment. In this case, the performance of the current experiment will not be based on the desired actions but on the previous collected data. This problem can be resolved by using a control group, which can be used for comparison.
- o **Regression artifact or regression-to-the-mean:** This hypothesis states that the results in an experimental research design are due to the extreme scores progressing towards the mean over a period of time. This problem can be resolved by using a control group, which has similar traits.
- o **Instrumentation:** This hypothesis states that the results in an experimental design are due to the deviation in the test or a defect in the measuring instruments. This problem can be resolved by developing or selecting a better measuring technique.

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- o **Halo effect:** This hypothesis states that the results in an experimental research design are due to the expectations of the researcher about a particular participant, based on the characteristics of the participant. This problem can be resolved by employing independent judges, random assignment of participants into the research experiment and by using objective measurement techniques.
- o **Attrition or mortality effect:** This hypothesis states that the results can get biased if the participants leave the experiment, as this leads to non-equivalent groups. This problem can be resolved by identifying the reasons why the participants leave the experiment and then implementing actions to check the attrition effect.

In addition to these hypotheses, other alternative hypotheses and non-specific factors may occur in an experimental research. The basic purpose of the experimental design is to eliminate the alternative hypotheses. Solutions of any experimental research are specific to the research study and the particular alternative hypothesis.

With the presence of various variables and hypotheses, the experimental designs may not be accurate or perfect, however, some good experimental designs can be set as a standard to base conclusions on.

Types of Experimental Designs

The experimental designs are grouped under three categories, based on how the experimental designs eliminate various alternative hypotheses. Each experimental design contains subsets with specific strengths and weaknesses. The various types of experimental designs are as follows:

- Pre-experimental design
- Quasi-experimental design
- True experimental design

1. Pre-experimental Design

Pre-experimental designs follow basic experimental steps, in which only a single group is studied or only a single group gets the treatment. Pre-experimental design does not include a control group and no comparison is made between the group receiving the treatment and its equivalent group that does not receive the treatment. The pre-experimental design may include pre-test, post-test or only the post-test and may eliminate the unknown and uncontrollable factors like, independent variables or confounding variables. However, this design does not eliminate the alternative or confounding variables. Therefore, no conclusion can be derived from this experimental design regarding the success of the experimental research. The pre-experimental design should be considered as a pilot test and followed up by a better experimental design.

There are three types of pre-experimental designs which are explained below.

- **One-shot case study:** In this type of experiment, one group of participants are given the same type of treatment and their outcome is measured. The objective of all the experimental designs is to determine if the treatment has any effect on the outcome. Since, there is no comparison made with an equivalent non-treatment group and there is no pre-test in this type of experiment, the conclusion cannot be drawn regarding the performance. That is, the researchers will not be

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able to identify if the outcome would have been better if no treatment were given. Also, without any pre-test scores, the researcher will not be able to determine if any variation has taken place in the group participating in the experimental research. For example, in an organization, one group of participants are subjected to a treatment and after six months their variation in performance is measured. Without the comparison group, it cannot be determined if the variation in the performance would have taken place without giving the treatment and without the pre-test scores, it cannot be determined if any variation from the past performance has taken place.

- **One group pre-test or post-test study:** In this type of experiment, one group of participants are given similar treatment along with the inclusion of pre-test study. The advantage of one group pre-test or post-test study over the one-shot case study is the consideration of pre-test scores, which helps in determining the baseline scores. For example, in an organization, one group of participants are subjected to a treatment and after six months their variation in performance is measured. With the help of pre-test scores, we can compare if any variation from the past performance has taken place. This will help us determine, if any change in the outcome or the dependent variable has taken place. However, we cannot determine if the variation in the performance would have taken place without giving the treatment or without the independent variables, as the change might be due to the external factors.
- **Static group comparison study:** In this type of experiment, two equivalent groups of participants are included and one group is given the treatment. After the experiment, the post-test score is derived to measure the difference in the outcome of the two groups. This experiment does not include any pre-test, so it cannot be determined if any variation from the past performance has taken place. Therefore, this experiment has the advantage of including a control group; however, it fails to show the results if a change has occurred. Figure 3.1 shows the diagrammatic representation of pre-experimental designs.

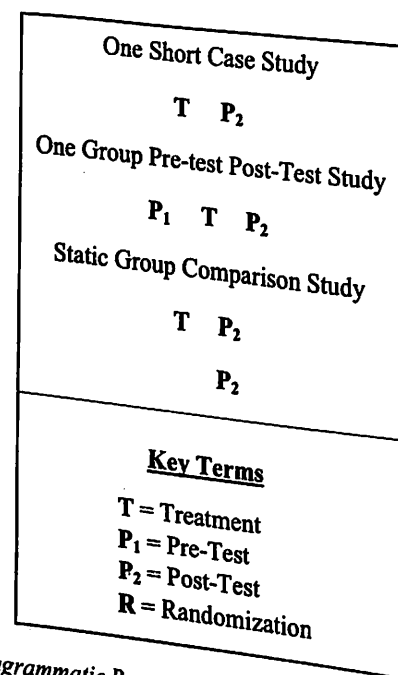


Fig. 3.1 Diagrammatic Representation of Pre-experimental Designs

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2. Quasi-experimental Design

The term 'Quasi' in quasi-experimental design refers to 'as if' or 'almost', so quasi-experimental design means almost a true experiment. Quasi-experimental designs are helpful in eliminating some of the alternative hypotheses.

Quasi-experimental designs are better than the pre-experimental designs, because in these experimental designs, some method to compare the outcome of the two groups is introduced. In quasi-experiment research, various causes or trends in research settings are identified. The major trends are then developed into syndromes or cycles and minor trends are referred to as normal or abnormal events. One of the basic purpose of implementing quasi-experimental design is to confine longer time periods and number of factors to control various threats to validity and reliability of the research experimental method. This will lead to a stable and reliable outcome of the experiment.

These designs are instrumental in applied settings for experimental research, wherein the factors or constraints present in the real world confound the experimental research settings. In this experimental design, we can choose the application of generalization or relevance to the real world (external validity) over the control or internal validity. However, in this experiment, the concept of randomization is ignored, which is an important element of the experimental research method. In any experimental research method, quasi-experimental design should be paired with other experimental designs to obtain strong or accurate results. There are three types of quasi-experimental designs which are explained as follows:

- **Pre-test, post-test, non-equivalent groups or static groups design:** In this type of experiment, two equivalent groups are chosen, which are not randomly assigned and are usually matched to the conditions of the experimental settings. In this experiment, the participants are assigned the groups according to the choice of the researcher. Different treatments are given to both static group and control or comparison group. This experiment is helpful in eliminating the effect of past account on the experiment setting, however, the effect of participants on the experiment setting is not eliminated. Moreover, the score of performance is compared prior to the experiment and after the experiment. For example, while studying the effectiveness of a new policy programme in a locality, another locality similar to the first one or static group is chosen. This second locality is more of a comparison group and less of control group and is termed as the non-equivalent group. After the introduction of the policy programme, if the static group improves more than the comparison group, we can be confident about the new policy programme.
- **Time series designs:** In this type of experiment, one group of participants are subjected to the pre-tests and post-tests at different intervals of time and the number of pre-tests and post-tests can vary from one test for each participant or for many participants. The subsequent tests are then performed to determine the long-term effect of the treatment on the result of the experimental research. A gap can be introduced between the tests to determine the strength of treatments given over a period of time. In this type of experiment, the post-test is referred to as a follow-up test. A time series design is the most common type of over time or longitudinal research in justice system. This design can be interrupted or

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non-interrupted and both the types determine the changes in the dependent variable over a period of time. Interrupted time series design includes pre-tests and post-tests measurements. Non-interrupted time series design includes time as an independent variable, itself. The time series design is most often used to evaluate the public policy changes, which affect large group of people. Therefore, time series design is also known as impact analysis or policy analysis. For example, to evaluate the effectiveness of a new public policy, at first the current policies and the current problem being faced by the society are identified. After the problem is identified, an action is taken or a reforming programme is introduced to the group of participants. The condition of the participants is appraised every month for several months. To determine the effectiveness of the reforming programme, the occurrence of number of incidents of a problem or the dependent variable may be obtained from the public records before and after the implementation of the programme. If the improvement in the conditions of system is noticed after the introduction of the reforming programme, and not before, then we can be confident about the newly introduced reforming programmes. This experiment is helpful in eliminating the effect of participants on the experiment setting, however, the effect of past accounts on the experiment setting is not eliminated.

- **Multiple time series or non-equivalent before-after design:** This design is considered as a strong quasi-experimental design. In this type of experiment, two or more groups are chosen that are likely to be different, as the participants are not randomly assigned. These participants receive several pre-treatment measures and at least one post-treatment measure. This experimental design is used to compare the performance of two groups that are likely to be different. This experiment can eliminate the effect of past accounts on the experiment setting and can also eliminate most of the effects of participants on the experiment setting. Similar to the time series design, this design is also helpful in evaluating the public policy changes, which affects large group of people. For example, to evaluate the effectiveness of a new public policy for the welfare of the society, the new reforming programme is implemented on one section of the society and then data is collected from that section of the community where the reforming programme was not implemented. If we derive that the rate of problems have reduced in the community only after receiving the reforming programme, the treatment or the programme can be said to be effective.

The only drawback of quasi-experimental design is that the participants for the experiment are not taken through randomization but through the choice of the researcher. This leads to the inclusion of different participants in the experiment and also the difference cannot be stated in terms of accurate measurement, as the differences might be due to education, work experience or other confounding variables. This prevents us from deriving the accurate difference and accurate results of the treatment between the two groups before and after the experiment. Therefore, whenever the participants are chosen based on the convenience of the researcher and not through the randomization, the reason for inclusion of participants in the experiment confounds the result. Figure 3.2 shows the diagrammatic representation of quasi-experimental designs.

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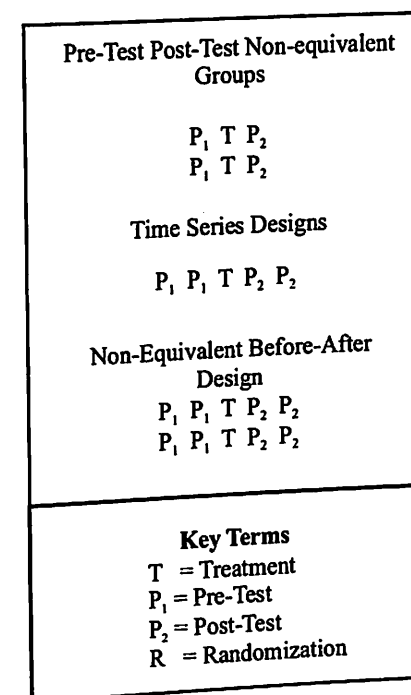


Fig 3.2 Diagrammatic Representation of Quasi-Experimental Designs

3. True Experimental Design

The true experimental design covers up the shortcomings of pre-experimental and quasi-experimental designs. This design includes the control group and a means to measure the changes that occur in the two groups participating in an experiment. The objective of this design is to control all the confounding variables or the impact of objective of this design is to control all the confounding variables on the experimental research and its result. The true experimental design is considered as the only research method which adequately measures the cause and effect relationship. This design eliminates most alternative hypotheses, mostly those hypotheses that are related to time and formation of participant groups. This elimination can also result in deviating the research setting from natural setting to the artificial setting. There are two types of true experimental designs which are explained as follows:

- **Post-test equivalent groups:** In this type of experiment, the comparison and randomization of both the experimental and control groups are considered. Each group chosen for the experiment is given either some treatment or type of control. To identify the difference in the outcome of the two groups in the experiment, post-tests are provided to each participant of the research experiment. However, this design does not include pre-test measures. Therefore, it is difficult to arrive at the conclusion that the difference in the outcome of an experiment between the two groups is actually a change from the difference in the beginning of the experimental research. This means that the participants in both the groups are equivalent by the process of randomization, however, this process cannot completely ensure that equivalency is created between the two groups.
- **Pre-test Post-test equivalent groups:** In this type of experiment, the control group and a measure of change are provided in the experimental design. Also, it provides a pre-test to assess the difference between the performances of the two groups prior to the experimental research. This design is most

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effective in implementing a cause and effect relationship and is also the most difficult to perform. The application of this design in the real world involves selection of participants at random and placing them in two groups using random assignment. Using pre-test scores, the previous record of performance can be measured and thus the mean measure of each participant can be derived. After this, the treatment will be given to one group and control will be applied to another group. It is necessary that the two groups be treated in a similar manner to control variables. At the end of the experiment, the result will be collected and will be compared along with the pre-test scores. If we derive that there is a variation in the result obtained at the end of the experiment from the pre-test result and also between the outcomes of both the groups, we can conclude that the treatment given to one group is effective. Figure 3.3 shows the diagrammatic representation of true experimental designs.

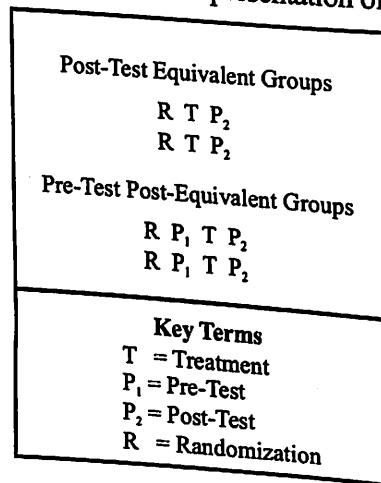


Fig. 3.3 Diagrammatic Representation of True Experimental Designs

Before working on an experimental design, the following conditions should be considered:

- The possibility of categorising people, places or things in the experiment.
- The possibility of selecting random people, place or things in the experiment.
- The process of random selection to create experimental and control groups to be ethical.

The participants included in the experimental designs are divided into two groups and one group gets the benefit of receiving the treatment and the other group (control group) is deprived of the treatment. If there is any harm in providing or preventing the treatment for anyone, the experimental design should not be used.

1.4 SAMPLING

All research in the field of behavioural sciences involves drawing inferences from a specified, identifiable group on the basis of a selected sample. The clearly identifiable and specified group is known as the population or universe. The selected group of persons or objects is called the sample. The conclusions are drawn from the sample, which are deemed to be valid to the entire population. Such conclusions are known as the statistical inferences.

A population can be finite or infinite. A finite population is one where all the members can be counted. An infinite population is one where all the members cannot be counted (e.g., stars in the sky). A population can be imaginary or real.

Check Your Progress

4. What is exploratory research design?
5. Name the two categories of conclusive research designs.
6. How can the confounding variables be controlled?
7. What are the conditions to be considered before working on an experimental design?

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A measure based on the entire population is called a parameter. A measure based on the sample is called a statistic.

A sample is limited number or set of persons or elements that are chosen from a population, according to some plan. It is thought to represent the population. Samples are based on probabilities. Probability is a form of relative frequency. For example, the probability of a seeing a head when coin is tossed once is 1/2 or 0.5. Probability is expressed as a fraction or in decimal numbers.

Need for Sampling

Sampling is needed for several reasons:

- Sampling is economical in terms of time and money. It saves time as well as cost because only a limited sample is involved, not the entire population.
- Sampling is carried out by trained personnel, so it has considerable accuracy in measurement and testing.
- Sampling errors can be easily determined from the sampling process. This yields valid information about the population characteristics.
- Sampling is the only available procedure when the population is infinite.
- Sampling enables fairly accurate generalizations about the population from the study of the sample.

Factors influencing decisions while drawing a sample are:

- **Size of the population:** When the population size is large, the selection of a sample becomes necessary.
- **Costs involved in obtaining the elements:** If the cost is reasonable, the sampling inquiry is facilitated.
- **Convenience of availability of the elements:** Each of these factors is important for deciding to select a sample, for study.

Implications of sample design: A sample is obtained according to a 'plan'. A sample design is a technique for selecting the items for a sample. The size of the sample means the number of items to be included in the sample. Sample design should be determined before data collection and the sample should be designed to suit the study.

Sampling is a process of selecting a few from a bigger group for estimating or predicting the prevalence of some outcome/factor regarding the bigger groups. So, a sample is a sub-group of the population, one is interested in. This is the concept of sampling (Figure 3.4).

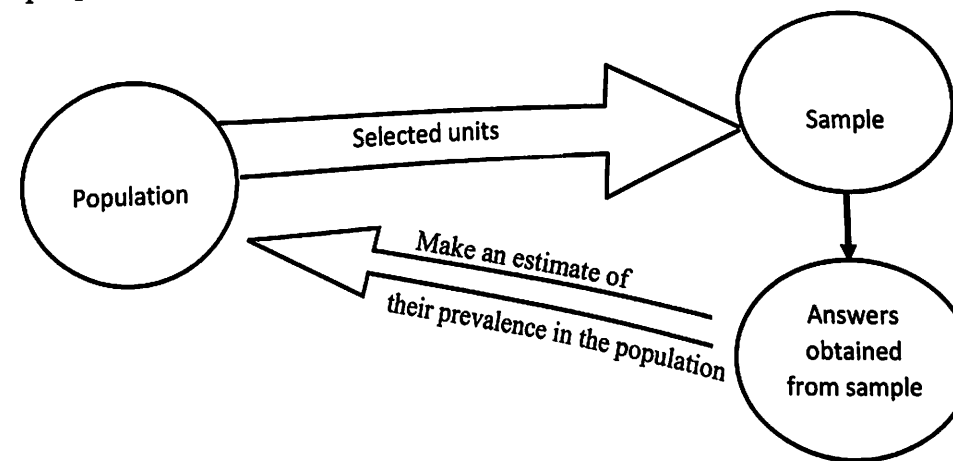


Fig. 3.4 Sampling

Check Your Progress

8. 'A population can be finite or infinite.' What are finite and infinite population?
9. How can samples be categorized?

1.4.1 Size of the Sample

Size refers to the number of items selected from the universe to constitute a sample.

The size of the sample should be neither too large, nor too small. An optimum sample size should be:

- Efficient
- Representative
- Reliable
- Flexible

The sample size should be decided by the level of precision needed and the estimate of the confidence level desired. The size of the population variance is an important determinant. If the population variance is large, then a larger sample size is indicated. The size of the population is another factor to be kept in mind. This limits the size of the sample

Other aspects to be considered for determining sample size:

(i) The parameters of interest

- Estimation of some characteristics or some proportion of persons in a population
- Knowing some average measure of a population
- Knowing about some sub-groups of a population.

All these types of estimates have a bearing on the sample size.

(ii) Budgetary constraint

From a purely practical point of view, the size of the budget is bound to influence the size of the sample.

(iii) Sampling procedure

The choice of the method in selecting the sample would have to provide a balance between the cost involved and the least possible sampling error that would result from the sample size.

1.4.2 Types of Sampling

Strategies for sampling can be categorized as:

- Probability sampling
- Non-probability sampling
- Mixed sampling

1. Probability (or random) Sampling

For a random sampling design, it is imperative that each element is included in the sample. Equal element means the probability of each element in the population is the same and is not influenced by other considerations. The notion of independence means that the choice of one element is not dependent upon the choice of another element in the sample. Only if both these conditions are met would the sample be a random/probability

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sampling. If not, bias would be introduced. As this sample represents the total population, the inferences drawn from such samples can be generalized to the total population.

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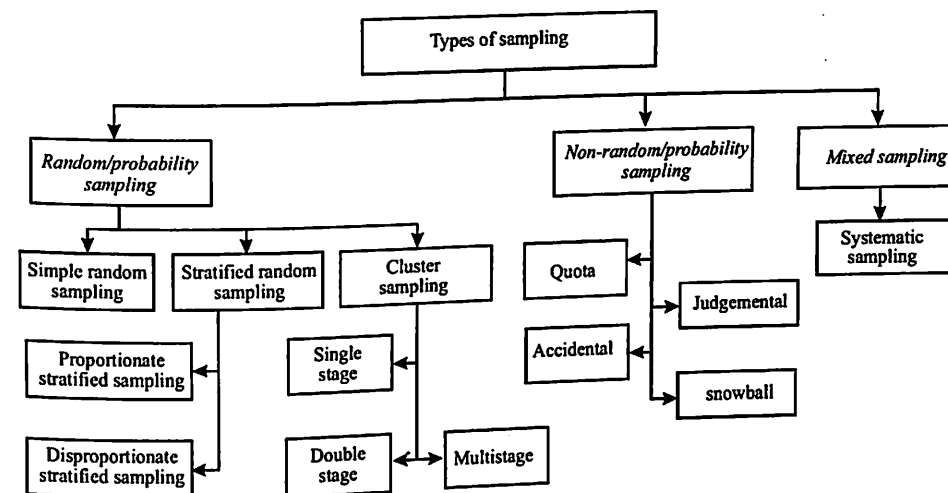


Fig. 3.5 Types of Sampling

Source: Kothari, C.R. Research Methodology Methods and Techniques. 1995.

Methods of Drawing a Random Sample

The three most common methods are

- **The Fish bowl method:** This method is useful when the total population size is small. Here, each element is numbered on a small slip of paper and put into a box or bowl. After the slips are mixed thoroughly, the investigator selects one number at a time, until the desired sample size is reached.
- **Using table of random numbers:** Most research methodology and statistic tools have a table of randomly generated numbers in their appendices. The sample can be selected from these tables by following the procedures described below. The principle of random table of numbers is that the column-row numbers do not appear in any particular sequence, nor does any number appear more frequently than the other one.

The random sample selection process:

- o Specify the number of elements in the study population
- o Number them from 1 to N (N is the total number of elements in the population). Example, if the population size is 500 and one intends to choose 50 cases from the population, now enter the random table at any point.
- o Then move systematically to the right, left, up, down or diagonally skipping the numbers that are too large and also those that have already been drawn.
- o Keep moving through the table and fill until the selected sample has 50 elements.

A random selection of 30 cases from a population serially numbered from 1 to 80 is illustrated here; 12 numbers have been omitted. Numbers 85, 84, 97 and 95 have been omitted because they exceed 80 and numbers 03, 74 and 12 have been omitted because they have duplicated the previous selections. The number 00 has been left out because the population number starts from 01.

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The following is a sample random number table:

64755	83885	84122	25920	17696
10302	52289	77436	34430	38112
71017	98495	51308	50374	66591
60012	55605	88410	34879	79655

Sample ($N = 30$ has been taken from a serially numbered population of 80).

64	59	28	12	85	55
75	20	97	71	03	60
58	17	74	01	74	
38	69	36	79	66	
85	61	34	84	59	
84	03	43	95	16	
12	02	03	51	00	
22	52	81	30	12	

The advantage of using the table of random numbers is that it is easily accessible to the researchers and requires no formal training for using it. However, the disadvantage is that it cannot be easily and constructively used when the size of the population exceeds 5 digits.

- **Method of computer-determined randomness:** This method is useful when the population size is large. The data are fed into the computer to obtain a random number of elements corresponding to the elements in the population. This method is easy and fast and therefore is increasingly in use. The only limitation is imposed by the need to have a computer.

(i) Simple Random Sample

A simple random sample (also known as an unrestricted random sample) may be defined as one in which each and every individual of the population has an equal chance of being included in the sample and also the selection of one individual is in no way dependent upon the selection of another person. For example, if we are to select a sample of ten students from the seventh grade consisting of 40 students, we can write the name (or roll number) of each of the 40 students on separate slips of all equal in size and colour and fold them in a similar way. Subsequently, they may be placed in a box and reshuffled thoroughly. A blindfolded person, then, may be asked to pick up one slip. Here, the probability of each slip being selected is $1/40$. Subsequently, after selecting the slip and noting the name written on the slip, he again returns it to the box. In this case, the probability of the second slip being selected is again $1/40$. But if he does not return the first slip to the box, the probability of the second slip becomes $1/39$. When an element of the population is returned to the population after being selected, it is called sampling with replacement and when it is not returned, it is called sampling without replacement. Sampling with replacement is wholly feasible except in certain situations where it is seldom used (Cochran, 1963). If sampling with replacement is used, the chance of the same case being selected more than once is increased. In such a situation, the repeated cases may be ignored as is done if a table of random numbers is used in making a selection of

cases. Thus, random sampling may be defined as one in which all possible combinations of samples of fixed size have an equal probability of being selected.

The major difference between sampling with replacement and sampling without replacement can be illustrated through an example. Suppose the size of a population consists of four persons, who are named as A, B, C and D. Suppose that the investigator wants to select samples of size 2 through the procedure of sampling without replacement. In such a situation, the investigator can maximally draw six samples of size 2 from the population of 4. This could be accomplished with the help of the following equation.

$$\binom{N}{n} = \frac{N!}{(N-n)!n!}$$

where

N = the size of parent population

n = the size of the sample

! = factorial

In the above example where $N = 4$ and $n = 2$, the maximum number of sample size of 2 would be 6 as under.

$${}^4C_2 = \frac{4!}{(4-2)!2!} = \frac{4 \times 3 \times 2 \times 1}{2 \times 1 \times 2 \times 1} = \frac{24}{4} = 6$$

Similarly, where $N = 5$, we can have 10 samples of size 2 as under.

$${}^5C_2 = \frac{5!}{(5-2)!2!} = \frac{5 \times 4 \times 3 \times 2 \times 1}{3 \times 2 \times 1 \times 2 \times 1} = \frac{120}{12} = 10$$

But from the same population, we can have 5 samples of size 4 as under:

$${}^5C_4 = \frac{5!}{(5-4)!4!} = \frac{5 \times 4 \times 3 \times 2 \times 1}{1 \times 4 \times 3 \times 2 \times 1} = \frac{120}{24} = 5$$

But if the investigator has decided to proceed with the technique of sampling with replacement, he can derive the likely number of samples from the given population with the help of the following equation.

$$N^n$$

where N and n are again population and the sample size. Suppose the size of the population is 4 and the size of sample is 2. In such a situation the investigator, following the technique of sampling with replacement, can maximally draw 16 samples, that is, $4^2 = 4 \times 4 = 16$. If the four members of population are named as A, B, C and D, the sixteen samples of size 2 would be

AA	AB	AC	AD
BA	BB	BC	BD
CA	CB	CC	CD
DA	DB	DC	DD

The case of AA, BB, CC and DD combinations reflects the fact that in sampling with replacement, an element or individual once drawn can be drawn again. In actual practice, such cases are ignored.

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There are some advantages and disadvantages of simple random sampling are as given below:

Advantages of simple random sampling

- It is a representative sample.
- It is assumed that all the characteristics of the population are reflected in the sample.
- This is the easiest and simplest of all probability sampling methods.
- This random sampling can be applied in conjunction with many other probability sampling methods.
- The sampling error can be easily estimated.

Disadvantages of simple random sampling

- It is difficult to ensure that the smaller elements that exist in a population are included in the sample. For example, in a population of 500 persons, only 12 people are dialectic. The sample size is only 50. The chance that they would be included is very slim.
- The simple random sampling method cannot fully avail certain information available in the sample. For example, if one knows that there is a population of children who are bright, dull, and artistic, all these elements cannot be brought into the sample.
- Sampling error is greater in the simple random sample than in a stratified random sample. To minimize the error, stratified random sample is used.

2. Non-probability Sampling

The different types of non-probability sampling are:

(i) Quota Sampling

This is an important non-probability sampling method. The population is seen as made up of strata of the population and from each stratum, individuals are chosen randomly, e.g., if the population of students in a school is 5,000 made up of high and low socio-economic classes. From this, 500 students can be chosen with 250 from the higher and 250 from the lower class. This is the quota sample.

Advantages of the quota sampling method

- Is quick and easy for gross estimates
- Is a convenient procedure
- Elements from the desired strata get included

Disadvantages of the quota sampling method

- Randomness cannot be established
- Generalizing ability is poor
- Since most credible elements are included, it may not be typical of the population
- Possibility of classification error is high.
- Other variables of significance cannot be controlled

This method does have some appeal, despite limitations.

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(ii) Purposive Sample

Purposive sample, which is a handpicked sample, is typical of the population. It is also called judgmental sample, because the choice is determined by the judgments of the researcher, e.g., attitudes towards corruption would be ascertained by interviewing professionals, academicians, tainted people and politicians. The investigator selects the persons from these selected people.

Advantages of purposive sample

- It is cost effective and easily accessible
- Is very convenient
- Only relevant individuals get included

Disadvantages of purposive sample

- In purposive sampling, randomness representatives are not ensured
- Generalizing ability is poor
- Sampling is highly subjective
- An inability to apply inferential statistics to acceptable levels exists

(iii) Accidental Sampling

Accidental sampling is also called incidental sampling. It is based on a non-probability sampling plan. Here, the investigator chooses the sample according to his/her convenience. Convenience and economy guide this method, as a useful option.

Advantages of accidental sampling

- Accidental sampling is the most convenient method of sampling.
- Economical in terms of time, money, effort and cost.

Disadvantages of accidental sampling

- Accidental sampling has poor generalizing ability.
- Biases and prejudices bound to exist.
- There is a high probability of high sampling error.

Accidental sampling is used in psycho-social research due to the convenience factor.

(iv) Systematic Sampling

This is another method of the non-probability sampling plan. Here, every n th person is drawn from a predetermined list for study, e.g., every 5th roll number from a class of 50 students or every 10th name from the telephone directory and so on. It is systematic in view of the fact that the selection is made according to a pre-determined plan. The first element selected is random and has non-probability characteristics.

Advantages of systematic sampling

- Quick and easy to obtain the sample
- Easy to select, say, every fifth name
- Easy to use (simpler than random table chart)

Disadvantages of systematic sampling

- Not a probability sampling plan

- High sampling error possibility creeps in
- Bias could invade into the sample

This method still finds favour in psycho-social research.

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(v) Snow Ball Sampling

Snow ball sampling is a non-probability sampling method. It is basically a socio-metric method. Here, all the persons of a group or sample are identified by friends or other acquaintances. The snow ball effect is how one person's contact leads to the others and from there moves further. The information gathered is through patterns of friendship, e.g., how rumours spread and how advertisements influence friends, etc. It is useful for small *N* samples, below 100. It is a method to study social change.

Advantages of snow ball sampling

- Is a systematic sampling technique helpful in studying small informal networked social groups
- Helps in community studies, decision-making
- Lends itself to computer-determined use of random numbers

Disadvantages of snow ball sampling

- Not feasible with large numbers
- No use of statistical methods possible
- Bias could enter the sample
- Largely useful for information dissemination, saturation sampling and dense sampling

(vi) Saturation Sampling

Saturation sampling involves drawing all elements or individuals having characteristics that are of interest to the researcher, e.g., all psychiatrists below the age of 45 years. Dense sampling is a method that lies between simple random sampling and saturation sampling. Here, the researcher selects 50 per cent or more from the population and takes a majority of individuals having specific characteristics that are of significance, e.g., 500–600 students from a class of 1000 students. These two methods are convenient. But it is not useful when the *N* exceeds 1000.

(vii) Double Sampling

Double sampling means drawing a sample of individuals from a sample that has already been drawn, e.g., from a population of 10,000 people, a sampling of 1000 is drawn. Again from this 1000, a further sample of 200 is drawn, for the study, e.g., a questionnaire is sent to 1000 people on the issue of pollution. Say, 50 per cent (or 500) of them respond. From these 500 persons, a sample of 100 is drawn for an in-depth interview. This is double sampling.

If this method is meaningful for research, then the representativeness of the sample must be increased. It is a time-consuming and labour intensive method.

Pre-requisites for a sample to be good are as follows:

- It must be representative.
- It must be of a sufficient size.

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(a) **Representativeness:** The sample must have approximately all the characteristics of the population that are relevant for the investigation. The relevant characteristics of the population must exist in the same proportion in the sample also, e.g., if the population has an education level ratio of 60:40 for men and women, the sample should also have a similar ratio to be representative. The population should be clearly defined and the observations to be made should be specified. This can reduce biases.

(b) **Sample size should be adequate:** This implies that the size should be sufficient. A larger sample is better for reducing the error. This is the difference between the population value and the sample value. The larger the size of the sample, the lesser is the error. However, too large a sample may not yield better results, as a large sample creates other problems.

Advantages of sampling methods in general are follows:

- Using sampling methods increases accuracy. Examining a sample becomes both efficient and involves lesser work, so the purpose of a sample is to get maximum accuracy with minimal effort, time, money, etc.
- It reduces the cost as the data is from a smaller number of cases. Statistical calculations for accidental errors are also reduced.
- Since the sample and not the universe is studied, work proceeds faster. This is a great advantage for research.

3. Mixed (probability and non-probability) Sampling Methods

The different types of mixed sampling methods are discussed below:

(i) Stratification (also called convenience) Sampling Method

Stratified random sampling is of two types:

- Proportionate stratified random sampling
- Disproportionate stratified random sampling

(a) Proportionate Stratified Random Sampling

Here the population is first stratified. Then the sample is drawn randomly from the stratum. The proportion of persons belonging to each strata of the total population is useful in applied research, e.g., the rank of army officers of one strata in the defence force and so on. Number of cardiologists in the total population of darters, etc., there proportional representation in the sample is a valuable index, for determining further studies.

In a stratified random sample, the population is first divided into two or more strata, e.g., on the basis of age-groups of say 30–40, 40–50, 50–60, etc., or as male and female. These divided populations are termed sub-populations. These are non-overlapping parts of the whole population. They are thought to be homogeneous. Then sample elements are selected from each stratum using simple random sample.

Advantage of stratified random sampling is :

- In stratified random sampling even those elements that exist in smaller numbers, get pieced up, and sampling error is minimized because the sample has all the characteristics of the population.

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Disadvantages of stratified random sampling

- It is a difficult method to start with in terms of assumptions of knowledge of the composition of the population.
- It is a time consuming method.
- It could give rise to classification error.
- It could give rise to disproportionate stratified random sampling.
- It is similar to the earlier one, but is different in that the substrata are not necessarily distributed according to their proportionate weight in the population from which they were randomly selected. There could be over representation or under representation of a strata in a population.

(b) Disproportionate stratified Sampling Means

- The investigator would give equal weight to each of the substrata
- Will give greater representation to some substrata and not enough weight to other substrate in the sample to be drawn.

Advantages of disproportionate stratified random sampling

- It is comparatively less time consuming than proportionate stratified random sampling.
- It is possible to give weight to particular elements that are not represented frequently in the population, as compared to other elements.

Disadvantages of disproportionate stratified random sampling

- The samples drawn might suffer from certain stratum being under or over represented.
- Assumption that the knowledge of the composition of the original population limited the use in conditions, where this information is not available.
- Possibility of misclassifying elements into a sub-strata, that they do not belong, legitimately, e.g., element X may be put into strata Y, but it may belong to strata Z.
- This method is common in the social sciences, despite these limitations.

(c) Area or Cluster Sampling

This is another important method of probability sampling. This is used often in field research. Here, geographical divisions in terms of territory, zone cities, towns, districts, etc., are made and a number is assigned to each area. Then the random sample is drawn from this area. This method is also called cluster sampling. For example, one wants to study the prevalence of HIV in a state. Then the state is divided into districts, towns and villages, etc. identified. Then finally even households in locality could be identified for studying. This is also called multi-stage sampling.

Advantages of area or cluster sampling

- This is useful for large scale study of areas, regions where specific lists are useful for public opinion polls.
- It saves time and money.
- The respondents can easily be substituted. It is a flexible method.

Disadvantages of area or cluster sampling

- Sampling errors rarely come to light

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- Little control over the size of the cluster
- Could result in bias in samples

However this method is used in large behaviour studies.

1.4.3 Steps in Sampling Designing

The following points should be kept in mind before designing a sample:

- **Type of universe:** Define the universe or set of objects to be studied. The universe can be finite or infinite. In the finite universe, the number of items is certain, while in the infinite universe, it is uncertain. An example of the former is the number of industrialists in a country, and the latter, the number of stars in the sky.
- **Sampling unit:** This is the group from which the sample is to be drawn. For example, a population unit can be in terms of people's age, gender, and a housing unit like bungalow, flat, or an educational unit like university, college or school.
- **Service list:** The sampling from a list index or other population records from which the sample is to be drawn, e.g., prepare all the items in the universe from which the selection of the sample can be made. It should be comprehensive, correct and reliable, so that the sample becomes representative.
- **Size of the sample:** This refers to the number of items to be selected from the population, to constitute the sample. An optimum sample size should be reliable, flexible and representative. The size can be determined by the precision with which estimations are needed. Cost considerations also come into play, here.
- **Parameters of interest:** This involves the type of measures needed from the sample. For example, the factors you want to study.
- **Budgetary constraints:** This refers to the practical problems about the size of the sample and costs associated with the collection of data from the sample.

1.4.4 Principles for Selecting a Sampling Procedure

There are three principles which guide sampling theory:

- In majority of cases of sampling there will be a difference between the sample statistics and the true population mean, which is attributable to the selection of the units in the sample.
- The greater the sample size, the more accurate will be the estimate of the true population mean.
- The greater the difference in the variable of the study in a population for a given sample size, the greater will be the difference between the sample statistics and the true population mean.

1.4.5 Types and Criteria of Sampling Designs

For selecting elements on the representation basis, the sample may be obtained using either probability sampling or non-probability sampling. Probability sampling is based on random selection, whereas non-probability sampling is based on non-random sampling.

On element selection basis, the sample may be either restricted or unrestricted. When each sample element is drawn individually from the population at large, the sample

is known as unrestricted sample. All the other forms of sampling are covered under the term restricted sample.

Table 3.1 Basic Sampling Designs

Element selection technique ↓	Representative basis ←→	
	Probability sampling	Non-probability sampling
Unrestricted sampling	Simple random sampling	Haphazard or convenience sampling
Restricted sampling	Complex random sampling, e.g., cluster sampling, systematic sampling, stratified sampling etc.	Purposive sampling, e.g., quota sampling, judgment sampling

Source: Singh, A.K. Tests, Measurements and Research Methods in Behavioural Sciences. 2008.

Criteria of Good Sample Design

The following are the criteria of a good sample design:

- Sample design should yield the best possible sampling error.
- Sample design should be chosen judiciously, keeping costs in mind.
- Sample design must attempt to control systematic bias in the best possible way.
- Sample findings should be applied with a reasonable level of confidence.

1.5 SAMPLING ERROR

Even if utmost care has been taken in selecting a sample, the results derived from a sample study may not be exactly equal to the true value in the population. The reason is that the estimate is based on a part and not on the whole and samples are seldom, if ever, perfect miniature of the population. Hence, sampling gives rise to certain errors known as 'sampling errors' or sampling fluctuations.

In other words, a sample survey requires study in small portions of population as there can be certain amount of inaccuracy in the information collected during sampling analysis. This inaccuracy is called sampling error or error variance. Sampling errors are those errors, which arise on account of sampling and generally happen to be random variations in the sample estimates of the actual population values. Figure 3.6 shows sampling error.

Sampling errors occur randomly and are equally likely to be in either direction and the magnitude of sampling error depends on the nature of the universe. The more uniform the universe is, the smaller is the sampling error. Sampling error is inversely proportional to the size of the sample and vice-versa. In addition, sampling error is the product of the critical value at a certain level of significance and the standard error.

$$\text{Sampling Error} = \text{Frame Error} + \text{Chance Error} + \text{Response Error}$$

Sampling errors would not be present in a complete enumeration survey. However, the errors can be controlled. The modern sampling theory helps in designing the survey in such a manner that the sampling errors can be made insignificant. Sampling errors are of two types: (i) biased and (ii) unbiased.

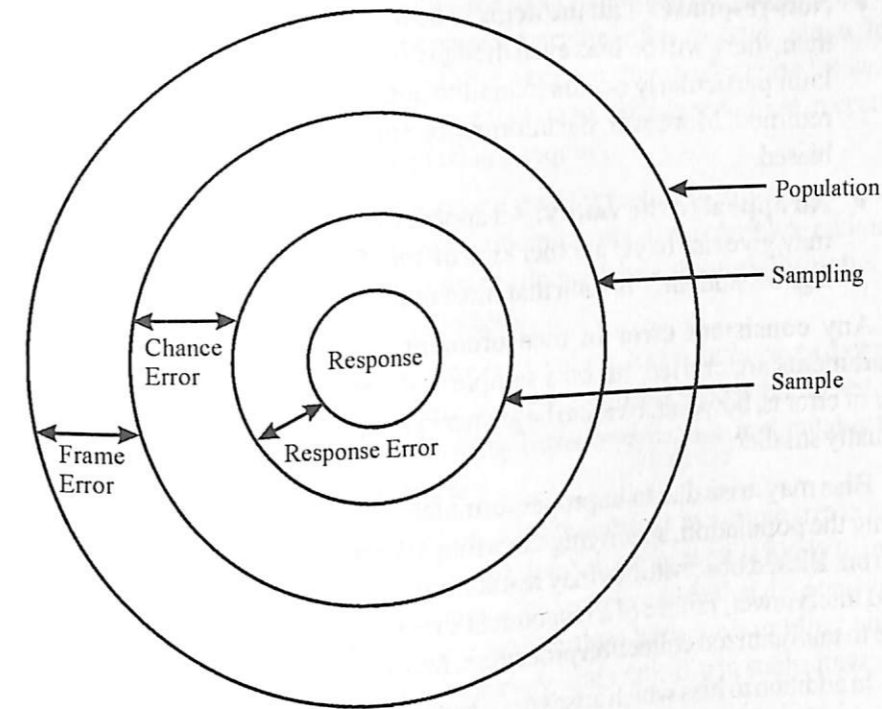


Fig. 3.6 Sampling Error

These errors arise from any bias in selection, estimation, etc. For example, if in place of simple random sampling, deliberate sampling has been used in a particular case; some bias is introduced in the result, and hence such errors are called 'biased sampling errors'.

An error in statistics is the difference between the value of a statistic and that of the corresponding parameter. These errors arise due to chance differences between the members of population included in the sample and those not included.

Thus, the total sampling error is made up of errors due to bias, if any, and the random sampling error. The essence of bias is that it forms a constant component of error that does not decrease in a large population as the number in the sample increases. Such error is, therefore, also known as 'cumulative/non-compensating error'. The random sampling error, on the other hand, decrease at an average as the size of the sample increases. Such error is, therefore, also known as 'non-cumulative/compensating error'.

Bias may arise due to: (i) faulty process of selection, (ii) faulty work during the collection, and (iii) faulty methods of analysis.

Faulty selection of the sample may give rise to bias in a number of ways. Some of which are discussed below:

- **Deliberate selection:** The deliberate selection of a 'representative' sample.
- **Conscious/Unconscious bias in the selection of 'random' sample:** The randomness of selection may not really exist, even though investigators claim that they had a random sample if they allow their desire to obtain a certain result to influence their selection.
- **Substitution:** Substitution of an item in place of one chosen in random sample sometimes leads to bias. Thus, if it were decided to interview every 50th household in a colony, it would be inappropriate to interview the 51st or any other number in its place as the characteristics possessed by it will differ from those which were originally to be included in the sample.

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Check Your Progress

10. Define population.
11. List the advantages of quota sampling.

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- **Non-response:** If all the items to be included in the sample are not covered then, there will be bias even though no substitution has been attempted. This fault particularly occurs in mailed questionnaires, which are incompletely returned. Moreover, the information supplied by the informants may also be biased.
- **An appeal to the vanity:** An appeal to the vanity of the person questioned may give rise to yet another kind of bias. For example, the question 'Are you a good student?' is such that most of the students would answer 'yes'.

Any consistent error in measurement will give rise to bias whether the measurements are carried out on a sample or on all the units of the population. The danger of error is, however, likely to be greater in sampling work, since the units measured are usually smaller.

Bias may arise due to improper formulation of the decision problem or wrongly defining the population, specifying the wrong decision, securing an inadequate frame, and so on. Biased observations may result from a poorly designed questionnaire, an ill-trained interviewer, failure of a respondent's memory, etc. Bias in the flow of data may be due to unorganized collection procedure, faulty editing or coding of responses.

In addition to bias which arises from faulty process of selection and faulty collection of information, faulty methods of analysis may also introduce bias. Such bias can be avoided by adopting proper methods of analysis.

If possibilities of bias exist, fully objective conclusions cannot be drawn. The first essential of any sampling or census procedure must, therefore, be the elimination of all sources of bias. The simplest and the only certain way of avoiding bias in the selection process is for the sample to be drawn either entirely at random or subject to restrictions, which while improving the accuracy are of such a nature that they do not introduce bias in the results. In certain cases, systematic selection may also be permissible.

Once the absence of bias has been ensured, attention should be given to the random sampling errors. Such errors must be reduced to the minimum so as to attain the desired accuracy.

Apart from reducing errors of bias, the simplest way of increasing the accuracy of a sample is to increase its size. The sampling error usually decreases with increase in sample size and in fact in many situations the decrease is inversely proportional to the square root of the sample size. Figure 3.7 illustrates the increase and decrease proportion between sampling error and sample size.

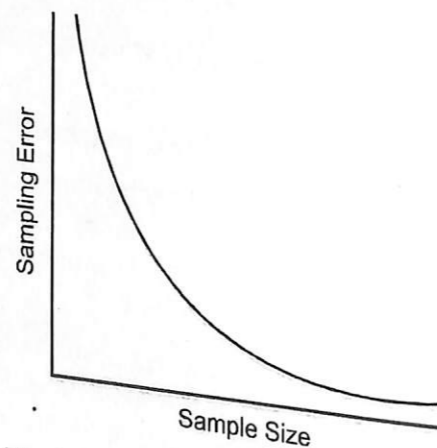


Fig. 3.7 Sampling Error and Sample Size

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From Figure 3.7, it is clear that though the reduction in sampling error is substantial for initial increases in sample size, it becomes marginal after a certain stage. In other words, considerably great effort is needed after a certain stage to decrease the sampling error than in the initial instances. Hence, after that stage, sizable reduction in cost can be achieved by lowering even slightly the precision required.

From this point of view, there is a strong case for resorting to a sample survey to provide estimates within permissible margins of error instead of a complete enumeration survey, as in the latter the effort and the cost needed will be substantially higher due to the attempt to reduce the sampling error to zero.

As regards non-sampling error, they are likely to be more in case of complete enumeration survey than in case of a sample survey, since it is possible to reduce the non-sampling errors to a greater extent by using better organization and suitably trained personnel at the field and tabulation stages.

The behaviour of the non-sampling errors with increase in sample size is likely to be opposite of that of sampling error, that is, the non-sampling error is likely to increase with increase in sample size. In many situations, it is quite possible that the non-sampling error in a complete enumeration survey is greater than both the sampling and non-sampling errors taken together in a sample survey, and naturally in such situations the latter is preferred to the former.

When a complete enumeration of units in the universe is made, one would expect that it would give rise to data free from errors. However, in practice it is not so. For example, it is difficult to completely avoid errors of observation or ascertainment. So also in the processing of data tabulation errors may be committed affecting the results. Errors arising in this manner are termed as non-sampling errors, as they are due to factors other than the inductive process of inferring about the population from a sample.

Thus, the data obtained in an investigation by complete enumeration, although free from sampling error, would still be subject to non-sampling error, whereas the results of a sample survey would be subject to sampling error as well as non-sampling error.

Non-sampling errors can occur at every stage of planning and execution of the census or survey. Such errors can arise due to a number of causes, such as defective methods of data collection and tabulation, faulty definition, incomplete coverage of the population or sample, etc. More specifically, non-sampling errors may arise from one or more of the following factors:

- Data specification being inadequate and inconsistent with respect to the objective of the census or survey
- Inappropriate statistical unit
- Inaccurate/Inappropriate methods of interview, observation or measurement with inadequate or ambiguous schedules, definitions or instructions
- Lack of trained and experienced investigators
- Lack of adequate inspection and supervision of primary staff
- Errors due to non-response, i.e., incomplete coverage in respect of units
- Errors in data processing operations, such as coding, punching, verification.
- Errors committed during presentation and printing of tabulated results.

These sources are not exhaustive, but are given to indicate some of the possible sources of error. In a sample survey, non-sampling errors may also arise due to defective frame and faulty selection of sampling units.

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In some situations, the non-sampling errors may be large and deserve greater attention than the sampling errors. While, in general sampling, errors decrease with increase in sample size, non-sampling errors tend to increase with the sample size.

In the case of complete enumeration, non-sampling errors and in the case of sample surveys, both sampling and non-sampling errors are required to be controlled and reduced to a level at which their presence does not vitiate the use of final results.

The reliability of samples can be tested in the following ways:

- More samples of the same size should be taken from the same universe and their results be compared. If results are similar, the sample will be reliable.
- If the measurements of the universe are known then they should be compared with the measurements of the sample. In case of similarity of measurement, the sample will be reliable.
- Sub-samples should be taken from the samples and studied. If the results of sample and sub-sample study show similarity, the sample should be considered reliable.

1.6 SUMMARY

In this unit, you have learnt that:

- Research design is a structure that gives an outline of the overall research work. It is the result of better planning and implementation of a good strategy.
- According to Kerlinger, research design is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance. Bernard Phillips defines research design as the blueprint for collection, measurement and analysis of data.
- Before starting the research process, the formulation of an efficient and appropriate research design is important.
- A research design depends to a large extent on the type of research study that you are conducting. If the research study is exploratory, then major emphasis is on the discovery of ideas.
- Experimentation is the process of examining and verifying the hypothesis related to some research problem.
- Ronald A. Fisher has classified three basic principles of research design, which are:
 - o Replication
 - o Randomization
 - o Local control
- The randomization principle protects the research design from extraneous factors while conducting an experiment. It indicates that the experiment must be designed or planned in such a way that unrelated factors can be included as possibilities.
- Exploratory research design is also known as formulative research design. In this research design, a specific subject is investigated. It helps to generate a set of hypotheses or research-based questions that can be used at a later stage.

Check Your Progress

12. What is a sampling error?
13. How are sampling errors and sample size related?
14. Why do non-sampling errors arise?

NOTES

- A conclusive research design is more structured and formal than an exploratory research design. It is based on large representative samples, and the data obtained is subjected to quantitative analysis.
- The two categories of conclusive research designs are descriptive and causal. Descriptive research designs can further be either cross-sectional or longitudinal.
- In contrast to the cross-sectional design, which provides a snapshot of the variables of interest at a single point in time, a longitudinal study gives a series of pictures that provide an in-depth view of the situation and the changes that have taken place over time.
- Experimental research design is usually applicable when we are determining the cause and effect relationship or deriving the cause and effect inferences in any experimental research study.
- Validating the experimental design ensures that the outcome of an experiment is accurate and right. Validating an experimental design includes two factors:
 - o Internal validity of experimental design
 - o External validity of experimental design
- External validity refers to the assessment of the generalized manner of the experimental design. This means, validating the common applicability of result or outcome of the experimental design in the real world.
- The various types of experimental designs are as follows:
 - o Pre-experimental design
 - o Quasi-experimental design
 - o True experimental design
- The term 'Quasi' in quasi-experimental design refers to 'as if' or 'almost', so quasi-experimental design means almost a true experiment.
- The true experimental design covers up the shortcomings of pre-experimental and quasi-experimental designs. This design includes the control group and a means to measure the changes that occur in two groups participating in an experiment.
- Before working on an experimental design, the following conditions should be considered:
 - o The possibility of categorizing people, places or things in the experiment
 - o The possibility of selecting random people, place or things in the experiment
 - o The process of random selection to create experimental and control groups to be ethical
- All research in the field of behavioural sciences involves drawing inferences from a specified, identifiable group on the basis of a selected sample. The clearly identifiable and specified group is known as the population or universe. The selected group of persons or objects is called the sample.
- Most samples can be categorized into two types:
 - o Probability sampling
 - o Non-probability sampling

NOTES

- A population is the aggregate of all the cases that conform to the researcher's designated set of specifications.
- For a random sampling design it is imperative that each element is included in the sample. Equal element means the probability of each element in the population is the same and is not influenced by other considerations.
- A simple random sample may be defined as one in which each and every individual of the population has an equal chance of being included in the sample and also the selection of one individual is in no way dependent upon the selection of another person.
- Accidental sampling is also called incidental sampling. It is based on a non-probability sampling plan. Here, the investigator chooses the sample according to convenience.
- Double sampling means drawing a sample of individuals from a sample that has already been drawn, e.g., from a population of 10,000 people, a sampling of 1000 is drawn.
- A sample survey requires study in small portions of population as there can be certain amount of inaccuracy in the information collected during sampling analysis. This inaccuracy is called sampling error or error variance.
- Biased observations may result from a poorly designed questionnaire, an ill-trained interviewer, failure of a respondent's memory, etc. Bias in the flow of data may be due to unorganized collection procedure, faulty editing or coding of responses.
- Non-sampling errors can occur at every stage of planning and execution of the census or survey. Such errors can arise due to a number of causes, such as defective methods of data collection and tabulation, faulty definition, incomplete coverage of the population or sample, etc.

1.7 KEY TERMS

- **Research design:** It is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance.
- **Extraneous variables:** Independent variables that are not a part of research, but still affect the dependent variables are known as extraneous variables.
- **Experimentation:** It is the process of examining and verifying the hypothesis related to some research problem.
- **Cohort:** A group of respondents who experience the same event within the same time interval is referred to as a 'cohort'.
- **Parameter:** A measure based on the entire population is called a parameter.
- **Statistic:** A measure based on the sample is called a statistic.
- **Size:** It refers to the number of items selected from the universe to constitute a sample.
- **Population:** It is the aggregate of all the cases that conform to the researcher's designated set of specifications.

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1.8 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Research design is a structure that gives an outline of the overall research work. It is the result of better planning and implementation of a good strategy.
2. A research design is significant as it has the following advantages:
 - It helps in the smooth functioning of various research operations.
 - It requires less effort, time and money.
 - It helps to decide the methods and techniques to be used for collecting and analysing data.
3. Ronald A. Fisher has classified three basic principles of research design, which are:
 - Replication
 - Randomization
 - Local control
4. Exploratory research design is also known as formulative research design. In this research design, a specific subject is investigated. It helps to generate a set of hypotheses or research-based questions that can be used at a later stage.
5. The two categories of conclusive research designs are descriptive and causal.
6. The confounding variables can be controlled by using the randomization technique or by implementing the pre-testing and post-testing methods on both the treatment and control groups. This controlling process helps in ensuring valid results, both internally and externally.
7. Before working on an experimental design, the following conditions should be considered:
 - The possibility of categorizing people, places or things in the experiment
 - The possibility of selecting random people, place or things in the experiment
 - The process of random selection to create experimental and control groups to be ethical
8. A population can be finite or infinite. A finite population is one where all the members can be counted. An infinite population is one where all the members cannot be counted (e.g., stars in the sky).
9. Most samples can be categorized into two types:
 - (i) Probability sampling
 - (ii) Non-probability sampling
10. A population is the aggregate of all the cases that conform to the researcher's designated set of specifications.
11. Advantages of the quota sampling method are:
 - Quota sampling method is quick and easy for gross estimates
 - It is a convenient procedure
 - Elements from the desired strata get included

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12. A sample survey requires study in small portions of population as there can be certain amount of inaccuracy in the information collected during sampling analysis. This inaccuracy is called sampling error or error variance.
13. Apart from reducing errors of bias, the simplest way of increasing the accuracy of a sample is to increase its size. The sampling error usually decreases with increase in sample size and in fact in many situations the decrease is inversely proportional to the square root of the sample size.
14. Non-sampling errors can occur at every stage of planning and execution of the census or survey. Such errors can arise due to a number of causes, such as defective methods of data collection and tabulation, faulty definition, incomplete coverage of the population or sample, etc.

1.9 QUESTIONS AND EXERCISES

Short-Answer Questions

1. What is the need of a research design?
2. List the features of a good research design.
3. Define experimentation. When can an experiment be absolute or comparative experimentation?
4. What are the three methods that are applied for explorative research studies?
5. Differentiate between cross-sectional and longitudinal research design.
6. 'Validating an experimental design includes two factors.' What are the two factors?
7. What is the basic purpose of implementing quasi-experimental design?
8. What are the two types of true experimental designs?
9. What is sampling? Write a note on the types of sampling.
10. List the different systems of drawing a random sample.
11. Why does sampling give rise to sampling errors? What are the types of sampling errors?

Long-Answer Questions

1. Discuss in detail the concept of research design and its features.
2. What are the important concepts related to a research design?
3. Evaluate the types of research design.
4. Describe in detail the experimental research design and its types.
5. Assess the sampling method of samples in research.
6. Explain the different types of sampling.
7. Critically analyse the concept of sampling errors and the effect of biasness on a research programme.
8. What is double sampling? Illustrate with an example.

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1.10 FURTHER READING

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UNIT 2 METHODS OF DATA COLLECTION I

NOTES

- 2.0 Introduction
- 2.1 Unit Objectives
- 2.2 Observation
 - 2.2.1 Types of Observation
 - 2.2.2 Recording Techniques of Observation
 - 2.2.3 Advantages and Disadvantages of Observation
 - 2.2.4 Characteristics of Observation for Research
- 2.3 Questionnaire Tools
 - 2.3.1 Types of Questionnaires
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 - 2.3.3 Appropriateness of Questionnaire
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 - 2.3.5 Steps for Preparing and Administering the Questionnaire
 - 2.3.6 Importance and Limitations of Questionnaire Method
- 2.4 Schedules
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- 2.8 Questions and Exercises
- 2.9 Further Reading

2.0 INTRODUCTION

To understand the multitude of choices available to a researcher for collecting the project/study-specific information, one needs to be fully cognizant of the resources available for the study and the level of accuracy required. To appreciate the truth of this statement, one needs to examine the gamut of methods available to the researcher. The data sources could be either contextual and primary or historical and secondary in nature.

Primary data as the name suggests is original, problem- or project-specific and collected for the specific objectives and needs spelt out by the researcher. The authenticity and relevance is reasonably high. The monetary and resource implications of this are quite high and sometimes a researcher might not have the resources or the time or both to go ahead with this method. In this case, the researcher can look at alternative sources

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of data which are economical and authentic enough to take the study forward. These include the second category of data sources—namely the secondary data.

Secondary data as the name implies is that information which is not topical or research specific and has been collected and compiled by some other researcher or investigative body. The said information is recorded and published in a structured format, and thus, is quicker to access and manage. Secondly, in most instances, unless it is a data product, it is not too expensive to collect. As suggested in the opening vignette, the data to track consumer preferences is readily available and the information required is readily available as a data product or as the audit information which the researcher or the organization can procure and use it for arriving at quick decisions. In comparison to the original research-centric data, secondary data can be economically and quickly collected by the decision maker in a short span of time. Also the information collected is contextual; what is primary and original for one researcher would essentially become secondary and historical for someone else.

Qualitative research, thus, is presumed to go beyond the obvious of constructs and variables that are not visible or measurable; rather they have to be deduced by various methods like observation, schedule, questionnaire, interview, projective, case study, focus groups and content analysis. There are a variety of such methods which will be discussed in detail in this unit. However, common premise of all these are that they are relatively loosely structured and require a closer dialogue or interaction between the investigator and the respondent. The information collected is more in-depth and intensive and results in rich insights and perspectives than those delivered through a more formal and structured method. However, since the element of subjectivity is high, they require a lot of objectivity on the part of the investigator while collecting and interpreting the data. Conducting a qualitative research is an extremely skillful task and requires both aptitude and adequate training in order to result in valuable and applicable data.

2.1 UNIT OBJECTIVES

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

- Explain observation schedule as a tool of data collection
- Discuss the concept of questionnaire as a method of data collection
- Assess schedule as a method of data collection
- Describe how conducting interviews are an important source of data collection
- Explain projective method as a tool of data collection
- Discuss how case studies and content analysis are important sources of data collection

2.2 OBSERVATION

Observations have led to some of the most important scientific discoveries in human history. Charles Darwin used his observations of animal and marine life at the Galapagos Islands to help him formulate his theory of evolution which he described in *On the Origin of Species*. Today, social scientists, natural scientists, engineers, computer scientists, educational researchers and many others use observation as a primary research method.

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The kind of observations one makes depends on the subject being researched. Traffic or parking patterns on a campus can be observed to ascertain what kind of improvements can be made. Clouds, plants or other natural phenomena can be observed as can people, though in the case of the latter, one may often have to ask for permission so as to not violate any privacy issue.

Observation may be defined as '*a process in which one or more persons monitor some real-life situation and record pertinent occurrences*'. It is used to evaluate the overt behaviour of the individual in controlled and uncontrolled situations.

According to Marie Jahoda: 'Observation method is a scientific technique to the extent that it (a) serves a formulated research purpose, (b) is planned systematically rather than occurring haphazardly, (c) is systematically recorded and related to more general propositions than presented as a set of interesting curious, and (d) is subjected to checks and controls with respect to validity, reliability, and precision much as is all other scientific evidence.'

According to Good and Hatt: 'Observation may take many forms and is at once the most primitive and the most modern of research techniques. It includes the most casual, uncontrolled experiences as well as the most exact film records of laboratory experimentation.'

2.2.1 Types of Observation

Observation can be of the following types:

1. **Participant observation:** In the process of 'participant observation', the observer becomes more or less one of the group members and may actually participate in some activity or the other of the group. The observer may play any one of the several roles in observation, with varying degrees of participation, as a visitor, an attentive listener, an eager learner or as a participant observer.
2. **Non-participant observation:** In the process of 'non-participant observation', the observer takes a position where his/her presence is not felt by the group. He/She may follow the behaviour of an individual or characteristics of one or more groups closely. In this type of observation, a one-way 'vision screen' permits the observer to see the subject but prevents the subject from seeing the observer.

Observation may also be classified into the following categories:

- **Natural observation:** Natural observation involves observing the behaviour in a normal setting and in this type of observation, no efforts are made to bring any type of change in the behaviour of the observed. Improvement in the collection of information can be done with the help of natural observation.
- **Subjective and objective observation:** All observations consist of two main components, the subject and the object. The subject refers to the observer, whereas the object refers to the activity or any type of operation that is being observed. Subjective observation involves the observation of one's own immediate experience, whereas the observation involving an observer as an entity apart from the thing being observed is referred to as 'objective observation'. Objective observation is also known as 'retrospection'.
- **Direct and indirect observation:** With the help of the direct method of observation, one comes to know how the observer is physically present, in which type of situation is he/she present and then this type of observation

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monitors what takes place. Indirect method of observation involves studies of mechanical recording or recording by some other means like photographic or electronic. Direct observation is relatively straightforward as compared to indirect observation.

- **Structured and unstructured observation:** Structured observation works according to a plan and involves specific information of the units that are to be observed and also about the information that is to be recorded. The operations that are to be observed and the various features that are to be noted or recorded are decided well in advance. Such observations involve the use of special instruments for the purpose of data collection that are also structured in nature. But in the case of unstructured observation, its basics are diametrically against the structured observation. In such observations, the observer has the freedom to note down what he/she feels is correct and unlike point of study. This approach of observation is very suitable for exploratory research.
- **Controlled and non-controlled observation:** Controlled observations are the observations made under the influence of some external forces. Such observations rarely lead to improvement in the precision of the research results. However, these observations can be very effective if these are made to work in coordination with mechanical synchronizing devices, film recordings, etc. Non-controlled observations are made in the natural environment, and reverse to the controlled observation these observations involve no influence or guidance of any type of external force.

2.2.2 Recording Techniques of Observation

Many different techniques may be employed to study and document a subject's behaviour. The data collection techniques are all accurate but may be suitable for different purposes. While certain methods help gather detailed descriptions of behaviour, certain others facilitate documenting behaviour promptly with bare minimum description.

- **Anecdotal records:** Anecdotal records refer to a few sentences jotted down in a notebook. These sentences pertain to what the subject is engaged in at a particular moment. Only those behaviours that can be seen or heard and that can be counted are documented while creating an anecdotal record.
- **Narrative description:** Narrative description is also known as running behaviour record and specimen record, and is a formal method of observation. When following this technique, one is supposed to record continuously in as detail as possible, like what the subject is doing and saying when alone or when interacting with other people. In its methodology, it is similar to anecdotal record but is definitely more detailed. The researcher studies the context setting, the behaviour patterns, and the order in which they take place. The main aim of this technique is to gain an objective description of a subject's behaviour without conjecture, analysis, or assessment.
- **Checklists:** Checklists are usually standardized forms which list specific skills and behaviours based on standard levels or are specifically compiled by the researcher for a particular research study.
- **Interviewing:** In this observation technique, the researching team tries to identify the feelings and beliefs of the subjects, that are not visible through simple

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observation. During the process of interviewing, everything that the subject says must be recorded exactly as it is. The interviewer should avoid any kind of editing of the interview subscript.

- **Time sampling:** This method is distinct from others in two ways—it monitors and keeps an account of a few chosen samples of subject's behaviour, and is carried out only during prearranged periods of time. When a behaviour pattern is seen during the specified time interval, it is recorded. This technique therefore helps to gather representative examples of behaviour.
- **Frequency counts:** In some cases, a researcher may be more interested in studying the frequency of an occurrence or behaviour or another pattern, such as how often a consumer buys a particular product or how often an individual started a conversation with a colleague. To get this data, the researcher will have to keep a count of the frequency of the particular behaviour and study how long the behaviour lasts. This is usually done by simply marking an occurrence on a chart each time the behaviour is repeated.
- **Event sampling:** This technique is focused on observing specific behaviours or events in a subject's behaviour pattern. However, it does not take into account the frequency or the length of the recording interval.

2.2.3 Advantages and Disadvantages of Observation

The advantages of observation are as follows:

- This technique is employed to observe characteristics of various designs of school buildings and equipment.
- For coaching purposes, an observation of various skills in games and athletics is made.
- A study of the significant aspects of personality which express themselves in behaviours can be made.
- The behaviour of the children in a classroom situation can be effectively analysed.
- The behaviour of those who cannot read, write or speak can be observed.
- Observation of skills in a workshop is made directly.
- Observation of pupils' behaviour as recorded in the cumulative records of pupils could serve as an anecdotal evidence and supply data for research studies.

The disadvantages of observation are as follows:

- It is very difficult to establish the validity of observations.
- Many items of observation cannot be defined.
- The problem of subjectivity is involved.
- Observation may give undue stress to aspects of limited significance simply because they can be recorded easily, accurately and objectively.
- Various observers observing the same event may concentrate on different aspects of a situation.
- The observers have little control over the physical situation.

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- Children being observed become conscious and begin to behave in an unnatural manner.
- Many children try to pose and exhibit at the time of observation.
- There are certain situations which observers are not allowed to observe, and are expected to produce an accurate account.
- It may not be feasible to classify all the events to be observed.
- Observation is a slow and laborious process.
- There may be lack of agreement among the observers.
- The data to be observed may be unmanageable.
- Observation needs competent observers and it may be difficult to find them.
- Observation is a costly affair. It involves lot of expenses on travelling, staying at the places where the events are taking place and purchasing sophisticated equipment to help in observation.

2.2.4 Characteristics of Observation for Research

The characteristics of observation for research are as follows:

- Observation schedule should be specific.
- The steps should be systematic.
- It should be quantitative.
- It should be recorded immediately.
- It should be made by experts.
- Schedule should be scientific. We should be able to check and substantiate the results.

Jennifer Symonds gives a list of nine essential characteristics of good observation, which are as follows;

- Good eyesight
- Alertness
- Ability to estimate
- Ability to discriminate
- Good physical condition
- An immediate record
- Good perception
- Freedom from preconceptions
- Emotional disinterest

Planning Administration Aspect of Observation

This includes the following:

- Securing an appropriate group of persons to observe
- Deciding and arranging any special conditions for the group
- Determining the length of each observation period, the interval between periods and the number of periods

Points to be Considered while Defining the Activities

These are as follows:

- Inclusion of those activities which are true representatives of the general category one is studying
- Defining those activities very carefully.

While arranging for the record, the following points should receive attention:

- Deciding the form for recording so as to make note-making easy and rapid
- Deciding the use of appropriate symbols, abbreviations and some use of shorthand

One can train oneself by:

- Training oneself to observe others as perception improves with practice
- Studying manuals that list observation techniques

Planning Effective Observation

This includes the following:

- Sampling to be observed should be adequate; appropriate group of subjects should be there
- Units of behaviour should be defined as accurately as possible
- Method of recording should be simplified
- Detailed instructions may be given to observers to eliminate the difference in the perspectives of observers
- Too many variables may not be observed simultaneously
- Excessively long periods of observation without interspersed rest periods should be avoided
- Observers should be fully trained
- Observers should be well equipped
- Conditions of observation should remain constant
- Number of observations should be adequate
- Records of observation must be comprehensive
- Length of each observation period, interval between periods, and number of periods should be clearly stated
- Interpretations should be carefully made

2.3

QUESTIONNAIRE TOOLS

A questionnaire is 'a tool for research, comprising a list of questions whose answers provide information about the target group, individual or event'. Although they are often designed for statistical analysis of the responses, this is not always the case. This method was the invention of Sir Francis Galton. Questionnaire is used when factual information is desired. When opinion rather than facts are desired, an opinionative or attitude scale is

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Check Your Progress

1. Define observation.
2. What are the main components of the observation method?
3. List two disadvantages of observation method of data collection.

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used. Of course, these two purposes can be combined into one form that is usually referred to as 'questionnaire'.

Questionnaire may be regarded as a form of interview on paper. The procedure for the construction of a questionnaire follows a pattern similar to that of the interview schedule. However, because the questionnaire is impersonal, it is all the more important to take care of its construction.

A questionnaire is a list of questions arranged in a specific way or randomly, generally in print or typed and having spaces for recording answers to the questions. It is a form which is prepared and distributed for the purpose of securing responses. Thus, a questionnaire relies heavily on the validity of the verbal reports.

According to Goode and Hatt, 'in general, the word questionnaire refers to a device for securing answers to questions by using a form which the respondent fills himself.'

Barr, Davis and Johnson define questionnaire as, 'questionnaire is a systematic compilation of questions that are submitted to a sampling of population from which information is desired' and Lundberg says, 'fundamentally, questionnaire is a set of stimuli to which literate people are exposed in order to observe their verbal behaviour under these stimuli.'

2.3.1 Types of Questionnaire

Figure 4.1 depicts the types of questionnaires that are used by researchers.

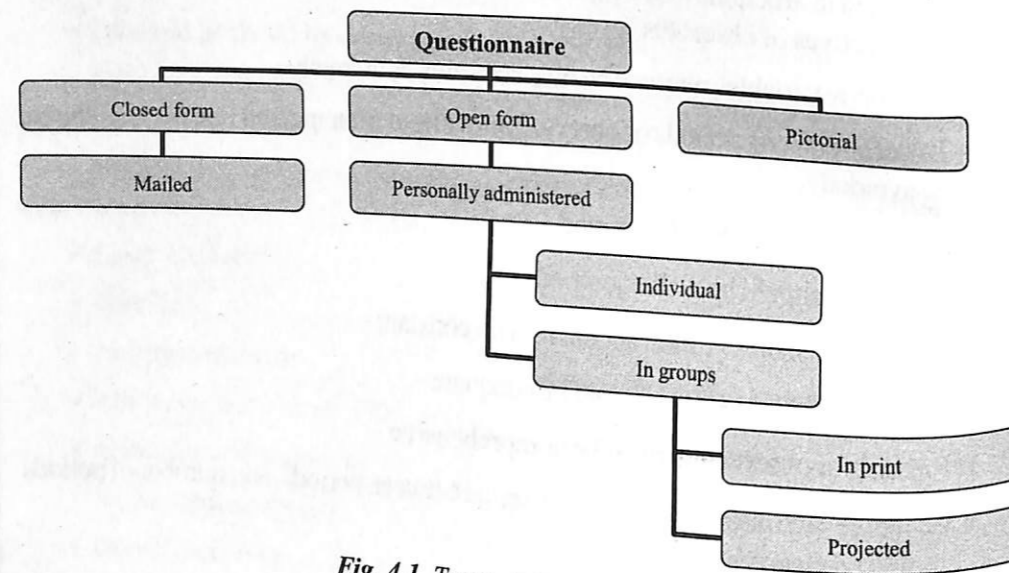


Fig. 4.1 Types of Questionnaires

Commonly used questionnaires are:

1. **Closed form:** Questionnaire that calls for short, check-mark responses are known as closed form type or restricted type. They have highly structured answers like mark a 'yes' or 'no', write a short response or check an item from a list of suggested responses. For certain types of information, the closed form questionnaire is entirely satisfactory. It is easy to fill out, takes little time, keeps the respondent on the subject, is relatively objective and is fairly easy to tabulate and analyse.

For example, How did you obtain your Bachelors' degree? (Put a tick mark against your answer)

- a. As a regular student
- b. As a private student
- c. By distance mode

These types of questionnaires are very suitable for research purposes. However, construction of such a type of questionnaire requires a lot of labour and thought. It is generally lengthy as all possible alternative answers are given under each question.

2. **Open form:** The open form or unrestricted questionnaire requires the respondent to answer the question in their own words. The responses have greater depth as the respondents have to give reasons for their choices. The drawback of this type of questionnaire is that not many people take the time to fill these out as they are more time consuming and require more effort, and it is also more difficult to analyse the information obtained. Example: Why did you choose to obtain your graduation degree through correspondence?

No alternative or plausible answers are provided. The open form questionnaire is good for depth studies and gives freedom to the respondents to answer the questions without any restriction.

Limitations of open questionnaire are as follows:

- Difficult to fill out
- Respondents may never be aware of all the possible answers
- Takes longer to fill
- Returns are often few
- Information is too unwieldy and unstructured, and hence difficult to analyse, tabulate and interpret

Some investigators combine the approaches and the questionnaires carry both the closed and open form items. In the close ended questions, the last alternative is kept open for the respondents to provide their optimum response. For example, 'Why did you prefer to join B.Ed. programme?

- (a) Interest in teaching
- (b) Parents' wish
- (c) For securing a government job
- (d) Other friends opted for this and
- (e) Any other.'

3. **Pictorial form:** Pictorial questionnaires contain drawings, photographs or other such material rather than written statements and the respondents are to choose answers in terms of the pictorial material. Instructions or directions can be given orally. This form is useful in working with illiterate persons, young children and persons who do not know a specific language. It keeps up the interest of the respondent and decreases subjects' resistance to answer.

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2.3.2 Questionnaire Administration Modes

Main modes of questionnaire administration are as follows:

- **Through mail:** Mailed questionnaires are the most widely used and also perhaps the most criticized tool of research. They have been referred to as a 'lazy person's way of gaining information'. The mailed questionnaire has a written and signed request as a covering letter and is accompanied by a self-addressed, written and stamped envelope for the return by post. The method of mailing out the questionnaire is less expensive in terms of time, funds required; it provides freedom to the respondent to work at his/her own convenience and enables coverage of a large population.
- **Personal contact/face-to-face:** Personally administered questionnaires both in individual and group situations are helpful in some cases and have the following advantages over the mailed questionnaire: (i) the investigator can establish a rapport with the respondents; (ii) the purpose of the questionnaire can be explained; (iii) the meaning of the difficult terms and items can be explained to the respondents; (iv) group administration when the respondents are available at one place is more economical in time and expense; (v) the proportion of non-response is cut down to almost zero; and (vi) the proportion of usable responses becomes larger. However, it is more difficult to obtain respondents in groups and may involve administrative permission which may not be forthcoming.
- **Computerized questionnaire:** It is a mode of questionnaire administration where the questions need to be answered on the computer.
- **Adaptive computerized questionnaire:** It is a mode of questionnaire administration presented on the computer where the next questions are adjusted automatically according to the responses given as the computer is able to gauge the respondent's ability or traits.

2.3.3 Appropriateness of Questionnaire

The qualities and features which make questionnaires an effective instrument of research and help to elicit maximum information are discussed below:

- **Type of information required:** The usefulness and effectiveness of a questionnaire is determined by the kind of information sought. Not every type of questionnaire can be elicited through it. A questionnaire which will consume more than 10-20 minutes is unlikely to get good response. Also, the questions should be explicit and capable of clear-cut replies.
- **Type of respondent reached:** A good deal depends upon the types of respondents covered by the questionnaire. All types of individuals cannot be good respondents. Only literate and socially conscious individuals would give any consideration to a questionnaire. Also, the respondent must be competent to answer the kind of questions contained in a particular questionnaire.
- **Accessibility of respondents:** Questionnaires sent by e-mail can help to survey the opinion of the people living in far-flung places.
- **Precision of the hypothesis:** Appropriateness of the questionnaire also depends upon how realistic is the hypothesis in the mind of the researcher. The researcher must frame questions in such a manner that they elicit responses needed to verify the hypothesis.

2.3.4 Types of Questions

There are many types of questions that can be asked, but the way to get to the correct answer is to know which is the right question. It requires knowledge and expertise to design the correct type of questionnaire.

The following is a list of the different types of questions which can be included in a questionnaire design:

- **Open format questions:** Open format questions are those which give the respondent a chance to communicate their individual opinions. There are no set answers to choose from. Responses from open format questionnaires are insightful and even unexpected. Qualitative questions are an example of open format questions. An ideal questionnaire is one which ends with an open format question giving the respondents the chance to state their opinion or ask for their suggestions.
Example: 'State your opinion about the grading system in education.'
A respondent's answer to an open-ended question is coded into a response scale afterwards. An example of an open-ended question is a question where the person being tested has to complete a sentence (sentence completion item).
- **Closed format questions:** Multiple choice questions are the best example of closed format questions. Closed format questions generate responses that can be statistics or percentages in nature. Preliminary analysis can also be performed with ease. Closed format questions have the added advantage of being able to monitor opinions over a period of time as they can be put to different groups at different intervals.
Example: 'Who is not an educationist among the following?'
(i) Prof Yashpal (ii) John Dewy (iii) Milkha Singh (iv) Rabindranath Tagore
- **Leading questions:** These types of questions force the audience to give a particular type of answer.
Example: 'How would you rate the grading system in India?'
(i) Fair (ii) Good (iii) Excellent (iv) Superb.
- **Likert questions:** Likert questions can help you ascertain how strongly your respondent agrees with a particular statement. Likert questions can also help to assess liking and disliking.
Example: 'Are you punctual in attending your classes?'
(i) Always (ii) Mostly (iii) Normally (iv) Sometimes (v) Never
- **Rating scale questions:** In rating scale questions, the respondent is asked to rate a particular issue on a scale that may range from poor to good. Rating scale questions usually have an even number of choices, so that respondents are not given the choice of a middle option.
Example: 'How was the food at the restaurant?'
(i) Good (ii) Fair (iii) Poor (iv) Very Poor

Questions to be Avoided during Preparation of a Questionnaire

The following questions should be avoided when preparing a questionnaire:

- **Embarrassing questions:** Embarrassing questions are those that ask respondents about their personal and private life. Embarrassing questions are mostly avoided.

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- **Positive/Negative connotation questions:** While defining a question, strong negative or positive overtones must be avoided. Depending on the positive or negative association of our question, we will get different data. Ideal questions should have neutral or subtle overtones.
- **Hypothetical questions:** Hypothetical questions are questions that are based on assumption and hope. An example of a hypothetical question would be 'If you were a director in the education department, what changes would you bring about?' These types of questions force the respondents to give their ideas on a particular subject. However, these kinds of questions do not give consistent or clear data.

2.3.5 Steps for Preparing and Administering the Questionnaire

The steps involved in preparing and administering the questionnaire are as follows:

- **Planning the questionnaire:** One should get all the help possible in planning and constructing the questionnaire. Other questionnaires should be studied and items should be submitted for criticism to other members of the class or faculty.
- **Modifying questions:** Items can be refined, revised or replaced by better items. If a computer is not readily available for easily modifying questions and rearranging the items, it is advisable to use a separate card or slip for each item. This procedure also provides flexibility in arranging items in the most appropriate psychological order before the instrument is finalized.
- **Validity and reliability of questionnaire:** Questionnaire designers rarely deal with the degree of validity and reliability of their instrument. There are ways to improve both validity and reliability of questionnaires. Basic to the validity of a questionnaire is asking questions in the least ambiguous way. The meaning of all terms must be clearly defined so that they have the same meaning to all respondents. The panel of experts may rate the instrument in terms of how effectively it samples significant aspects of content validity. The reliability of the questionnaire may be tested by a second administration of the instrument with a small sub-sample, comparing the responses with those of the first. Reliability may also be estimated by comparing the responses of an alternate form with the original form.
- **Try out or pilot testing:** The questionnaire should be tried on a few friends and acquaintances. What may seem perfectly clear to the researcher may be confusing to the other person who does not have the frame of reference that the researcher has gained from living with and thinking about an idea over a long period. It is also a good idea to pilot test the instrument with a small group of persons similar to those who will be used in the study. They may reveal defects that can be corrected before the final form is printed.
- **Information level of respondents:** It is important that the questionnaire be sent only to those who possess the desired information and are likely to be sufficiently interested to respond objectively and conscientiously. A preliminary card asking whether the individual would respond is recommended by some research authorities.
- **Getting permission:** If the questionnaire is to be used in a public school, it is essential that approval for the project is secured from the Principal. Students should be informed that participation is voluntary. If the desired information is delicate or intimate in nature, the possibility of providing for anonymous responses

should be considered. The anonymous instrument is most likely to produce objective and honest responses.

- **Cover letter:** A courteous, carefully constructed cover letter should be included to explain the purpose of the study. The cover letter should assure the respondent that all information will be held in strict confidence. The letter should promise some sort of inducement to the respondent for compliance with the request. In educational circles, a summary of questionnaire results is considered an appropriate reward, a promise that should be scrupulously honoured after the study has been completed.
- **Follow-up procedures:** Recipients are often slow to return completed questionnaires. To increase the numbers of returns, a vigorous follow-up procedure may be necessary. A courteous postcard reminding the recipient may bring in some additional responses. A further step in follow-up may involve a personal letter or reminder. In extreme cases, it may be appropriate to send the copy of questionnaire with a follow-up letter.
- **Analysing and interpreting questionnaire responder:** Data obtained by the questionnaire is generally achieved through calculation and counting. The total is converted into proportion or percentages. Calculation of contingency coefficient of correlation is often made in order to suggest probability of relation among data. Computation of chi-square statistics in it is also advisable.

Improving the Validity of a Questionnaire

The validity of the information collected through a questionnaire can be improved by using the following techniques:

- The questions should be relevant to the subject or problem.
- The questions should be perfectly clear and unambiguous.
- The questions should be retroactive and not repulsive.
- Check whether the information has been collected from a reasonably good proportion of respondents.
- The information should show a reasonable range of variety.
- The information should be consistent with what is already known or is expected.
- Use another external criterion like consultation of documents or interview with a small group of respondents to cross check the truthfulness of the information given through the questionnaire.

Question sequence should be the following:

- Questions should flow logically from one to the next.
- The researcher must make sure that the answer to a specific question is not prejudiced by earlier questions.
- Questions should flow from the more general to the more specific.
- Questions should follow an order which starts from the least sensitive to the most sensitive.
- Questions should flow from factual and behavioural questions to attitudinal and opinion questions.
- Questions should flow from unaided to aided questions.

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The three stages theory (also known as the sandwich theory) should be applied when sequencing questions. The order to be followed should be first, screening and rapport questions; second, the product specific questions; and third, demographic questions.

Questionnaire Construction Issues

The following problems are faced by a researcher while constructing a questionnaire.

- It is very important to know exactly how you are going to use the information received from the research conducted. If the research or information cannot be implemented or acted upon, then the research would just have been a waste of time, money and effort.
- Clear parameters regarding the research's aims and scope should be drawn before starting the research. This would include the questionnaire's time frame, budget, manpower, intrusion and privacy.
- The target audience selected will depend on how arbitrarily one has chosen the respondents and what the selection criteria are.
- The framework of expected responses should be clearly defined so that the responses received are not random.
- Only relevant questions should be included in the questionnaire as unrelated questions are a burden on the researcher and respondent.
- If you have formed a hypothesis which you want to study then you will know what questions need to be asked.
- The respondents' background and education should not influence the way they answer the questions.
- The type of scale, index, or typology to be used shall be determined.
- The questions asked (closed, multiple-choice, and open) should adhere to the statistical data analysis techniques available and the goals of the study.
- Questions and prepared responses to choose from should not be biased. A biased question or questionnaire influences the responses given.
- The order in which the questions are presented or asked is also important as the earlier questions and their responses may influence the later ones.
- The language should be kept simple to avoid ambiguity. Ambiguous words may cause misunderstanding, possibly invalidating questionnaire results. Double negatives should also be avoided.
- Questions should address only one issue at a time so that the respondent is not confused as to what response is required.
- The list of possible responses should be comprehensive so that respondents should not find themselves without a suitable response. A solution to this would be to add the category of 'other' in the options.
- Categories in the questionnaire should be kept separate. For example, in both the 'married' category and the 'single' category—there may be a need for separate questions on marital status and living situation.
- Writing style should be informal yet to the point and suitable for the target audience.
- Personal questions about age, income, marital status, etc., should be placed at the end of the survey so that even if the respondent is hesitant to give out personal information, they would still have answered the other questions.

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- Questions which try to trick the respondent may end in inaccurate responses.
- Presentation which is pleasing to the eye with the use of colours and images can end up distracting the respondent.
- Numbering the questions would be helpful.
- Whoever administers the questionnaire, be it research staff, volunteers or whether self-administered by the respondents, it should have clear, detailed instructions.

Factors Affecting Reliability of Answers

Factors affecting reliability of answers are as follows:

- **Confusing questions:** If the questions are not easily understood or they are capable of being interpreted in more than one way, the answers might be unreliable because the answer may be the result of misinterpretation of the questions not intended by the researcher.
- **Prejudice regarding sample:** The responses received from the sample may not be true representations of the sample.
- **Lack of coverage to illiterates:** This method is inapplicable to illiterates and semi-illiterates as they will be unable to read the questions.
- **Response selectivity:** The respondents of a questionnaire may belong to a selected group. Therefore, the conclusions lack the kind of objectivity and representativeness essential for its validity.

2.3.6 Importance and Limitations of Questionnaire Method

As a matter of fact, this method can be applied in a very narrow field. It can be used only if the respondents are educated and willing to cooperate. However, it is still widely used, owing to the following merits:

- **Economical:** The questionnaire requires paper, printing and postage only. There is no need to visit the respondents personally or continue the study over a long period.
- **Time saving:** Besides saving money, the questionnaire also saves time. Data can be collected from a large number of people within a small time frame.
- **Most reliable in special cases:** It is a perfect technique of research in some cases.
- **Research in wide area:** Mailed questionnaire comes very handy if the sample comprises people living at great distances.
- **Suitable in specific type of responses:** The information about certain problems can be best obtained through the questionnaire method.

Limitations of the Questionnaire Method

Like all other methods, the questionnaire is also limited in value and application. This means that it cannot be used in every situation and that its conclusions are not always reliable. Key limitations of the method are as follows:

- **Limited response:** As noted earlier, this method cannot be used with illiterate or semi-illiterate groups. The number of persons who cooperate and respond to the questionnaire is very small.

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- **Lack of personal contact:** There is very little scope of personal contact in this method. In the absence of personal contact, very little can be done to persuade the respondents to fill up the questionnaire.
- **Useless in-depth problems:** If a problem requires deep and long study, it is obvious that it cannot be studied by the questionnaire method.
- **Possibility of wrong answers:** A respondent may not really understand a question or may give the answer in a casual manner. In both cases, there is a strong likelihood of misleading information being given.
- **Illegibility:** Some persons write so badly that it is difficult to read their handwriting.
- **Incomplete response:** There are people who give answers which are so brief that the full meaning is incomprehensible.

2.4 SCHEDULES

A schedule is a questionnaire containing a set of questions that are required to be answered to collect data about a particular item. A schedule is generally used in a face-to-face situation. The following are the objectives for which a schedule is created:

- It is created for a definite item of inquiry. A schedule sets the boundaries for the subject under study.
- It acts as an aid to memorize the information being collected by the interviewer from various respondents. It helps to avoid being confused while analysing and tabulating the data.
- It helps in tabulating and analysing the data in a systematic and standardized manner.

Characteristics of a Good Schedule

The essential characteristics of a good schedule are as follows:

- The information or questions included in the schedule should be accurate and should enable the respondent to understand properly the context in which the questions are being asked.
- The schedule should be pre-arranged and structured in such a manner that the information gathered or collected should be accurate and tenable. For this, the following points must be considered:
 - o The size of the schedule should be accurate.
 - o The questions in the schedule should be understandable and definite.
 - o The questions should not contain any biased evaluation.
 - o All the questions of the schedule should be properly interlinked.
 - o The information gathered should be organized in a table so that it can be easily used for statistical analysis.

Suitability of the Schedule Method

The schedule method is mostly applied in the following situations:

- When the field of investigation is wide and dispersed
- When the researcher requires quick results at lesser cost
- When the respondents are well-trained and educated

Check Your Progress

4. What is a questionnaire?
5. What are the limitations of open form questionnaire?
6. What is the three stages theory when sequencing questions?
7. List two limitations of the questionnaire method.

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2.4.1 Types of Schedules

There are five types of schedules, which are as follows:

- **Observation schedule:** This schedule is used to observe all the activities and record the responses of the respondents under some predefined conditions. The main idea behind examining the activities is to verify the required information.
- **Rating schedule:** It is used to measure and rate the thoughts, preferences, self-consciousness, perceptions and other similar characteristics of the respondent.
- **Document schedule:** It is used for collecting important data and preparing a source list. This schedule is mostly used to attain data from autobiographies, diaries or government records regarding written facts and case histories.
- **Institution survey schedule:** It is used for studying the problems of institutions.
- **Interview schedule:** It is used to ask the interviewee questions and record the responses in the space provided in the questionnaire itself.

Merits and Limitations of the Schedule Method

The merits of the schedule method are as follows:

- In this method, the researcher is always there to help the respondents. So, the response rate is high as compared to other methods of data collection.
- The presence of the researcher not only removes doubts present in the mind of the respondent, but also avoids false replies from the respondent due to fear of cross-checking.
- In this method, there is personal contact between the researcher and the respondent. Thus, the data can be collected easily and can also be relied upon.
- This method helps to better understand the personality, living conditions and values of the respondents.
- It is easy for the researcher to detect and rectify defects in the schedule during sampling.

Limitations of the Schedule Method

The limitations of this method are as follows:

- It is a costly and time-consuming method.
- It requires well-trained and experienced field workers for conducting interviews of the respondents.
- Sometimes, the respondent may not be able to speak out due to the physical presence of the researcher.
- If the field of research is dispersed, it becomes difficult to organize the various activities of the research.

2.4.2 Organization of the Schedule

The schedule is prepared by performing the following steps:

- **Selection of respondents:** Usually, the sampling method is used for the selection of respondents. The sample should be representative of the respondents and should contain all the relevant information about the respondents.

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- **Selection and training of field workers:** Since the field workers interview the respondents and collect the required data, this should be done carefully and proper training should be provided to them.
- **Conducting interviews:** For a successful interview and correct results, the following points must be kept in mind:
 - o **Follow correct approach:** The field worker should go to the respondent with the correct approach so that the respondent can clearly understand the purpose of the interview.
 - o **Generating accurate responses:** For proper and accurate response from the respondents, the respondents should not be misunderstood in their perspective and context.

2.4.3 Difference between Questionnaire and Schedule

When you work with questionnaires and schedules, you will observe that there are several similarities between the two. However, there are prominent differences also, which are as follows:

- A questionnaire is mostly sent by the interviewer to the interviewee by mail and is filled by the interviewee, whereas a schedule is filled by the interviewer at the time of interview.
- Data collection through a questionnaire is cheaper as compared to a schedule, as money is spent only in preparing the schedules and mailing them. In the schedule method, extra money is spent on appointing interviewers and imparting training to them.
- In the case of a questionnaire, response is generally low because many people do not respond. On the other hand, response is high in the case of schedules since the interviewer fills them at the time of the interview.
- The identity of the respondent is not always clear in the case of a questionnaire, whereas in the case of schedules, the identity of the interviewee or respondent is known.
- The questionnaire method is time consuming as the respondent may not return the questionnaire in time. There is no such problem with the schedule method because the schedule is filled at the time of the interview.
- The questionnaire method does not allow personal contact with the respondent but the schedule method does.
- The questionnaire method is useful only if the respondent is literate, while in the case of a schedule, it is not necessary for the interviewee to be literate.
- The risk of incomplete and incorrect information is more in a questionnaire, while in a schedule, the information collected is complete.

Check Your Progress

8. What is a schedule?
9. When is the interview schedule used?

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Check Your Progress

15. What are case studies?
16. Why do critics feel that the case study method is not reliable enough for establishing a rule or principle?
17. What does content analysis involve?

2.5 SUMMARY

In this unit, you have learnt that:

- Observations have led to some of the most important scientific discoveries in human history. Charles Darwin used his observations of animal and marine life at the Galapagos Islands to help him formulate his theory of evolution which he described in *On the Origin of Species*.
- Observation may be defined as 'a process in which one or more persons monitor some real-life situation and record pertinent occurrences'.

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- In the process of 'participant observation', the observer becomes more or less one of the group members and may actually participate in some activity or the other of the group.
- All observations consist of two main components, the subject and the object. The subject refers to the observer, whereas the object refers to the activity or any type of operation that is being observed.
- Observation is a costly affair. It involves lot of expenses on travelling, staying at the places where the event is taking place and purchase of sophisticated equipment.
- A questionnaire is 'a tool for research, comprising a list of questions whose answers provide information about the target group, individual or event'.
- Questionnaire that calls for short, check-mark responses are known as closed form type or restricted type. They have highly structured answers like mark a 'yes' or 'no', write a short response or check an item from a list of suggested responses.
- The open form or unrestricted questionnaire requires the respondent to answer the question in their own words.
- The three stages theory (also known as the sandwich theory) should be applied when sequencing questions. The order to be followed should be first, screening and rapport questions; second, the product specific questions; and third, demographic questions.
- Whoever administers the questionnaire, be it research staff, volunteers or whether self-administered by the respondents, it should have clear, detailed instructions.
- The respondents of a questionnaire may belong to a selected group. Therefore, the conclusions lack the kind of objectivity and representativeness essential for its validity.
- A schedule is a questionnaire containing a set of questions that are required to be answered to collect data about a particular item. A schedule is generally used in a face-to-face situation.
- Observation schedule is used to observe all the activities and record the responses of the respondents under some predefined conditions. The main idea behind examining the activities is to verify the required information.
- Data collection through a questionnaire is cheaper as compared to a schedule, as money is spent only in preparing the schedules and mailing them. In the schedule method, extra money is spent on appointing interviewers and imparting training to them.
- One of the main methods of data collection is conducting interviews. It takes place as a two-way conversation between the researcher and the respondent, whereby information is gathered by asking topic related questions.
- A proper setting for group interviews requires a group of not more than 10 to 12 persons with some social, intellectual, and educational homogeneity, which ensures effective participation by all.
- There are two chief means of recording opinion during the interview. If the question is preceded, the interviewer need only check a box or circle or code, or otherwise indicate which code comes closest to the respondent's opinion. If the question is not preceded, the interviewer is expected to record the response verbatim.

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- A proper setting for group interviews requires a group of not more than 10 to 12 persons with some social, intellectual, and educational homogeneity, which ensures effective participation by all.
- Research interview is aimed at getting information required by the investigator to test his hypothesis or solve his problems of historical, experimental, survey or clinical type.
- Perhaps the most difficult part of the job of an interviewer is to obtain a specific, complete response. People can often be evasive and answer 'do not know' if they do not want to make the effort of thinking. They can also misunderstand the question and answer incorrectly in which case the interviewer would have to probe more deeply.
- A well-trained interviewer can obtain more data and greater clarity by altering the interview situation. This cannot be done in a questionnaire.
- An interview permits the research worker to follow-up leads as contrasted with the questionnaire.
- The idea of projecting oneself or one's feelings on to ambiguous objects is the basic assumption in projective techniques. The 19th century saw the origin of these techniques in clinical and developmental psychology.
- Ernest Dichter (1960) was one of the pioneers who used these techniques in consumer and motivational research. Consumer surveys and research were considered incomplete if they did not make use of projective techniques.
- In the theoretical sense, projective techniques unearth beliefs, attitudes and feelings that might underlie certain behaviour or interaction situations.
- Cartoon tests make use of animated characters in a particular situation (Masling, 1952). They are considered ambiguous as the figures bear no resemblance to a living being and thus are considered non-threatening.
- Case studies are discussions of individual cases under topics of discussion which help researchers to corroborate known facts proved previously through research.
- Researchers using case study method generally gather a large amount of data from a number of sources. Organizing this data in a systematic manner is a challenge in itself. The researcher should plan ahead to prevent getting overwhelmed by this data.
- An exemplary case study report transforms the manner in which a complex issue is presented. Case study reports are often published so that readers may apply the experience in his or her real-life situations. The case studies mostly display evidences to gain the reader's confidence.
- Content analysis involves studying a previously recorded or reported communication and systematically and objectively breaking it up into more manageable units that are related to the topic under study.
- Content analysis of large volumes becomes tedious and prone to error if handled by humans. Thus, there are various computer programmes available that can assist in the process. For computers running on Windows, one can use TEXTPACK, this is a dictionary word approach, where it can tag defined words for word frequency by sorting them alphabetically or by frequencies.

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- Content analysis is a very useful technique when one has a large quantity of text as data and it needs to be structured in order to arrive at some definite conclusions about the variables under study.

2.6 KEY TERMS

- **Observation:** It may be defined as a process in which one or more persons monitor some real-life situation and record pertinent occurrences.
- **Questionnaire:** It is a tool for research, comprising a list of questions whose answers provide information about the target group, individual or event.
- **Schedule:** It is a questionnaire containing a set of questions that are required to be answered to collect data about a particular item; it is generally used in a face-to-face situation.
- **Case studies:** They are discussions of individual cases under topics of discussion which help researchers to corroborate known facts proved previously through research.

2.7 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Observation may be defined as 'a process in which one or more persons monitor some real-life situation and record pertinent occurrences'.
2. All observations consist of two main components, the subject and the object. The subject refers to the observer, whereas the object refers to the activity or any type of operation that is being observed.
3. The disadvantages of observation are as follows:
 - It is very difficult to establish the validity of observations.
 - Many items of observation cannot be defined.
4. A questionnaire is 'a tool for research, comprising a list of questions whose answers provide information about the target group, individual or event'.
5. Limitations of open questionnaire are as follows:
 - They are difficult to fill out.
 - The respondents may never be aware of all the possible answers.
 - They take longer to fill.
6. The three stages theory (also known as the sandwich theory) should be applied when sequencing questions. The order to be followed should be first, screening and rapport questions; second, the product specific questions; and third, demographic questions.
7. The limitations of the questionnaire method is:
 - **Limited response:** As noted earlier, this method cannot be used with illiterate or semi-illiterate groups. The number of persons who cooperate and respond to the questionnaire is very small.
 - **Lack of personal contact:** There is very little scope of personal contact in this method. In the absence of personal contact, very little can be done to persuade the respondents to fill up the questionnaire.

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8. A schedule is a questionnaire containing a set of questions that are required to be answered to collect data about a particular item. A schedule is generally used in a face-to-face situation.
9. The interview schedule is used to ask the interviewee questions and record the responses in the space provided in the questionnaire itself.
10. According to Rummel J. Francis: 'The interview method of collecting data requires the actual physical proximity of two or more persons, and generally requires that all the normal channels of communication be open to their use. It is necessary to see one another, to hear each other's voices, to understand one another's language, and to use all that is psychologically inherent in physical proximity. It usually entails a non-reciprocal relation between the individuals concerned. One party desires to get information from another—one party interviews the other—for a particular purpose.'
11. Research interview is aimed at getting information required by the investigator to test his hypothesis or solve his problems of historical, experimental, survey or clinical type.
12. A tape recorder is very helpful in an interview because:
 - It reduces the tendency of the interviewer to make an unconscious selection of data favouring his/her biases.
 - The tape recorded data can be played more than once, and thus it permits a thorough study of the data.
13. The 19th century saw the origin of these techniques in clinical and developmental psychology.
14. Cartoon tests make use of animated characters in a particular situation (Masling, 1952). They are considered ambiguous as the figures bear no resemblance to a living being and thus are considered non-threatening.
15. Case studies are discussions of individual cases under topics of discussion which help researchers to corroborate known facts proved previously through research.
16. Critics feel that the case study method is not reliable enough for establishing a rule or principle as it portrays only a minuscule population which forms not even a part of the entire population.
17. Content analysis involves studying a previously recorded or reported communication and systematically and objectively breaking it up into more manageable units that are related to the topic under study.

2.8 QUESTIONS AND EXERCISES

Short-Answer Questions

1. Differentiate between participant and non-participant observation.
2. What are the recording techniques of observation?
3. Enumerate the advantages of observation method of data collection.
4. What are the types of questionnaires?
5. List the questions that should be avoided during the preparation of a questionnaire.

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6. State the importance of the questionnaire method of data collection.
7. What are the characteristics of a good schedule?
8. What are the major differences between a schedule and questionnaire?
9. What is the interview method of data collection? What are its types?
10. How is the attitude of a respondent significant for a researcher during an interview?
11. What are projective techniques? How is it different from the other methods of data collection?
12. Write a note on the evaluation of projective techniques.
13. How do case studies help the common man?
14. What is the content analysis technique of data collection?

Long-Answer Questions

1. Explain observation schedule as a tool of data collection.
2. Discuss the concept of questionnaire as a method of data collection.
3. Assess schedule as a method of data collection. Also, assess the difference between a schedule and a questionnaire.
4. List the merits and limitations of the schedule method of data collection.
5. Critically analyse how conducting interviews are an important source of data collection.
6. 'The idea of projecting oneself or one's feelings on to ambiguous objects is the basic assumption in projective techniques.' Explain projective method as a tool of data collection.
7. How are case studies an important source of data collection? What are the steps that should be used when utilizing the case study method?
8. Describe content analysis as a technique of data collection.

2.9 FURTHER READING

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UNIT 3 METHODS OF DATA COLLECTION II

NOTES

- 3.0 Introduction
- 3.1 Unit Objectives
- 3.2 Interview
 - 3.2.1 Types of Interviews
 - 3.2.2 Important Elements of Research Interview
 - 3.2.3 Indifferent Attitude of the Respondent and the Role of the Research Worker
 - 3.2.4 Advantages and Disadvantages of Interview Method
- 3.3 Projective Techniques
 - 3.3.1 Evaluating Projective Techniques
- 3.4 Case Study and Content Analysis
 - 3.4.1 Content Analysis
- 3.5 Summary
- 3.6 Key Terms
- 3.7 Answers to 'Check Your Progress'
- 3.8 Questions and Exercises
- 3.9 Further Reading

3.0 INTRODUCTION

To understand the multitude of choices available to a researcher for collecting the project/study-specific information, one needs to be fully cognizant of the resources available for the study and the level of accuracy required. To appreciate the truth of this statement, one needs to examine the gamut of methods available to the researcher. The data sources could be either contextual and primary or historical and secondary in nature.

Primary data as the name suggests is original, problem- or project-specific and collected for the specific objectives and needs spelt out by the researcher. The authenticity and relevance is reasonably high. The monetary and resource implications of this are quite high and sometimes a researcher might not have the resources or the time or both to go ahead with this method. In this case, the researcher can look at alternative sources

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of data which are economical and authentic enough to take the study forward. These include the second category of data sources—namely the secondary data.

Secondary data as the name implies is that information which is not topical or research specific and has been collected and compiled by some other researcher or investigative body. The said information is recorded and published in a structured format, and thus, is quicker to access and manage. Secondly, in most instances, unless it is a data product, it is not too expensive to collect. As suggested in the opening vignette, the data to track consumer preferences is readily available and the information required is readily available as a data product or as the audit information which the researcher or the organization can procure and use it for arriving at quick decisions. In comparison to the original research-centric data, secondary data can be economically and quickly collected by the decision maker in a short span of time. Also the information collected is contextual; what is primary and original for one researcher would essentially become secondary and historical for someone else.

Qualitative research, thus, is presumed to go beyond the obvious of constructs and variables that are not visible or measurable; rather they have to be deduced by various methods like observation, schedule, questionnaire, interview, projective, case study, focus groups and content analysis. There are a variety of such methods which will be discussed in detail in this unit. However, common premise of all these are that they are relatively loosely structured and require a closer dialogue or interaction between the investigator and the respondent. The information collected is more in-depth and intensive and results in rich insights and perspectives than those delivered through a more formal and structured method. However, since the element of subjectivity is high, they require a lot of objectivity on the part of the investigator while collecting and interpreting the data. Conducting a qualitative research is an extremely skillful task and requires both aptitude and adequate training in order to result in valuable and applicable data.

3.1 UNIT OBJECTIVES

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

- Explain observation schedule as a tool of data collection
- Discuss the concept of questionnaire as a method of data collection
- Assess schedule as a method of data collection
- Describe how conducting interviews are an important source of data collection
- Explain projective method as a tool of data collection
- Discuss how case studies and content analysis are important sources of data collection

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Check Your Progress

8. What is a schedule?
9. When is the interview schedule used?

3.2 INTERVIEW

One of the main methods of data collection is conducting interviews. It takes place as a two-way conversation between the researcher and the respondent, whereby information is gathered by asking topic related questions.

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We learn not only from the respondents' responses but also his/her gestures, facial expressions and pauses. Interviewing can be conducted either face-to-face or over the telephone by skilled personnel by using a structured schedule or an unstructured guide.

According to Rummel J. Francis: '*The interview method of collecting data requires the actual physical proximity of two or more persons, and generally requires that all the normal channels of communication be open to their use. It is necessary to see one another, to hear each other's voices, to understand one another's language, and to use all that is psychologically inherent in physical proximity. It usually entails a non-reciprocal relation between the individuals concerned. One party desires to get information from another—one party interviews the other—for a particular purpose.*'

Theodore L. Torgerson has stated that the interview method of study extends certain aspects of the observational technique.

Thus, the interview method permits the gathering of development data to supplement the cross-sectional data obtained from observations. The interviewer can probe into the casual factors, determine attitudes, discover when the problem started, enlist the interviewee in an analysis of his own problem and secure his support of the therapy to be applied.

3.2.1 Types of Interviews

The different types of interviews are as follows:

- **Group interview:** A proper setting for group interviews requires a group of not more than 10 to 12 persons with some social, intellectual, and educational homogeneity, which ensures effective participation by all. For a full spontaneous participation of all, it is better to arrange a circular seating arrangement.
- **Diagnostic interview:** Its purpose is to locate the possible causes of an individual's problems, getting information about his past history, family relations and personal adjustment problem.
- **Clinical interview:** Such an interview follows after the diagnostic interview. It is a means of introducing the patient to therapy.
- **Research interview:** Research interview is aimed at getting information required by the investigator to test his/her hypothesis or solve his/her problems of historical, experimental, survey or clinical type.
- **Single interview or panel interviews:** For the purpose of research, a single interviewer is usually present. In case of selection and treatment purposes, panel interviews are held.
- **Directed interview:** It is structured, includes questions of the closed type and is conducted in a prepared manner.
- **Non-directive interview:** It includes questions of the open-ended form and allows much freedom to the interviewee to talk freely about the problem under study.
- **Focused interview:** It aims at finding out the responses of individuals to exact events or experiences rather than on general lines of enquiry.

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- **Depth interview:** It is an intensive and searching kind of interview. It emphasizes certain psychological and social factors relating to attitudes, emotions or convictions.

It may be observed that on occasions several types are used to obtain the needed information.

Other classifications of interviews are as follows:

- Intake interview, as the initial stage in clinic and guidance centres
- Brief talk contacts as in schools and recreation centres
- Single hour interview
- Clinical psychological interview, stressing psychotherapeutic counselling and utilizing case history data and active participation by the counsellor in the re-education of the client
- Psychiatric interviews, similar to psychological counselling, but varying with the personality and philosophical orientation of the individual worker and with the setting in which used
- Psychoanalytic interviews
- Interview form of test
- Group interviews for selecting applicants for special course
- Research interview

3.2.2 Important Elements of Research Interview

The important elements of research interview are as follows:

1. Preparation for Research Interview

- Decide the category and number of persons that you would like to interview.
- Have a clear conception of the purpose and the information required.
- Prepare a clear outline, a schedule or a checklist of the best sequence of questions that will systematically bring out the desired information.
- Decide the type of interview that you are going to use, i.e., structured or non-structured interview.
- Have a well thought-out plan for recording responses.
- Fix up the time well in advance.
- Procure the tools to be used in recording responses.

2. Executing an Interview

- Be friendly and courteous and put the respondent at ease so that he talks freely.
- Listen patiently to all opinions and never show surprise or disapproval to a respondent's answer.
- Assume an interested manner towards the respondent's opinion, and as far as possible do not divulge your own.
- Keep the direction of the interview in your own hands and avoid irrelevant conversation and try to keep the respondent on track.
- Repeat your questions slowly and with proper emphasis in case respondent shows signs of failing to understand a particular question.

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3. Obtaining the Response

Perhaps the most difficult part of the job of an interviewer is to obtain a specific, complete response. People can often be evasive and answer 'do not know' if they do not want to make an effort of thinking. They can also misunderstand the question and answer incorrectly in which case the interviewer would have to probe more deeply.

An interviewer should be skilled in the technique as only then can the interviewer gauge whether the answers are incomplete or non-specific. Each interviewer must fully understand the motive behind asking particular questions and whether the answer is giving the information required. The interviewer should form the habit of asking himself/herself, 'Does that completely answer the question that I just asked?'

Throughout, the interviewer must be extremely careful as to not suggest a possible reply. The interviewer should always content himself with mere repetition (if the question is not understood to answer).

4. Reporting the Response

There are two chief means of recording opinion during an interview. If the question is preceded, the interviewer only needs check a box or circle or code, or otherwise indicate which code comes closest to the respondent's opinion. If the question is not preceded, the interviewer is expected to record the response verbatim.

The following points may be kept in view in this respect:

- Quote the respondents directly, just as if the interviewers were newspaper reporters taking down the statement of an important official without paraphrasing the reply, summarizing it in the interviewer's own words, 'polishing up' any slang or correcting bad grammar that distorts the respondent's meaning and emphasis.
- Ask the respondent to wait until the interviewer gets down 'that last thought'.
- Do not write as soon as you have asked the question and do not write while the respondent talks. Wait until the response is completed.
- Use common abbreviations.
- Do not record and evaluate the responses simultaneously.

5. Closing the Interview

It should be accompanied by an expression of thanks giving recognition to the respondent's generosity in sparing time and effort.

6. Use of Tape Recorder in Interview

- It reduces the tendency of the interviewer to make an unconscious selection of data favouring the interviewer's biases.
- The tape recorded data can be played more than once, and thus it permits a thorough study of the data.
- Tape recorder speeds up the interview process.
- Tape recorder permits the recording of some gestures.
- The tape recorder permits the interviewer to devote full attention to the respondent.
- No verbal productions are lost in a tape recorded interview.
- Other things being equal, the interviewer who uses a tape recorder is able to obtain more interviews during a given time period than an interviewer who takes

notes or attempts to reconstruct the interview from memory after the interview has been completed.

3.2.3 Indifferent Attitude of the Respondent and the Role of the Research Worker

It is observed that the research worker is likely to encounter several problems arising out of the apathy of the respondents. In such a situation, the following points may be kept in view:

- When the respondent is really busy and has no time, the field worker may request for a more convenient time.
- When the respondent simply wants to avoid the interview and is not inclined to be bothered about it, the field worker should try to explain to the respondent the importance of the study, and how the respondent's own response is of material value in the case.
- When the respondent is afraid to give the interview as it affects his boss or the party to which he belongs or any other cause which is likely to harm his interest, the field worker must assure the respondent that absolute secrecy would be maintained by the researcher and the organization.
- When the respondent does not hold a high opinion about the outcome of such interviews in general, or has a poor opinion about the research organization or institution conducting it, it is the duty of the research worker at such times to explain to the respondent the importance of the problem, and convince the respondent regarding the status of the research body.
- When the respondent is suspicious and he thinks that the enquiry is either from the income tax department or some other secret agency, at such times he may generally ask such questions. Who are you? Who told you our name? Have you interviewed the neighbour? etc. The research worker should try to eliminate the respondent suspicion. A letter of authority, the letter head or the seal of the research body would prove to be useful on such occasions.
- When the respondent is unsocial or otherwise confined to his own family (such a tendency is mostly found in the case of newly married couples), the research worker at such times will try to create the respondent's interest in the subject of investigation.
- When the respondent is too haughty and thinks it below his dignity to grant an interview to petty research workers, the investigator should get a letter of introduction from an influential person.

3.2.4 Advantages and Disadvantages of Interview Method

The advantages of interview method over other techniques are as follows:

- A well-trained interviewer can obtain more data and greater clarity by altering the interview situation. This cannot be done in a questionnaire.
- An interview permits the research worker to follow-up leads as contrasted with the questionnaire.
- Questionnaires are often shallow and they fail to dig deeply enough to provide a true picture of opinions and feelings. The interview situation usually permits much greater depth.

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- It is possible for a skilled interviewer to obtain significant information through motivating the subject and maintaining rapport, other methods do not permit such a situation.
- The respondents when interviewed may reveal information of a confidential nature which they would not like to record in a questionnaire.
- Interview technique can be used in the case of children and illiterate persons who cannot express themselves in writing. This is not possible in a questionnaire.
- The percentage of response is much higher than in case of a mailed questionnaire.
- The field worker is personally present to remove any doubt or suspicion regarding the nature of enquiry or meaning of any question or term used. The answers are, therefore, not biased because of any misunderstanding.
- The field worker may create a friendly atmosphere for proper response. The field worker may start a discussion, and develop the interest of the respondent before showing the schedule. A right atmosphere is very conducive for getting correct replies.
- The interviewee may disclose personal and confidential information which the interviewee would not ordinarily place in writing on paper. The interviewee may need the stimulation of personal contacts in order to be drawn out.
- The interview enables the investigator to follow-up leads and to take advantage of small clues, in dealing with complex topics and questions.
- The interview permits an exchange of ideas and information. It permits 'give and take'.
- It is useful in the case of some categories of persons. The interview enables the interviewee to deal with young children, illiterates and those with limited intelligence or who's state of mind is not quite normal.
- Interviews are also used for pupil counselling, for selection of candidates for instructional purposes, for employment, for psychiatric work, etc.
- The respondent does not feel tired or bored. Supplementary questions may be put to enliven the whole discussion.
- The difficulties of bad handwriting of the respondent, use of pencil, etc., are also avoided as every schedule is filled in by the interviewer.
- A probe into life pattern is possible. The personal contact with the respondent enables the field worker to probe more deeply into the character, living conditions and general life pattern of the respondent. These factors have a great bearing in understanding the background of any reply.
- The information gathered through interviews has been found to be fairly reliable.
- It is possible for the interviewer to probe into attitudes, discover the origin of the problem, etc.
- Interview technique is very close to the teacher. It is generally accepted that no research technique is as close to the teacher's work as the interview.
- Sometimes interviews can be held at suitable intervals to trace the development of behaviour and attitudes.
- Interviews can be used for student counselling, occupational adjustment, selection of candidates for educational courses, etc.

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- Interviews can be used for all kinds of research methods—normative, historical, experimental, case studies and clinical studies.
- Interview techniques provide scope for cross questioning.
- This technique allows the interviewer to remain in command of the situation throughout the investigation.
- Through the respondent's incidental comments, facial expression, bodily movements, gestures, etc., an interviewer can acquire information that could not be obtained easily by other means.
- Cross questioning by the interviewer can enable him/her to judge the sincerity, frankness and insight of the interviewee.

Disadvantages of Interview Method

The method of interview, in spite of its numerous advantages has the following limitations:

- **Very costly:** It is a very costly affair. The cost per case is much higher in this method than in case of mailed questionnaires. Generally speaking, the cost per questionnaire is much less than the cost per interview. A large number of field workers may have to be engaged and trained in the work of collection of data. All this entails a lot of expenditure and a research worker with limited financial means finds it very difficult to adopt this method.
- **Biased information:** The presence of the field worker while encouraging the respondent to reply, may also introduce a source of bias in the interview. At times the opinion of the respondent is influenced by the field worker and his replies may not be based on what he thinks to be correct but what he thinks the investigator wants.
- **Time consuming:** It is a time consuming technique as there is no guarantee how much time each interview can take, since the questions have to be explained, interviewees have to be assured and the information extracted.
- **Expertness required:** It requires a high level of expertise to extract information from the interviewee who may be hesitant to part with this knowledge.

Among the important qualities to be possessed by an interviewer are objectivity, insight and sensitivity.

3.3 PROJECTIVE TECHNIQUES

The idea of projecting oneself or one's feelings on ambiguous objects is the basic assumption in projective techniques. The 19th century saw the origin of these techniques in clinical and developmental psychology. However, it was after second World War that these techniques were adopted for use in advertising agencies and market research firms. Ernest Dichter (1960) was one of the pioneers who used these techniques in consumer and motivational research. Consumer surveys and research were considered incomplete if they did not make use of projective techniques (Henry, 1956; Rogers and Beal, 1958; Newman, 1957). However, with the advent of technology and computer-aided analysis, these subjective methods were generally forgotten.

It was only in the 1990s that work done on semiotics, in-depth interviews and renewed interest in human emotions and needs, especially the latent needs and brand personalities led to resurgence of these methods (Belk et al., 1997 and Zaltman, 1997).

Check Your Progress

10. What is the interview method of collecting data according to Rummel J. Francis?
11. What does research interview emphasize?
12. State the significance of a tape recorder while conducting an interview.

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Unlike the other approaches discussed in the unit, these methods involve indirect questioning. Instead of asking direct questions, the method involves a relatively ambiguous stimuli and indirect questions related to imaginary situations or people. The purpose of the research is to present a situation to the respondents to project their underlying needs, emotions, beliefs and attitudes. The ambiguity of the situation is non-threatening and thus a person has no hesitation in revealing his/her true inner motivations and emotions. The more the degree of ambiguity, the more is the range of responses one gets from the respondents. In the theoretical sense, projective techniques unearth beliefs, attitudes and feelings that might underlie certain behaviour or interaction situations. Thus, the respondents' attitudes are uncovered by analysing their responses to the scenarios that are deliberately constructed to stimulate responses from the right side of the brain, which is stated to be the affective side. The second premise of projective techniques is to uncover the different levels of consciousness (Freud, 1911). Generally, the structured methods look at primary motivations; however, it is the underlying latent needs which might drive the individual to behave in a certain manner. The third is to reveal data that is inhibited by socially-desirable and correct responses. Sometimes individuals hesitate to express their prejudices or feelings towards other individuals, groups or objects. Indirect and ambiguous stimuli might reveal startling results in such cases. In psychology, there are a wide variety of techniques available. These can be categorized on the basis of the conduction process. Some of these techniques are briefly discussed below.

1. Association techniques: These are the most frequently used methods in management research. They essentially involve presenting a stimulus to the respondent and he needs to respond with the first thing that comes to his mind. The method is essentially borrowed from clinical psychology, the most well-known being the Rorschach Inkblot test. The set of inkblots are ambiguous in nature, however, these are standardized blots symmetrical in nature. The first few are in shades of black and white and the others are coloured. Each of these is presented in a sequence to the consumer. The responses, time taken, the direction in which the blot is turned, are noted. There are norms and scores available for evaluating the personality of the individual. They require a considerable amount of training in conduction and interpretation and, thus, are not commonly used. A technique based on the same principle is called the word association test. This found its earliest uses in 1936 by Houghton for advertising evaluations. The technique involves presenting a group of words and the respondent needs to respond instantly with the first thing that comes to his mind. The critical words are disguised and come after a few neutral or mundane words. The idea is that the element of surprise will reveal associations that lie in the subconscious or the unconscious mind. The words which are selected to address the objectives of the study are called test words and the others are called fillers.

For example, to attest the extent of eco-friendly attitude of a community, one could have a number of words like 'environment', 'plastic', 'water', 'earth', 'tigers', 'clean', etc. These would be embedded in the fillers to see the extent to which the consumer is aware. The person's exact response is either noted or recorded; in case one is doing this manually, it is critical to note the reaction time of the person, as hesitating would mean that there was a latent response which the person was not comfortable about revealing. In this case, the response needs to be discarded or evaluated through other responses. Another variation

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of the test used in individual and brand personality is to ask the person to think of an animal/object that one associates with a brand or a person.

For example, the word 'wall' is associated with a famous Indian cricketer.

The obtained answers are measured in terms of:

- Similarity of responses given to a test word by a number of respondents
- Unique responses
- Time taken for a response
- Non-response

In case a person does not respond at all, it is assumed that there is emotional block hampering. A person's attitudes and feelings related to the topic can be measured by this technique.

Illustration: Talking to elders: A popular pharmaceutical firm produces a range of expensive products meant for old age consumers. The company plans to use television advertising to create awareness about the products. Word association was used to study old people's attitudes towards medication and supportive therapy. Six men and six women were selected to administer the test; they were matched on income, class, age, education and current status of living with their married sons/daughters. The test words used and the responses obtained are in Table 4.1.

Table 4.1 Test Word Used and Responses Obtained

Test words	Responses		
Health	Care (3)	Bad (2)	Good (1)
Life	Difficult (2)	Relaxed (3)	Good (1)
Medicines	Necessity (4)	Prevention (2)	Avoid (1)
Walking stick	Support (3)	Avoid (2)	Carved ivory (1)
Adult diapers	Embarrassment (4)	Necessity (2)	
Treatment	In time (2)	Expensive (4)	
Bones	Weak (3)	Brittle (3)	
Death	The end (1)	Inevitable (5)	

The major responses are highlighted and reveal that the seniors are not afraid of dying, are realistic about failing health and supportive medicines or walking stick. However, they have clearly stated that they do not want to be embarrassed. Thus, talking about their health problems on a public platform and offering solutions would not be welcome. They are conscious and positive about medicines being essential, however, their dignity must be kept intact.

This research was taken as a reflection of the attitude of the elderly at large and the company does not use television advertising at all, rather it relies on doctors and chemists to push the product.

An extension of the association technique is the completion technique.

2. Completion techniques: These techniques involve presenting an incomplete object to the respondent, which can be completed by the respondent in any way.

Old age is

Sentence completion is the most popular of all projective techniques and is inevitably used in almost all measuring instruments as an open-ended question. However, the incomplete sentence of a typical projective test needs to be more ambiguous than a typical open-ended question. Generally, they are given a single word or phrase and asked to fill it in, for example:

Working at IBM is. Or

McDonald is.

Another extension of the technique is story completion. Here, the individual is given an incomplete story or idea. One provides a backdrop and a background for a possible topic. However, the possible end is left open-ended. The subject is supposed to complete the story and provide a conclusion. The theoretical assumption is that the completion of the story/sentence reflects the underlying attitude and personality traits of the person.

3. Construction techniques: These techniques might appear similar to completion technique, however here, the focus is on the completed object, which could be a story, a picture, a dialogue or a description. Here again, the level of ambiguity and scope for letting loose the respondents' imagination is vast.

Clinical psychology has a whole range of construction techniques, but here we will refer only to the ones which are actively used in business research. These are:

- **Story construction tests:** The most often used test is the Thematic Apperception Test (TAT) developed by Henry (1956). There are a total of 20 pictures, most of them having the profile of a man, woman or child either clearly visible or diffused. The pictures are given to the respondent and he is asked about what is happening here? What happened or led to this? What do you think is going to happen now? The assumption is, that in most instances the person puts himself into the shoes of the protagonist and actually indicates how he would respond in the given situation. The story gives an indication of the person's personality and need structure. For example, an individual may be characterized as extroverted, or a pessimistic or high on creativity or high on dogmatism, and so on. The TAT is used extensively, in parts (a few selected pictures) or in totality in a number of organizations, including the armed forces. The usage is majorly done for selection and recruitment process.

- **Cartoon tests:** The tests make use of animated characters in a particular situation (Masling, 1952). They are considered ambiguous as the figures bear no resemblance to a living being and thus are considered non-threatening. The cartoon usually has a picture that has two or more characters talking to each other; usually the statement/question by one character is denoted and one needs to fill in the response made by the other character. The picture has a direct relation with the topic under study and is assumed to reveal the respondent's attitude, feelings or intended behaviour. They are one of the easiest to administer, analyse and score.

4. Choice or ordering techniques: These techniques involve presenting the respondents with an assortment of stimuli—in the form of pictures or

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statements—related to the study topic. The subject is supposed to sort them into categories, based on the study instructions given. For example, in a study on measuring desired supervisor-subordinate relations, a set of Tom and Jerry cartoon pictures were used, some in which Tom is overpowering Jerry, some neutral pictures where they are carrying out their respective tasks and others where Jerry, the mouse outwits Tom. The respondent needs to sort them into good, neutral and bad picture piles.

These sets are not similar to cartoon tests as they do not require completion or closure. These require sorting, in order to measure any stereotyped or typical behaviour of the respondent. The pictures that have been given to the person carry an expert score (that is they have been categorized on a rating scale to reveal different degrees of the attitude). The higher the selection of pictures with extreme scores, the more rigid is the respondent's attitude and in case modification or enhancement is required, the task would be more difficult. The test is used to measure attitudes and the strength of the existing attitude.

5. **Expressive techniques:** The focus on the other five techniques was on the end result or the output. However, in expressive techniques, the method or means or expressions used in attempting the exercise are significant. The subject needs to express not his/her own feelings and opinions but those of the protagonist(s) in a given verbal or visual situation. Again the presumption is that people are uncomfortable giving personal opinion on a sensitive issue, but do not mind or are less inhibitive when it is in the third person. There are many examples: Clay modelling—here the emphasis is on the manner in which the person uses or works with clay and not on the end result.

Psychodrama (Dichter, 1964)—here the person needs to take on the roles of living or inanimate object, like a brand(s) and carry out a dialogue.

Object personification (Vicary, 1951)—here the person personifies an inanimate object/brand/organization and assigns it human traits.

Role playing is another technique that is used in business research. The respondents are asked to play the role or assume the behaviour of someone else. The details about the setting are given to the subject(s) and they are asked to take on different roles and enact the situation.

The third-person technique is again considered harmless as here, the respondent is presented with a verbal or visual situation and needs to express what might be the person's beliefs and attitudes. The person may be a friend, neighbour, colleague, or a 'typical' person. Asking the individual to respond in the third person reduces the social pressure, especially when the discussion or study is about a sensitive issue. For example, no respondent even when assured of anonymity, would own up to being open to an extra-marital affair; however, if asked whether a colleague/friend/person in his/her age group might show an inclination for the same, the answers might be starkly different.

3.3.1 Evaluating Projective Techniques

As can be seen from the description of the techniques available to the researcher, the projective techniques are unsurpassed in revealing latent yet significant responses. These would not surface through a more structured or standardized techniques like focus group discussions or interviews. The ambiguity and the third-person setting give the respondent a sufficient camouflage and confidence to feel comfortable about revealing attitudes, interests and beliefs about sensitive issues. There might also be instances where the

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respondent is unaware of his underlying motivations, beliefs and attitudes that are operating at a subconscious level. Projective techniques are helpful in unearthing these with considerable ease and expertise.

However, this richness of data also has its disadvantages. The conduction and analysis of the technique requires specialists and trained professionals. This is also the reason why the tests are expensive and time consuming in usage. Most of the techniques require varying degrees of ambiguity and the higher the ambiguity, the richer is the response. But, at the same time, it makes the analysis and interpretation difficult and subjective. Role playing and psychodrama require interaction and participation by the subject, thus the person who volunteers to participate in the study, might be unusual in some way. Therefore, generalizing the results of the analysis might be subject to error.

3.4 CASE STUDY AND CONTENT ANALYSIS

Case studies are discussions of individual cases under topics of discussion which help researchers to corroborate known facts proved previously through research. Social scientists, in particular, used the case study method to conduct research for many years. A variety of disciplines used this method of research to corroborate their findings in real life situations. Researcher Robert K. Yin defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (Yin, 1984, p. 23).

However, critics feel that the case study method is not reliable enough for establishing a rule or principle as it portrays only a minuscule population which forms not even a part of the entire population. Some feel that this method is only a reliable exploratory tool. Literature supports reports of carefully planned and crafted studies of the case study method. Robert E. Stake, Helen Simmons, and Robert Yin are renowned researchers who have written about the utility of case studies in social sciences. They have prescribed six steps that should be used when utilizing the case study method. These are:

- Determine and define the research questions
- Select the cases and determine data gathering and analysis techniques
- Prepare to collect the data
- Collect data in the field
- Evaluate and analyse the data
- Prepare the report

1. Determine and define the research questions

Before a case study research is undertaken, cementing a research focus is important so that the researcher can refer to it during the course of study. The research object is often a person, an organizational policy, a group of people, etc. A number of data gathering methods are used by the researcher who studies every case study in depth. The researcher reads the available literature to understand where the topic stands in terms of prior research and undertakes a thorough planning before embarking on the actual case study. Literature and previous studies help him to decide where to look for evidence to corroborate his findings on the concerned topic. These help in designing the blueprint for the current study.

Check Your Progress

13. Which century saw the origin of projective techniques in clinical and developmental psychology?
14. Why is the cartoon test considered to be ambiguous in nature?

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2. Select the cases and determine data gathering and analysis techniques

While designing the study, researchers finalize the approaches, methods of data extraction and data gathering for real-life cases that they need to study. While using multiple cases, each case is treated as a single case. The conclusions of these cases can then be utilized for underlining various facets of their study. The researchers need to discriminate positively for the case study that they want to utilize for corroborating their findings. Researchers should decide whether they want to study cases that are conventional or extraordinary while conducting the study. In case they are hesitant, they may go back to the purpose of the study that they had enumerated before beginning the research. The decision to choose a single or multiple case studies is an important one, while a single case study may be examined for analysing more than one inherent principle. These types of case studies involve two different levels of analysis which increases the complexity of data collected. Multiple sources and techniques in the data collecting process is a key strength of the case study method. Researchers need to determine what data they would wish to gather by examining a case and how to analyse the data collection. The tools they may use are interviews, surveys, documentation review, observation and collection of physical artifacts. During the design phase of the research, researchers should make sure that the study ensures construct validity, external validity, internal validity and reliability. Researchers need to use the correct measures for ensuring construct validity. Internal validity is ensured when the conditions may be used over and over again to prove validity of the case. External validity is ensured when the findings may be generalized beyond the case or cases. A case study is said to be more externally valid when it can withstand more people, places and procedures. Techniques known as within-case examination and cross-case examination and literature review help ensure the validity of the case.

3. Prepare to collect the data

Researchers using the case study method generally gather a large amount of data from a number of sources. Organizing this data in a systematic manner is a challenge in itself. Researchers should plan ahead to prevent getting overwhelmed by this data. They might even lose sight of the original purpose of gathering the data. Researchers sort, categorize, store and retrieve data for analysis with the help of databases. Extraordinary cases help researchers by providing an efficient training programme, establishing proper protocols and conducting a pilot study before entering fieldwork. The training programme covers the concept to be studied, terminology, processes, methods, etc. The researchers also learn the application of techniques used in the study. In order to gather data from the interviewed population, researchers have to be skilled enough to retain or record the interviews without the gadget coming in the interviewee's way. Researchers should know how to steer conversation towards the questions they intend to ask next. They should be trained in analysing body language and interpret answers not expected by them. Researchers need to read between the lines and in case the topic is sensitive, understand a respondent's hesitation and silence. Researchers should not feel threatened by missed appointments and lack of space for holding the interview or unexpected turns of events during the interview; for example, a respondent may break down while answering a sensitive question. Researchers should be humane, understanding and flexible in approach. They should revisit the research design that they had created before starting the case studies and make changes as and when required.

4. Collect data in the field

Researchers should be trained to collect and store multiple sources of evidence in various formats while going about studying the case. Though case study research is flexible, any

change that comes up needs to be documented carefully. The multiple storing of data is required so that converging lines of enquiry and patterns may be discovered. Field notes may be used for recording intuitions, hunches, feelings, and also for documenting the work in progress. Illustrations, anecdotes and special records may be written in the field notes so that the researcher may refer to it when making case study reports. The data and the field notes should be kept separately for analysis. The researcher needs to document, classify and cross-refer all evidence so that these could be efficiently recalled for examination and sorting as and when required.

5. Evaluate and analyse the data

The raw data gathered by the researchers need to be interpreted at different levels to find linkages between the objectives of the research and the outcome of studying the case. Researchers must remain open to new insights and opportunities throughout the evaluation and analysis process. They can triangulate data with the help of different techniques and collection methods inherent to the case study method. Researchers will be provided with new insights and conflicting data by case studies which are extraordinary. They would need to categorize, tabulate and combine data to address the purpose of the study. In order to cross-check data collected, short, repeated interviews need to be conducted. Placing information into arrays, creating matrices of categories, making flow charts or other displays, etc., may be used by the researcher as specific techniques. The quantitative data collected may be used to corroborate the qualitative data collected during interviews. Many research organizations may also use multiple researchers to verify the data collected. When these multiple observations converge, researchers may become more confident of their findings. Conflicting observations need in-depth study of the findings. The cross-case search technique requires that researchers look at data from different angles and do not reach a premature conclusion. Across all cases investigated, the cross-case search divides data by type. When a pattern from one data is vouched for by another data, the finding is stronger. When these evidences do not form a data, a further probe is essential.

6. Prepare the report

An exemplary case study report transforms the manner in which a complex issue is presented. Case study reports are often published so that readers may apply the experience in their real-life situations. Case studies mostly display evidences to gain the confidence of the readers. Researchers also underline the boundaries of the case and draw the attention of the readers to conflicting propositions. Many researchers present case study reports in the form of a chronological account. Some may treat a case as a fresh chapter. Once a report is completed, the researcher should always edit and examine it for loopholes. Representative audience group is used for comments and criticisms and the valid criticisms are incorporated in the next draft. Since case studies involve multiple sources of data, or may include more than one case within a study, they often become complex. The case study method is generally used by researchers from various disciplines to build upon a theory, to produce a new theory, to challenge or dispute a theory, to explore new horizons, to apply solutions to situations, to describe a phenomenon, etc. There are a number of advantages of the case-study method. These are: applicability to real life situations, to contemporary social situations and easy accessibility to its published reports. Case studies help common man understand a complex theory through easy, real-life situations that are used to exemplify the principle being discussed.

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Some examples of case studies are given below.

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Case Study 4.1
Danish International (C)

Shameem was returning back after an exhaustive session with P&Y consultants. The lady consultant had reviewed the information that he had provided about the working atmosphere at Danish.

The consultant had also conducted a couple of visits to the office and had submitted her report. She had pointed out clearly that the indifference she had observed was a matter of serious concern. No benchmarked data would help as the problem was peculiar to the unit. She had advised that the attitude and emotions of the members would have to be analysed. She had told Shameem that they had a couple of standardized tests that she could administer and prepare an action plan.

Shameem was not convinced as he knew that the issue needed to be handled at a different level. Then he remembered the lady he had met from Transcend, the research beyond group, who had made a presentation yesterday about seeking the latent to work on the manifest. He recalled the book that he had read by Sigmund Freud and how it had made a lot of sense about why people reacted in a certain way. Yes, there was merit in the surreal. But this was business, should he go for the subjective?

He reached office, read the P & Y report, thought about what he believed and picked up his phone and made the call

1. Who do you think he called? Why?
2. Are there any alternative technique(s) he could use? Explain by providing a template for collecting the information.

Case Study 4.2
What's in a Car?

Shridhar from Bengaluru, had developed an electric car—VERVE (It is a fully automatic, no clutch, no gears), two-door hatchback, easily seating two adults and two children with a small turning radius of just 3.5 metres. It runs on batteries and as compared to other electric vehicles, has an onboard charger to facilitate easy charging which can be carried out by plugging into any 15 amp socket at home or work. A full battery charge takes less than seven hours and gives a range of 80 km. In a quick-charge mode (two-and-a-half hours) 80 per cent charge is attained which is good enough for 65 km. A full charge consumes just about 9 units of electricity. Somehow the product did not take off the way he expected. He is contemplating about repositioning the car. As he stood looking at the prototype, he knew that there were a couple of questions to which he must find answers before he undertook the repositioning exercise. Who should be the target segment—old people, young students just going to college, housewives, or customers relate to? Was a new name or punch-line required? What kind of image would these be undertaken? Hyundai had done it with Shah Rukh Khan, should he also consider a celebrity? If yes who?

1. What kind of research study should Shridhar undertake? Define the objectives of his research.
2. Do the stated objectives have scope for a qualitative research?
3. Which method(s) would you recommend and why?
4. Can you construct a template for conducting the study? What element would you advice Shridhar to keep in mind, and why?

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Case Study 4.3

Candy-Ho! (A)

The evening sky was overcast. Looking out from the window of his office on the 12th floor, Sagar Ahuja could still see the etched out skyline of New Delhi. Sighing wearily, he turned his thoughts back to his comfortable job at Indore where he was marketing spicy Gujarati namkeen, and wondered what on earth he was doing in an alien city whose complexities and multiplicities seemed to defy any description to his simple mind. Having been a star performer at his regional office, and responsible for the launch of two revolutionary products for his company, he had been approached by head hunters to join Nefertiti—the famous global confectionary company in India. As his first assignment he had been given the job of swimming in deep waters and launch a new bubblegum that had been developed.

The Product

It was a sugar-coated, round-shaped, centre-filled liquid gel bubblegum in two flavours—strawberry and blueberry. The product was packed in mono pillow packs and was going to be priced at ₹1.00 per piece. The name of the product was to be *Moondrops*.

He had in front of him the results of a research conducted by Offspring Research Agency—a market research company specializing in child research studies.

Research Objectives

- To understand the meaning of a candy/bubblegum in a child's life.
- To analyse the response to two advertisements that had been created to market the bubblegum.
- To arrive at a decision on how to position and market the gum, and the advertisement that would be more suitable for the purpose.

Weighted base: Those whose favourite category is bubblegum and chewing gum	771
Like the taste/like to eat it	87
Soft to chew	26
Easily available everywhere	18
Helps in passing time/kills boredom/overcomes feeling of restlessness	18
Freshens breath	17
Taste you never get tired of/can keep eating repeatedly	11
Has variety of flavours	11
Not costly/Does not cost much	11
Improves taste of mouth/removes bad taste in mouth	10
Can be had any time of the day	10
Makes me feel happy/fun to have	9
Liked by my friends	7
Worth the price I pay for it/value for money	6

Data Source: Primary Research carried out by Nefertiti Company. Random Interviews with SEC A and B consumers equally split between male and female respondents, in the top eight cities, total sample size was 1,000 respondents.

FGD Analysis

The result of 24 focus groups across age groups and metros revealed the following data from a projective technique that involved personifying the bubblegum. The responses are across age groups and are in the decreasing order of most stated.

- I want to play with my bubblegum
- The bubblegum has lots of friends— lot of names
- The bubblegum is very naughty—no one can catch him

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- The bubblegum is my friend and helps me fight the older kids
- If all bubblegums were to fight, my bubblegum would win
- If I am feeling sad, my bubblegum would make me laugh
- My bubblegum is the bravest

Post the FGC. Select respondents (children) were shown two advertisements. reaction to these are listed below:

(a) The Race Ad

The storyboard was that at a school annual function race, where the 'hero' of the story deliberately loses the race and comes third instead of first to get the third prize of two big jars of Moondrops. Followed by the punchline 'Moondrops ke liye kuch bhi ho sakta hai'.

Reactions (With loud laughter)

All the kids were involved with the ad while viewing it and liked the storyboard with comments such as:

- 'It was interesting'.
- 'Main soch raha tha ki yeh ladka ruk kyon gaya'. (I was wondering why the boy stopped.)

The children enjoyed when the kid smiles with two big Moondrop jars in his hand.

- 'Jab who ladka race mein finish line ke pas aake ruk jata hai'. (When the boy stops near the finish line.)
- 'Jab use third prize Moondrops milta hai aur use doorse do first and second prize wale ladke ghoor ke dekhte hain'. (When he gets Moondrops as the third prize and the first and second prize winners stare at him.)
- We feel proud to win a race even if we do not get any prize.'
- 'If I win the race then Mummy and Daddy will anyway buy me Moondrops'.
- 'Mein sirf Moondrops ke liye race nahin haroonga'. (I'll never lose a race just for Moondrops.)
- 'Woh ladka buddhoo tha, kyonki usne jeeti hui race har di.' (That boy was a fool, as he lost a race that he was winning.)

The kids were surprised when the child stops just near the finish line and when the other two children are surprised and shocked that he is getting the Moondrops as the third prize.

Empathy/Relatability

Not many of the kids could relate to the ad. They did not see themselves doing the same just for getting two jars of Moondrops, the underlying reason being that they had to lose (If they could finish first, then why finish third).

(b) Kitty Party Ad

The story starts with a child returning from school to see a kitty party in progress at home (lots of fat aunties chatting and eating samosas and pakoras). One fat aunty pulls his cheek affectionately and much to his disgust, kisses him. He then feels happy when his reward is a Moondrop from the fat aunty. Seeing that he gets a Moondrop when the aunty kisses him, he plays a prank on all the aunties by jumping on the table and the sofa and kissing all the aunties there. His reward is lots of Moondrops. Followed by the punchline, 'Moondrops ke liye kuch bhi ho sakta hai'.

Reactions

The scene where the fat aunty kisses the boy and they show her fat lips. The boy kissing the aunties by jumping on the sofa, on the table and by hugging an aunty.

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- 'Jab who moti aunty ke lips dikhate hain'. (When they show the fat aunty's lips.)
- 'Jab who moti aunty use kiss karti hain'. (When the fat aunty kisses him.)
- 'Jab who sari aunties ko kiss karta hai aur aunties hairan ho jati hain'. (When he surprises all the aunties by kissing them.)

Likeability

- 'Dekhne mein maza aaya' (It was fun to watch.)
- 'Jab usne aunties ko kiss kiya to bahut accha laga' (It was really good to see him kissing the aunties.)
- 'Aunty ka face itna funny tha, unko dekh ke hasi aayi' (Aunty's face was so funny that we felt like laughing.)

Empathy/Relatability

- 'Chii, hum naughty nahin hain' (Ugh, we are not naughty.)
- 'Aunty ko kiss nahin karenge, beizzati hoti hai.' (Will not kiss the aunty, it is insulting.)
- 'Ganda lagta hai'. (Don't like it.)
- 'Aunty ko kis karenge to manjan karna padega'. (Will have to brush teeth if we kiss aunty.)

1. Can you help Mr Ahuja arrive at a decision?

3.4.1 Content Analysis

This technique involves studying a previously recorded or reported communication and systematically and objectively breaking it up into more manageable units that are related to the topic under study. It is peculiar in its nature that it is classified as a primary data collection technique and yet makes use of previously produced or secondary data. However, since the analysis is original, first hand and problem specific, it is categorized under primary methods. Some researchers classify it under observation methods, the reason being that in this, one is also analysing the communication in order to measure or infer about variables. The only difference being that one analyses communication that is ex-post facto rather than live. One can content-analyse letters, diaries, minutes of meetings, articles, audio and video recordings. The method is structured and systematic and thus of considerable credibility.

The first step involves defining U, or the *universe of content*. For example, in the case of Ritu, who wants to know what makes the young Indian tick, she could make use of the blogs written by youngsters, essays and reality shows featuring the age group. She decides that she wants to assess value systems, attitudes towards others/elders, clarity of life goal and peer influences. This step is extremely critical as this indicates the assumptions or hypotheses the researcher might have formulated.

This universe can be reported in any of five different formats (Berelson, 1954). The smallest reported unit could be a *word*. This is especially useful as it can be easily subjected to a computer analysis. In Ritu's case, the values that she wants to evaluate are individualistic or collectivistic, aggressive or compliant. Thus, she can sift the communication and place words such as 'I' or 'we' under the respective heads. Words like 'hate' 'dislike' go under aggression and 'alright' 'fine' 'maybe not so good' for complacency. Then counts and frequencies are calculated to arrive at certain conclusions.

The next level is a *theme*. This is very useful but, a little difficult to quantify as this involves reporting the propositions and sentences or events as representing a theme.

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For example, disrespect towards elders is the theme and one picks out the following as a representative: a young teen's blog which says *my old man (father) has gone senile and needs to be sent to the looney bin for expecting me to become a space scientist, just because he could not become one.....*

This categorization becomes more complex as the element of observer's bias comes into play. Thus, this kind of analysis could be extremely useful when carried out by an expert. However, in the case of an untrained analyst, the reliability and validity of the findings would be questionable.

The other units are *characters* and *space and time measures*. The character refers to the person producing the communication, for example the young teenager writing the blog. Space and time are more related to the physical format, i.e., the number of pages used, the length of the communication and the duration of the communication.

The last unit is the *item*, which is more Gestaltian in nature and refers to categorizing the entire communication as say 'responsible and respectful' or 'aggressive and amoral'. As in the case of theme, this categorization is equally complex as the observer's bias is likely to be high. Thus, to ensure the reliability of the findings, one may ask another coder to evaluate the same data. Cohen (1960) states the measuring of the percentage of agreement between the two analyses by the following formula:

$$K = \frac{\text{Pr}(a) - \text{Pr}(e)}{1 - \text{Pr}(e)}$$

Here, Pr(a) is the relative observed agreement between the two raters. Pr(e) is the probability that this is due to chance. If the two raters are in complete agreement, then Kappa is 1. If there is no agreement, then Kappa = 0, 0.21-0.40 is fair, 0.41-0.80 is good and 0.81-1.00 is considered excellent.

Content analysis of large volumes becomes tedious and prone to error if handled by humans. Thus, there are various computer programmes available that can assist in the process. For computers running on Windows, one can use TEXTPACK, this is a dictionary word approach, where it can tag defined words for word frequency by sorting them alphabetically or by frequencies. Open-ended questions can be sorted by a programme called Verbastat (generally used by corporate users) or Statpac, which has an automatic coding module and is of considerable use to individual researchers.

Content analysis is a very useful technique when one has a large quantity of text as data and it needs to be structured in order to arrive at some definite conclusions about the variables under study. Computer assistance has greatly aided in the active usage of the technique. However, it can appear too simplistic, when one reduces the whole data to counts or frequencies.

3.5 SUMMARY

In this unit, you have learnt that:

- Observations have led to some of the most important scientific discoveries in human history. Charles Darwin used his observations of animal and marine life at the Galapagos Islands to help him formulate his theory of evolution which he described in *On the Origin of Species*.
- Observation may be defined as 'a process in which one or more persons monitor some real-life situation and record pertinent occurrences'.

Check Your Progress

15. What are case studies?
16. Why do critics feel that the case study method is not reliable enough for establishing a rule or principle?
17. What does content analysis involve?

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- In the process of 'participant observation', the observer becomes more or less one of the group members and may actually participate in some activity or the other of the group.
- All observations consist of two main components, the subject and the object. The subject refers to the observer, whereas the object refers to the activity or any type of operation that is being observed.
- Observation is a costly affair. It involves lot of expenses on travelling, staying at the places where the event is taking place and purchase of sophisticated equipment.
- A questionnaire is 'a tool for research, comprising a list of questions whose answers provide information about the target group, individual or event'.
- Questionnaire that calls for short, check-mark responses are known as closed form type or restricted type. They have highly structured answers like mark a 'yes' or 'no', write a short response or check an item from a list of suggested responses.
- The open form or unrestricted questionnaire requires the respondent to answer the question in their own words.
- The three stages theory (also known as the sandwich theory) should be applied when sequencing questions. The order to be followed should be first, screening and rapport questions; second, the product specific questions; and third, demographic questions.
- Whoever administers the questionnaire, be it research staff, volunteers or whether self-administered by the respondents, it should have clear, detailed instructions.
- The respondents of a questionnaire may belong to a selected group. Therefore, the conclusions lack the kind of objectivity and representativeness essential for its validity.
- A schedule is a questionnaire containing a set of questions that are required to be answered to collect data about a particular item. A schedule is generally used in a face-to-face situation.
- Observation schedule is used to observe all the activities and record the responses of the respondents under some predefined conditions. The main idea behind examining the activities is to verify the required information.
- Data collection through a questionnaire is cheaper as compared to a schedule, as money is spent only in preparing the schedules and mailing them. In the schedule method, extra money is spent on appointing interviewers and imparting training to them.
- One of the main methods of data collection is conducting interviews. It takes place as a two-way conversation between the researcher and the respondent, whereby information is gathered by asking topic related questions.
- A proper setting for group interviews requires a group of not more than 10 to 12 persons with some social, intellectual, and educational homogeneity, which ensures effective participation by all.
- There are two chief means of recording opinion during the interview. If the question is preceded, the interviewer need only check a box or circle or code, or otherwise indicate which code comes closest to the respondent's opinion. If the question is not preceded, the interviewer is expected to record the response verbatim.

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- A proper setting for group interviews requires a group of not more than 10 to 12 persons with some social, intellectual, and educational homogeneity, which ensures effective participation by all.
- Research interview is aimed at getting information required by the investigator to test his hypothesis or solve his problems of historical, experimental, survey or clinical type.
- Perhaps the most difficult part of the job of an interviewer is to obtain a specific, complete response. People can often be evasive and answer 'do not know' if they do not want to make the effort of thinking. They can also misunderstand the question and answer incorrectly in which case the interviewer would have to probe more deeply.
- A well-trained interviewer can obtain more data and greater clarity by altering the interview situation. This cannot be done in a questionnaire.
- An interview permits the research worker to follow-up leads as contrasted with the questionnaire.
- The idea of projecting oneself or one's feelings on to ambiguous objects is the basic assumption in projective techniques. The 19th century saw the origin of these techniques in clinical and developmental psychology.
- Ernest Dichter (1960) was one of the pioneers who used these techniques in consumer and motivational research. Consumer surveys and research were considered incomplete if they did not make use of projective techniques.
- In the theoretical sense, projective techniques unearth beliefs, attitudes and feelings that might underlie certain behaviour or interaction situations.
- Cartoon tests make use of animated characters in a particular situation (Masling, 1952). They are considered ambiguous as the figures bear no resemblance to a living being and thus are considered non-threatening.
- Case studies are discussions of individual cases under topics of discussion which help researchers to corroborate known facts proved previously through research.
- Researchers using case study method generally gather a large amount of data from a number of sources. Organizing this data in a systematic manner is a challenge in itself. The researcher should plan ahead to prevent getting overwhelmed by this data.
- An exemplary case study report transforms the manner in which a complex issue is presented. Case study reports are often published so that readers may apply the experience in his or her real-life situations. The case studies mostly display evidences to gain the reader's confidence.
- Content analysis involves studying a previously recorded or reported communication and systematically and objectively breaking it up into more manageable units that are related to the topic under study.
- Content analysis of large volumes becomes tedious and prone to error if handled by humans. Thus, there are various computer programmes available that can assist in the process. For computers running on Windows, one can use TEXTPACK, this is a dictionary word approach, where it can tag defined words for word frequency by sorting them alphabetically or by frequencies.

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- Content analysis is a very useful technique when one has a large quantity of text as data and it needs to be structured in order to arrive at some definite conclusions about the variables under study.

3.6 KEY TERMS

- **Observation:** It may be defined as a process in which one or more persons monitor some real-life situation and record pertinent occurrences.
- **Questionnaire:** It is a tool for research, comprising a list of questions whose answers provide information about the target group, individual or event.
- **Schedule:** It is a questionnaire containing a set of questions that are required to be answered to collect data about a particular item; it is generally used in a face-to-face situation.
- **Case studies:** They are discussions of individual cases under topics of discussion which help researchers to corroborate known facts proved previously through research.

3.7 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Observation may be defined as 'a process in which one or more persons monitor some real-life situation and record pertinent occurrences'.
2. All observations consist of two main components, the subject and the object. The subject refers to the observer, whereas the object refers to the activity or any type of operation that is being observed.
3. The disadvantages of observation are as follows:
 - It is very difficult to establish the validity of observations.
 - Many items of observation cannot be defined.
4. A questionnaire is 'a tool for research, comprising a list of questions whose answers provide information about the target group, individual or event'.
5. Limitations of open questionnaire are as follows:
 - They are difficult to fill out.
 - The respondents may never be aware of all the possible answers.
 - They take longer to fill.
6. The three stages theory (also known as the sandwich theory) should be applied when sequencing questions. The order to be followed should be first, screening and rapport questions; second, the product specific questions; and third, demographic questions.
7. The limitations of the questionnaire method is:
 - **Limited response:** As noted earlier, this method cannot be used with illiterate or semi-illiterate groups. The number of persons who cooperate and respond to the questionnaire is very small.
 - **Lack of personal contact:** There is very little scope of personal contact in this method. In the absence of personal contact, very little can be done to persuade the respondents to fill up the questionnaire.

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8. A schedule is a questionnaire containing a set of questions that are required to be answered to collect data about a particular item. A schedule is generally used in a face-to-face situation.
9. The interview schedule is used to ask the interviewee questions and record the responses in the space provided in the questionnaire itself.
10. According to Rummel J. Francis: 'The interview method of collecting data requires the actual physical proximity of two or more persons, and generally requires that all the normal channels of communication be open to their use. It is necessary to see one another, to hear each other's voices, to understand one another's language, and to use all that is psychologically inherent in physical proximity. It usually entails a non-reciprocal relation between the individuals concerned. One party desires to get information from another—one party interviews the other—for a particular purpose.'
11. Research interview is aimed at getting information required by the investigator to test his hypothesis or solve his problems of historical, experimental, survey or clinical type.
12. A tape recorder is very helpful in an interview because:
 - It reduces the tendency of the interviewer to make an unconscious selection of data favouring his/her biases.
 - The tape recorded data can be played more than once, and thus it permits a thorough study of the data.
13. The 19th century saw the origin of these techniques in clinical and developmental psychology.
14. Cartoon tests make use of animated characters in a particular situation (Masling, 1952). They are considered ambiguous as the figures bear no resemblance to a living being and thus are considered non-threatening.
15. Case studies are discussions of individual cases under topics of discussion which help researchers to corroborate known facts proved previously through research.
16. Critics feel that the case study method is not reliable enough for establishing a rule or principle as it portrays only a minuscule population which forms not even a part of the entire population.
17. Content analysis involves studying a previously recorded or reported communication and systematically and objectively breaking it up into more manageable units that are related to the topic under study.

3.8 QUESTIONS AND EXERCISES

Short-Answer Questions

1. Differentiate between participant and non-participant observation.
2. What are the recording techniques of observation?
3. Enumerate the advantages of observation method of data collection.
4. What are the types of questionnaires?
5. List the questions that should be avoided during the preparation of a questionnaire.

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6. State the importance of the questionnaire method of data collection.
7. What are the characteristics of a good schedule?
8. What are the major differences between a schedule and questionnaire?
9. What is the interview method of data collection? What are its types?
10. How is the attitude of a respondent significant for a researcher during an interview?
11. What are projective techniques? How is it different from the other methods of data collection?
12. Write a note on the evaluation of projective techniques.
13. How do case studies help the common man?
14. What is the content analysis technique of data collection?

Long-Answer Questions

1. Explain observation schedule as a tool of data collection.
2. Discuss the concept of questionnaire as a method of data collection.
3. Assess schedule as a method of data collection. Also, assess the difference between a schedule and a questionnaire.
4. List the merits and limitations of the schedule method of data collection.
5. Critically analyse how conducting interviews are an important source of data collection.
6. 'The idea of projecting oneself or one's feelings on to ambiguous objects is the basic assumption in projective techniques.' Explain projective method as a tool of data collection.
7. How are case studies an important source of data collection? What are the steps that should be used when utilizing the case study method?
8. Describe content analysis as a technique of data collection.

3.9 FURTHER READING

- Chawla, D. and N. Sondhi. 2011. *Research Methodology*. New Delhi: Vikas Publishing House.
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UNIT 4 SCALES AND SCALING TECHNIQUES

NOTES

Structure

- 4.0 Introduction
- 4.1 Unit Objectives
- 4.2 Scaling and its Importance
- 4.3 Types of Measurement Scales
 - 4.3.1 Nominal Scale
 - 4.3.2 Ordinal Scale
 - 4.3.3 Interval Scale
 - 4.3.4 Ratio Scale
 - 4.3.5 Attitude
- 4.4 Classification of Scales
 - 4.4.1 Single Item vs Multiple Item Scale
 - 4.4.2 Comparative vs Non-Comparative Scales
 - 4.4.3 Likert Scale
 - 4.4.4 Bogardus Scale
- 4.5 Measurement Error
 - 4.5.1 Criteria for Good Measurement
- 4.6 Summary
- 4.7 Key Terms
- 4.8 Answers to 'Check Your Progress'
- 4.9 Questions and Exercises
- 4.10 Further Reading

4.0 INTRODUCTION

The term 'measurement' means assigning numbers or some other symbols to the characteristics of certain objects. When numbers are used, the researcher must have a rule for assigning a number to an observation in a way that provides an accurate description. We do not measure the object but some characteristics of it. Therefore, in research, people/consumers are not measured; what is measured only are their perceptions, attitude or any other relevant characteristics. There are two reasons for which numbers are usually assigned. First of all, numbers permit statistical analysis of the resulting data and secondly, they facilitate the communication of measurement results.

As mentioned earlier, the numbering is done based on certain rules. Therefore, the assignment of numbers to the characteristics must be isomorphic, i.e., there must be a one-to-one correspondence between the numbers and the characteristics being measured.

For example, same rupee figures should be assigned to a household with identical annual income. Only then numbers can be associated with specific characteristics of the measured object and vice versa. Further, they must not change over the objects or time. This means that the rules for a given assignment must be invariant over time or the object being measured.

Scaling is an extension of measurement. Scaling involves creating a continuum on which measurements on objects are located. Suppose you want to measure the satisfaction level towards Kingfisher Airlines and a scale of 1 to 11 is used for the said purpose. This scale indicates the degree of dissatisfaction, with 1 = extremely dissatisfied

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and 11 = extremely satisfied. Measurement is the actual assignment of a number from 1 to 11 to each respondent whereas the scaling is the process of placing the respondent on a continuum with respect to their satisfaction towards Kingfisher Airlines. In this unit, you will learn the concept of scales and scaling techniques

4.1 UNIT OBJECTIVES

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

- Define scaling
- Distinguish between the four types of measurement scales
- Describe attitude and its three components
- Discuss the various classifications of scales
- Explain Likert scale and Bogardus scale
- Discuss measurement error and explain the criteria for good measurement

4.2 SCALING AND ITS IMPORTANCE

We quite often face measurement problems in research (since we want a valid measurement but we may not obtain it), especially when the concepts to be measured are complex and abstract and we do not possess the standardized measurement tools. Alternatively, we can say that while measuring attitudes and opinions, we face a problem of their valid measurement. Similar problems may be faced by a researcher, of course in a lesser degree, while measuring physical or institutional concepts. As such, we should study some procedures which may enable us to measure abstract concepts more accurately. This brings us to the study of scaling techniques.

Meaning of Scaling

Scaling describes the procedures of assigning numbers to various degrees of opinion, attitude and other concepts. This can be done into two ways:

- Making a judgment about some characteristics of an individual and then placing him directly on a scale that has been defined in terms of that characteristics.
- Constructing questionnaires in such a way that the score obtained by the individual's responses assigns him a place on a scale.

It may be stated here that a scale is a continuum, consisting of the highest point (in terms of some characteristics e.g. preference) and the lowest point along with several intermediate points between these two extreme points. These scale-point positions are so related to each other that when the first point happens to be the highest point, the second point indicates the higher degree in terms of a given characteristics as compared to the third point and the third point indicates a higher degree as compared to the fourth and so on. Numbers for measuring the distinctions of degree in the attitudes/opinions are, thus, assigned to individuals corresponding to their scale/positions.

4.3 TYPES OF MEASUREMENT SCALES

There are four types of measurement scales—nominal, ordinal, interval and ratio scales. We will discuss each one of them in detail. The choice of the measurement scale has implications for the statistical technique to be used for data analysis.

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4.3.1 Nominal Scale

This is the lowest level of measurement. Here, numbers are assigned for the purpose of identification of the objects. Any object which is assigned a higher number is in no way superior to the one which is assigned a lower number. In the nominal scale there is a strict one-to-one correspondence between the numbers and the objects. Each number is assigned to only one object and each object has only one number assigned to it. It may be noted that the objects are divided into mutually exclusive and collectively exhaustive categories.

Examples of nominal scale:

- What is your religion?
 - (a) Hinduism
 - (b) Sikhism
 - (c) Christianity
 - (d) Islam
 - (e) Any other, (please specify)

A Hindu may be assigned a number 1, a Sikh may be assigned a number 2, a Christian may be assigned a number 3 and so on. Any religion which is assigned a higher number is in no way superior to the one which is assigned a lower number. The assignment of numbers is only for the purpose of identification. We also note that all respondents have been divided into mutually exclusive and collectively exhaustive categories. For example:

- Are you married?
 - (a) Yes
 - (b) No

If a person is married, he or she may be assigned a number 101 and an unmarried person may be assigned a number 102.

- In which of the following departments do you work?
 - (a) Marketing
 - (b) HR
 - (c) Information Technology
 - (d) Operations
 - (e) Finance and Accounting
 - (f) Any other, (please specify)

Here also, a person working for the marketing department may be assigned a number 1, the one working for HR may be assigned a number 2 and so on.

Nominal scale measurements are used for identifying food habits (vegetarian or non-vegetarian), gender (male/female), caste, respondents, brands, attributes, stores, the players of a hockey team and so on.

The assigned numbers cannot be added, subtracted, multiplied or divided. The only arithmetic operations that can be carried out are the count of each category. Therefore, a frequency distribution table can be prepared for the nominal scale variables and mode of the distribution can be worked out. One can also use chi-square test and compute contingency coefficient using nominal scale variables.

4.3.2 Ordinal Scale

This is the next higher level of measurement than the nominal scale measurement. One of the limitations of the nominal scale measurements is that we cannot say whether the assigned number to an object is higher or lower than the one assigned to another option. The ordinal scale measurement takes care of this limitation. An ordinal scale measurement tells whether an object has more or less of characteristics than some other objects. However, it cannot answer how much more or how much less. An ordinal scale tells us the relative positions of the objects and not the difference between the magnitudes of the objects. Suppose Shashi scores the highest marks in marketing and is ranked no. 1; Mohan scores the second highest marks and is ranked no. 2; and Krishna scores third highest marks and is ranked no. 3. However, from this statement, we cannot say whether the difference in the marks scored by Shashi and Mohan is the same as between Mohan and Krishna. The only statement which can be made under ordinal scale is that Shashi has scored higher than Mohan and Mohan has scored higher than Krishna. The difference between the ranks does not have any meaningful interpretation in the sense that it cannot tell the difference in absolute marks between the three candidates. Another example of the ordinal scale could be the CAT score given in percentile form. Suppose a candidate's score is 95 percentile in the CAT exam. What it means is that 95 per cent of the candidates that appeared in the CAT examination have a score below this candidate, whereas only 5 per cent have scored more than him. The actual score is how much less or more cannot be known from this statement. Examples of the ordinal scale include quality ranking, rankings of the teams in a tournament, ranking of preference for colours, soft drinks, socio-economic class and occupational status, to mention a few. Some of the examples of ordinal scales are listed below:

- Rank the following attributes while choosing a restaurant for dinner. The most important attribute may be ranked one, the next important may be assigned a rank of 2 and so on.

Attribute	Rank
Food quality	
Prices	
Menu variety	
Ambience	
Service	

- Rank the following by placing a 1 beside the attribute you think is the most important, a 2 beside the attribute you think is the second most important and so on while purchasing a two-wheeler.

Attribute	Rank
After sale service	
Prices	
Re-sale value	
Fuel efficiency	
Aesthetic appeal	

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In the ordinal scale, the assigned ranks cannot be added, multiplied, subtracted or divided. One can compute median, percentiles and quartiles of the distribution. The other major statistical analysis which can be carried out is the rank order correlation coefficient, sign test. As the ordinal scale measurement is higher than the nominal scale measurement, all the statistical techniques which are applicable in the case of nominal scale measurement can also be used for the ordinal scale measurement. However, the reverse is not true. This is because ordinal scale data can be converted into nominal scale data but not the other way round.

4.3.3 Interval Scale

The interval scale measurement is the next higher level of measurement. It takes care of the limitation of the ordinal scale measurement where the difference between the score on the ordinal scale does not have any meaningful interpretation. In the interval scale, the difference of the score on the scale has meaningful interpretation. It is assumed that the respondent is able to answer the questions on a continuum scale. The mathematical form of the data on the interval scale may be written as

$$Y = a + bX \quad \text{Where } a \neq 0$$

The interval scale data has an arbitrary origin (non-zero origin). The most common example of the interval scale data is the relationship between Celsius and Fahrenheit temperature. It is known that:

$$C^{\circ} = \frac{5}{9}(F^{\circ} - 32)$$

Therefore,
$$C^{\circ} = \frac{160}{9} + \frac{5}{9}F^{\circ}$$

This is of the form $Y = a + bX$, where $a = \frac{-160}{9}$ and $b = \frac{5}{9}$ and hence it represents the interval scale measurement. In the interval scale, the difference in score has a meaningful interpretation while the ratio of the score on this scale does not have a meaningful interpretation. This can be seen from the following interval scale question:

- How likely are you to buy a new designer carpet in the next six months?

	Very unlikely	Unlikely	Neutral	Likely	Very likely
Scale A	1	2	3	4	5
Scale B	0	1	2	3	4
Scale C	-2	-1	0	1	2

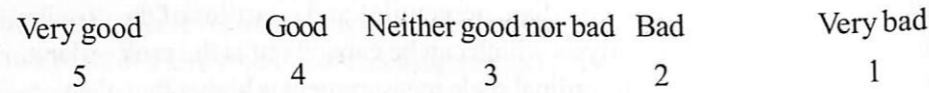
Suppose a respondent ticks the response category 'likely' and another respondent ticks the category 'unlikely'. If we use any of the scales A, B or C, we note that the difference between the scores in each case is 2. Whereas, when the ratio of the scores is taken, it is 2, 3 and -1 for the scales A, B and C respectively. Therefore, the ratio of the scores on the scale does not have a meaningful interpretation. The following are some examples of interval scale data.

- How important is price to you while buying a car?
- | | | | | |
|-----------------|-------------|---------|-----------|----------------|
| Least important | Unimportant | Neutral | Important | Most important |
| 1 | 2 | 3 | 4 | 5 |

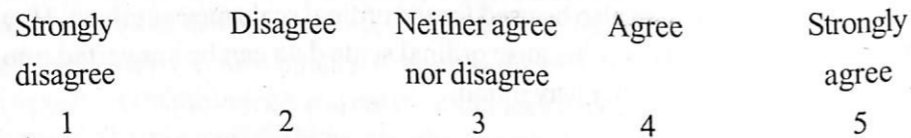
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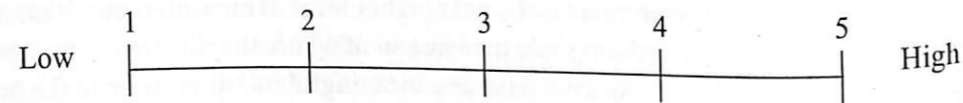
- How do you rate the work environment of your organization?



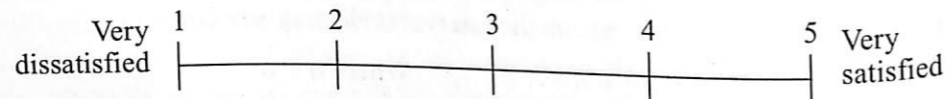
- The counter-clerks at ICICI Bank, (Vasant Kunj Branch) are very friendly.



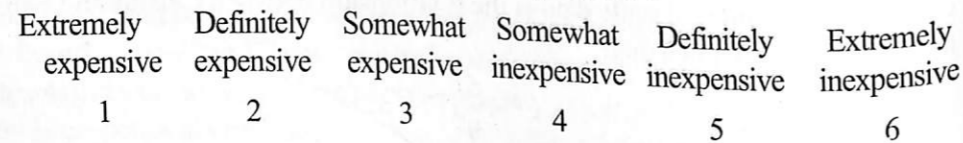
- Rate the life of the battery of your inverter.



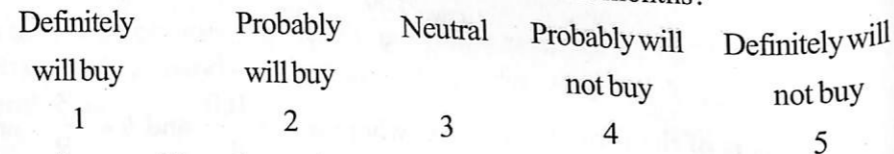
- Indicate the degree of satisfaction with the overall performance of Wagon R.



- How expensive is the restaurant 'Punjabi By Nature'?



- How likely are you to buy a new car within the next six months?



The numbers on this scale can be added, subtracted, multiplied or divided. One can compute arithmetic mean, standard deviation, correlation coefficient and conduct a t-test, Z-test, regression analysis and factor analysis. As the interval scale data can be converted into the ordinal and the nominal scale data, therefore, all the techniques applicable for the ordinal and the nominal scale data can also be used for interval scale data.

4.3.4 Ratio Scale

This is the highest level of measurement and takes care of the limitations of the interval scale measurement, where the ratio of the measurements on the scale does not have a meaningful interpretation. The ratio scale measurement can be converted into interval, ordinal and nominal scale. But the other way round is not possible. The mathematical form of the ratio scale data is given by $Y = bX$. In this case, there is a natural zero (origin), whereas in the interval scale we had an arbitrary zero. Examples of the ratio scale data are weight, distance travelled, income and sales of a company, to mention a few. Consider the following examples for ratio scale measurements.

- How many chemist shops are there in your locality?
- How many students are there in the MBA programme at IIFT?
- How much distance do you need to travel from your residence to reach the railway station?

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All the mathematical operations can be carried out using the ratio scale data. In addition to the statistical analysis mentioned in the interval, the ordinal and the nominal scale data, one can compute coefficient of variation, geometric mean and harmonic mean using the ratio scale measurement. The basic characteristics, examples and the statistical techniques applicable under each of the four scales are summarized in Table 5.1.

Table 5.1 Types of Scale, Characteristics, Examples, Permissible Statistical Techniques

Scale	Basic Characteristics	Examples	Permissible Statistics
Nominal	Numbers are used to label and classify objects.	Players of Team India, Caste, Religion, Gender, Marital Status, Store Types, Brands, etc.	Percentage, Mode, Chi-square, Contingency coefficient, Binomial test.
Ordinal	Numbers indicate the relative position of the objects, however the difference in the magnitude of the score cannot be known.	Preference Ranking, Image Ranking, Social Class, etc.	Percentile, Quartiles, Median, Rank order correlation. Friedman ANOVA.
Interval	Difference between the objects can be known, however the ratio of the scores has no meaning.	Attitude, Opinion, Index Numbers	Product moment correlation, coefficient, t-test, z-test, ANOVA, Regression Analysis, Factor Analysis
Ratio	Ratios of the score value have a meaningful interpretation.	Age, Income, Market Share, Sales, Cost, etc.	Geometric means, Harmonic Means and Coefficient of Variation

4.3.5 Attitude

An attitude is viewed as an enduring disposition to respond consistently in a given manner to various aspects of the world, including persons, events and objects. A company is able to sell its products or services when its customers have a favourable attitude towards its products/services. In the reverse scenario, the company will not be able to sustain itself for long. It, therefore, becomes very important to measure the attitude of the customers towards the company's products/services. Unfortunately, attitude cannot be measured directly. There are many variables which the researcher wishes to investigate as psychological variables and these cannot be directly observed. For example, we may have a favourable attitude towards a particular brand of toothpaste, but this attitude cannot be observed directly. In order to measure an attitude, we make an inference based on the perceptions the customers have about the product/services. The attitude is derived from the perceptions. If the consumers have a favourable perception towards the products/services, the attitude will be favourable. Therefore, the attitudes are indirectly observed.

Basically, attitude has three components: cognitive, affective and intention (or action) components.

- Cognitive component:** This component represents an individual's information and knowledge about an object. This includes awareness of the existence of the object, beliefs about the characteristics or attributes of the object and judgement about the relative importance of each of the attributes. In a survey, if the respondents are asked to name the companies manufacturing plastic products, some respondents may remember names like Tupperware, Modicare

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and Pearl Pet. This is called unaided recall awareness. More names are likely to be remembered when the investigator makes a mention of them. This is aided recall. It may be noted that the knowledge may not be limited only to the awareness. An individual can form beliefs or judgements about the characteristics or attributes of the plastic products manufacturing companies through advertisements, word of mouth, peer groups, etc. The examples of such beliefs could be that the products of Tupperware are of high quality, non-toxic and can be used in parties; a mutton dish can be cooked in a pressure cooker in less than 30 minutes; the Nano car gives a very high mileage as compared to the other small cars.

2. **Affective component:** The affective component summarizes a person's overall feelings or emotions towards the objects. The examples for this component could be: the food cooked in a pressure cooker is tasty, taste of orange juice is good or the taste of bitter gourd is very bad. If there are a number of alternatives to choose from, liking is expressed in terms of preference for one alternative over the other. Among the various soft drinks like Pepsi, Coke, Limca and Sprite, the respondents might have to indicate the most preferred soft drinks, the second preferred one and so on. This is an example of the affective component. The other example could be that the plastic products produced by Pearl Pet are cheaper than Tupperware products; however, the quality of Tupperware products is better than that of Pearl Pet.
3. **Intention or action component:** This component of an aptitude, also called the behavioural component, reflects a predisposition to an action by reflecting the consumer's buying or purchase intention. It also reflects a person's expectations of future behaviour towards an object. How likely a person is to buy a designer carpet may range from most likely to not at all likely, reflecting the purchase intentions. However, when one is talking about the purchase intentions, a time horizon has to be kept in mind as the intentions may undergo a change over time. The intentions incorporate information regarding the respondent's willingness to pay for the product.

4.4 CLASSIFICATION OF SCALES

One of the ways of classifications of scales is in terms of the number of items in the scale. Based on this, the following classification may be proposed:

4.4.1 Single Item vs Multiple Item Scale

Single item scale: In the single item scale, there is only one item to measure a given construct. For example:

Consider the following question:

- How satisfied are you with your current job?
 - Very Dissatisfied
 - Dissatisfied
 - Neutral
 - Satisfied
 - Very satisfied

Check Your Progress

1. What does the term measurement mean?
2. Name the four types of measurement scales.
3. Name the three components of attitude.

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The problem with the above question is that there are many aspects to a job, like pay, work environment, rules and regulations, security of job and communication with the seniors. The respondent may be satisfied on some of the factors but may not on others. By asking a question as stated above, it will be difficult to analyse the problem areas. To overcome this problem, a multiple item scale is proposed.

Multiple item scale: In multiple item scale, there are many items that play a role in forming the underlying construct that the researcher is trying to measure. This is because each item forms some part of the construct (satisfaction) which the researcher is trying to measure. As an example, some of the following questions may be asked in a multiple item scale.

- How satisfied are you with the pay you are getting on your current job?
 - Very dissatisfied
 - Neutral
 - Very satisfied
 - Dissatisfied
 - Satisfied
- How satisfied are you with the rules and regulations of your organization?
 - Very dissatisfied
 - Neutral
 - Very satisfied
 - Dissatisfied
 - Satisfied
- How satisfied are you with the job security in your current job?
 - Very dissatisfied
 - Neutral
 - Very satisfied
 - Dissatisfied
 - Satisfied

4.4.2 Comparative vs Non-Comparative Scales

The scaling techniques used in research can also be classified into comparative and non-comparative scales (Figure 5.1).

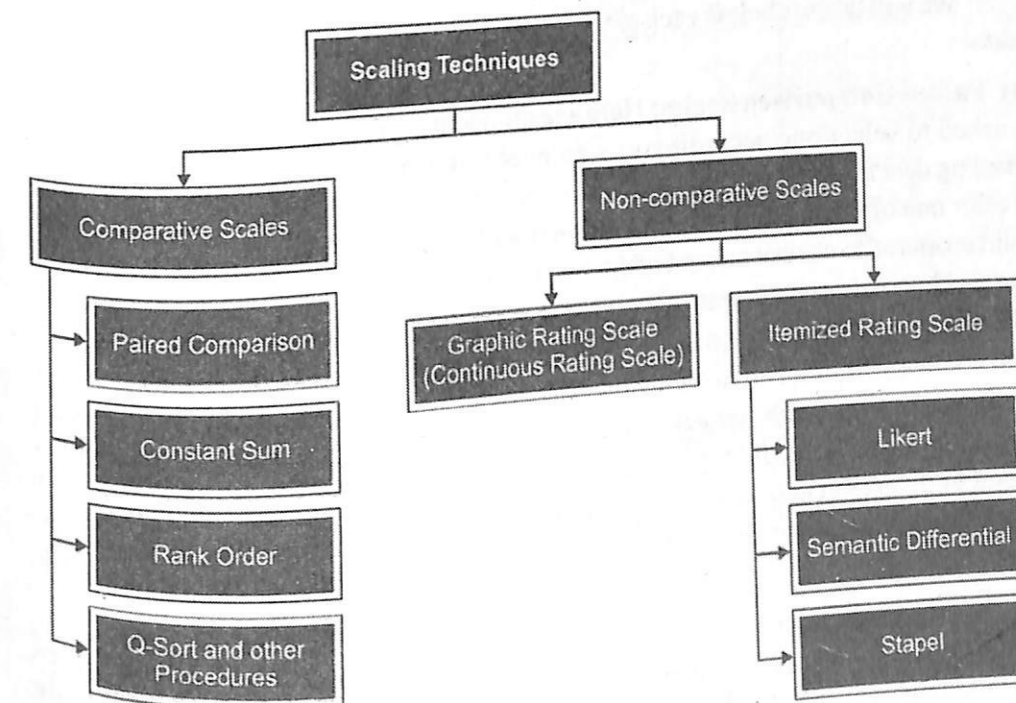


Fig. 5.1 Types of Scaling Techniques

1. Comparative Scales

In comparative scales it is assumed that respondents make use of a standard frame of reference before answering the question. For example:

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A question like 'How do you rate Barista in comparison to Cafe Coffee Day on quality of beverages?' is an example of the comparative rating scale. It involves the direct comparison of stimulus objects. For example, respondents may be asked whether they prefer Chinese or Indian food. Consider the following set of questions generally used to compare various attributes of Domino's Pizza and Pizza Hut.

- Please rate Domino's in comparison to Pizza Hut on the basis of your satisfaction level on an 11-point scale, based on the following parameters: (1 = Extremely poor, 6 = Average, 11 = Extremely good). Circle your response:

a	Variety of menu options	1	2	3	4	5	6	7	8	9	10	11
b	Value for money	1	2	3	4	5	6	7	8	9	10	11
c	Speed of service (delivery time)	1	2	3	4	5	6	7	8	9	10	11
d	Promotional offers	1	2	3	4	5	6	7	8	9	10	11
e	Food quality	1	2	3	4	5	6	7	8	9	10	11
f	Brand name	1	2	3	4	5	6	7	8	9	10	11
g	Quality of service	1	2	3	4	5	6	7	8	9	10	11
h	Convenience in terms of takeaway location	1	2	3	4	5	6	7	8	9	10	11
i	Friendliness of the salesperson on the phone	1	2	3	4	5	6	7	8	9	10	11
j	Quality of packaging	1	2	3	4	5	6	7	8	9	10	11
k	Adaptation of Indian taste	1	2	3	4	5	6	7	8	9	10	11
l	Side orders/appetizers	1	2	3	4	5	6	7	8	9	10	11

Comparative scale data is interpreted generally in a relative kind. The comparative scale includes paired comparison, rank order, constant sum scale and Q-sort technique to mention a few.

We will discuss below each of the scale under comparative rating scales in detail below:

(a) Paired Comparison Scales: Here a respondent is presented with two objects and is asked to select one according to whatever criterion he or she wants to use. The resulting data from this scale is ordinal in nature. As an example, suppose a parent wants to offer one of the four items to a child—chocolate, burger, ice cream and pizza. The child is offered to choose one out of the two from the six possible pairs, i.e., chocolate and burger, chocolate or ice cream, chocolate or pizza, burger or ice cream, burger or pizza and ice cream or pizza. In general, if there are n items, the number of paired comparison would be $(n(n-1)/2)$. Paired comparison technique is useful when the number of items is limited because it requires a direct comparison and overt choice. In case the number of items to be compared is large (say 10), it would result in 45 paired comparisons which would further result in fatigue for the respondents. Further, in reality, a respondent does not make the choice from two items at a time—there are multiple alternatives available to him.

There are many ways of analysing the paired comparison data. The analysis of paired comparison data would result in an ordinal scale and also in an interval scale measurement. This will be shown with the help of an example. Let us assume that there

are five brands—A, B, C, D and E—and a paired comparison with two brands at a time is presented to the respondent with the option to choose one of them. As there are five brands, it will result in 10 paired comparisons. Suppose this is administered to a sample of 250 respondents with the results as presented in Table 5.2.

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Table 5.2 Paired Comparison Data

	A	B	C	D	E
A	—	0.60	0.30	0.60	0.35
B	0.40	—	0.28	0.70	0.40
C	0.70	0.72	—	0.65	0.10
D	0.40	0.30	0.35	—	0.42
E	0.65	0.60	0.90	0.58	—

The above table may be interpreted by assuming that the cell entry in the matrix represents the proportion of respondents who believe that 'the column brand is preferred over the row brand'. For example:

In brand A versus brand B comparison, it can be said that 60 per cent of the respondents prefer brand B to brand A. Similarly, 30 per cent of the respondents prefer brand C to brand A and so on.

To develop the ordinal scale from the given paired comparison data in the above table, we can convert the entries in the table to 0–1 scores. This is to show whether the column brand dominates the row brand and vice versa. If the proportion is greater than 0.5 in the above table, a number of '1' is assigned to that cell, which means that the column brand is preferred over the row brand. Whenever the proportion is less than 0.5 in the above table, a number of '0' is assigned to that cell, which means column brand does not dominate the row brand. The results are in Table 5.3.

Table 5.3 Conversion of Paired X Comparison Data into 0 to 1 Form

	A	B	C	D	E
A	—	1	0	1	0
B	0	—	0	1	0
C	1	1	—	—	0
D	0	0	0	—	—
E	1	1	1	1	—
Total	2	3	1	4	0

To get the ordinal relationship among the brands, we total the columns. Here the ordinal scale of brands is $D > B > A > C > E$. This means brand D is the most preferred brand, followed by B, A, C and E.

In order to obtain the interval scale data from the paired comparison data as presented above, the entries in the table can be analysed by using a technique called Thurston's law of comparative judgement, which converts the ordinal judgements into the interval data. Here the proportions are assumed as probabilities and using the assumption of normality, Z-scores can be computed. Z-value has symmetric distribution with a mean of '0' and variance of '1'. If the proportion is less than 0.5, the corresponding Z-value has a negative sign and for the proportion that is greater than 0.5, the Z-score takes a positive value. The Z-scores for the paired comparison data is given in Table 5.4.

Table 5.4 Z-scores for Paired Comparison Data

	A	B	C	D	E
A	0	0.255	-0.525	0.255	-0.38
B	-0.255	0	-0.58	0.525	-0.255
C	0.525	0.58	0	0.385	-1.28
D	-0.255	-0.525	-0.385	0	-0.2
E	0.38	0.255	1.28	0.2	0
Total Distance	0.395	0.565	-0.21	1.365	-2.115
Average Distance	0.079	0.113	-0.042	0.273	-0.423
Brand	D	B	A	C	E
Interval scale value with change of origin	0.696	0.536	0.502	0.381	0

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The entries in Table 5.4 show the distance between two brands. Assuming that the scores can be added, the total distance is computed. The average distance is computed by dividing the total score by the number of brands. This way one obtains the absolute position of each brand. Now the highest negative values among all the column is added to each entry corresponding to the average value so that by change of origin, interval scale values can be obtained. This is shown in the last row and the values are of interval scale, indicating the difference between brands. Brand D is the most preferred brand and E is the least preferred brand and the distance between the two is 0.696. The distance between brand C and E equals 0.381.

(b) Rank Order Scaling: In the rank order scaling, respondents are presented with several objects simultaneously and asked to order or rank them according to some criterion. Consider, for example the following question:

- Rank the following soft drinks in order of your preference, the most preferred soft drink should be ranked one, the second most preferred should be ranked two and so on.

Soft Drinks	Rank
Coke	
Pepsi	
Limca	
Sprite	
Mirinda	
Seven Up	
Fanta	

Like paired comparison, this approach is also comparative in nature. The problem with this scale is that if a respondent does not like any of the above-mentioned soft drink and is forced to rank them in the order of his choice, then, the soft drink which is ranked one should be treated as the least disliked soft drink and similarly, the other rankings can be interpreted. This scale is very commonly used to measure preferences for brands as well as attributes. The rank order scaling results in the ordinal data.

(c) Constant Sum Rating Scaling: In constant sum rating scale, the respondents are asked to allocate a total of 100 points between various objects and brands. The respondent

distributes the points to the various objects in the order of his preference. Consider the following example:

- Allocate a total of 100 points among the various school into which you would like to admit your child. The more the points you allocate to a school, more preferred it is considered to be. The points should be allocated in such a way that the sum total of the points allocated to various schools adds up to 100.

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Schools	Points
DPS	
Modern School	
Mother's International	
APEEJAY	
DAV Public School	
Laxman Public School	
Tagore International	
TOTAL POINTS	100

Suppose Mother's International is awarded 30 points, whereas Laxman Public School is awarded 15 points, one can make a statement that the respondent rates Mother's International twice as high as Laxman Public School. This type of data is not only comparative in nature but could also result in ratio scale measurement. This type of scale is widely used in allocating points which the individual may assign to the various attributes of an object.

(d) Q-sort Technique: The Q-sort technique was developed to discriminate among a large number of objects quickly. This technique makes use of the rank order procedure in which objects are sorted into different piles based on their similarity with respect to certain criterion. Suppose there are 100 statements and an individual is asked to pile them into five groups, in such a way, that the strongly agreed statements could be put in one pile, agreed statements could be put in another pile, neutral statement form the third pile, disagreed statements come in the fourth pile and strongly disagreed statements form the fifth pile, and so on. The data generated in this way would be ordinal in nature. The distribution of the number of statement in each pile should be such that the resulting data may follow a normal distribution. The number of piles need not be restricted to 5. It could be as large as 10 or more as the large number increases the reliability or precision of the results.

2. Non-Comparative Scales

In the non-comparative scales, the respondents do not make use of any frame of reference before answering the questions. The resulting data is generally assumed to be interval or ratio scale. For example:

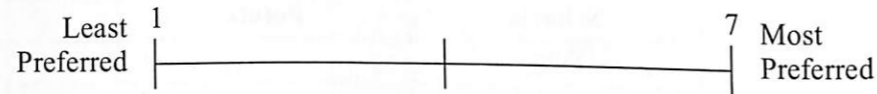
The respondent may be asked to evaluate the quality of food in a restaurant on a five point scale (1 = very poor, 2 = poor and 5 = very good). The non-comparative scales are divided into two categories, namely, the graphic rating scales and the itemized rating scales. The itemized rating scales are further divided into Likert scale, Semantic Differential scale and Stapel scale. All these come under the category of the multiple item scales.

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(a) Graphic Rating Scale

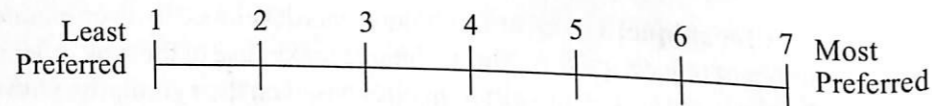
This is a continuous scale, also called graphic rating scale. In the graphic rating scale respondents is asked to tick their preference on a graph. Consider for example the following question:

- Please put a tick mark (✓) on the following line to indicate your preference for fast food.



To measure the preference of an individual towards fast food one has to measure the distance from the extreme left to the position where a tick mark has been put. Higher the distance, higher would be the individual preference for fast food. This scale suffers from two limitations—one, if a respondent has put a tick mark at a particular position and after ten minutes, he or she is given another form to put a tick mark, it will virtually be impossible to put a tick at the same position as was done earlier. Does it mean that the respondent's preference for fast food has undergone a change in 10 minutes? The basic assumption in this scale is that the respondents can distinguish the fine shade in differences between the preference/attitude which need not be the case. Further, the tedious task and researchers would try to avoid using it. Another version of graphic scale could be the following:

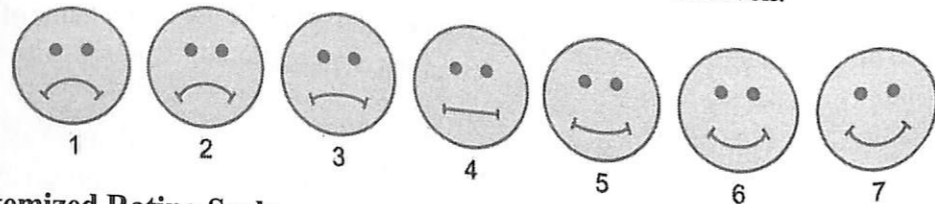
- Please put a tick mark (✓) on the following line to indicate your preference for fast food.



This is a slightly better version than the one discussed earlier. It will overcome the limitation of the scale to some extent. For example, if a respondent had earlier ticked between 5 and 6, it is likely that he would remember the same and the second time, he responses could be negligible.

Another way of presenting the graphic rating scale is through smiling face scale. The following example would illustrate the same.

- Please indicate how much do you like fast food by pointing to the face that best shows your attitude and taste. If you do not prefer it at all, you would point to face one. In case you prefer it the most, you would point to face seven.



(b) Itemized Rating Scale

In the itemized rating scale, the respondents are provided with a scale that has a number of brief descriptions associated with each of the response categories. The response categories are ordered in terms of the scale position and the respondents are supposed

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to select the specified category that describes the best possible way an object is rated. Itemized rating scales are widely used in survey research. There are certain issues that should be kept in mind while designing the itemized rating scale. These issues are:

- **Number of categories to be used:** There is no hard and fast rule as to how many categories should be used in an itemized rating scale. However, it is a practice to use five or six categories. Some researchers are of the opinion that more than five categories should be used in situations where small changes in attitudes are to be measured. There are others that argue that the respondents would find it difficult to distinguish between more than five categories. It is, however, a fact that the additional categories need not increase the precision with the attitude being measured. It is generally seen that researchers use five-category scales and in special cases, may increase or decrease the number of categories.
- **Odd or even number of categories:** It has been a matter of debate among the researchers as to whether odd or even number of categories are to be used in survey research. By using even number of categories, the scale would not have a neutral category and the respondent will be forced to choose either the positive or the negative side of the attitude. If odd numbers of categories are used, the respondent has the freedom to be neutral if he wants to be so. The Likert scale (to be discussed later) is a balanced rating scale with an odd number of categories and a neutral point. It is generally seen that if respondents are not aware of the subject matter being measured by the scale, they would prefer to be neutral. However, if we have selected our unit of analysis to be one who are knowledgeable about the study being conducted and if they prefer to be neutral, we should not debar them from this opportunity.
- **Balanced versus unbalanced scales:** A balanced scale is the one which has equal number of favourable and unfavourable categories. Examples of balanced and unbalanced scale are given below.

The following is the example of a balanced scale:

- (i) How important is price to you in buying a new car?

- Very important
- Relatively important
- Neither important nor unimportant
- Relatively unimportant
- Very unimportant

In this question, there are five response categories, two of which emphasize the importance of price and two others that do not show its importance. The middle category is neutral.

The following is the example of the unbalanced scale.

- (ii) How important is price to you in buying a new car?

- More important than any other factor
- Extremely important
- Important
- Somewhat important
- Unimportant

In this question, there are four response categories that are skewed towards the importance given to the price, whereas one category is for the unimportant side. Therefore,

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Once the scale is constructed and administered to the representative respondents, the mean score for each of the descriptor is calculated. The scale is administered under the assumption that the numerical values assigned to the response categories are of interval scale in nature. This is generally the practice adopted by many researchers. However, if the response categories are treated as ordinal scale, instead of computing the arithmetic mean, median may be computed. In this example, we are treating the responses as the interval scale and hence the mean is computed. Once the mean for all the bipolar adjectives/phrases is computed we put the result in the form of a pictorial profile so as to make the comparison easy. At this time, all the favourable descriptors are kept on one side and all the unfavourable descriptors are positioned at the other. In our example, we have positioned all the favourable descriptors for the two companies whose image we want to compare on the left hand side. This is shown in Table 5.6.

Table 5.6 Pictorial Profile Based on Semantic Differential Ratings

1	Makes quality products		Does not make quality products
2	Leader in technology		Backward in technology
3	Cares about general public		Does not care about general public
4	Leads in R & D		Lagging behind in R&D
5	A good paymaster		Not a good paymaster
6	Products go through stringent quality test		Products do not go through quality test
7	Done remarkable job in curbing pollution		Done nothing to curb pollution
8	Cares about community near plants		Does not care about community near plants
9	Company stocks good to buy		Not advisable to invest in company stock
10	Has good labour relations		Does not have good labour relations

----- Company A - - - - - Company B

Stapel Scale

The Stapel scale is used to measure the direction and intensity of an attitude. At times it may be difficult to use semantic differential scales because of the problem in creating bipolar adjectives. The Stapel scale overcomes this problem by using only single adjectives. This scale generally has 10 categories involving numbering -5 to +5 without a neutral point and is usually presented in a vertical form. The job of the respondent is to indicate how accurately or inaccurately each term describes the object by selecting an appropriate numerical response category. If a positive higher number is selected by the respondent,

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it means the respondent is able to describe it more favourably. Suppose a restaurant is to be evaluated on quality of food and quality of service, then the Stapel scale would be presented as shown below:

RESTAURANT	
+5	+5
+4	+4
+3	+3
+2*	+2
+1	+1
Quality of Food	Quality of Service
-1	-1
-2	-2
-3	-3
-4	-4
-5	-5*

In the above scale, the respondents are asked to evaluate how accurately each word or phrase describes the restaurant in question. They will choose a value of +5 if the restaurant very accurately describes the attribute and -5 if it does not describe at all correctly the word in question. Suppose a respondent has chosen his options as indicated by *. This shows that the respondent slightly prefers the quality of food and is of the opinion that the quality of service is totally useless.

4.4.3 Likert Scale

This is also called a summated scale because the scores on individual items can be added together to produce a total score for the respondent. An assumption of the Likert scale is that each of the items (statements) measures some aspect of a single common factor, otherwise the scores on the items cannot legitimately be summed up. In a typical research study, there are generally 25 to 30 items on a Likert scale.

To construct a Likert scale to measure a particular construct, a large number of statements pertaining to the construct are listed. These statements could range from 80 to 120. The identification of the statements is done through exploratory research which is carried out by conducting a focus group, unstructured interviews with knowledgeable people, literature survey, analysis of case studies and so on. Suppose we want to assess the image of a company. As a first step, an exploratory research may be conducted by having an informal interview with the customers, and employees of the company. The general public may also be contacted. A survey of the literature on the subject may also give a set of information that could be useful for constructing the statements. Suppose the number of statements to measure the constructs is 100 in number. Now samples of representative respondents are asked to state their degree of agreement/disagreement on those statements. Table 5.7 gives a few statements to assess the image of the company.

Table 5.7 Likert Scale Statements to Measure the Image of the Company

No.	Statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1.	The company makes quality products			√		
2.	It is a leader in technology					√
3.	It doesn't care about the general public.		√			
4.	The company leads in R&D to improve products				√	
5.	The company is not a good paymaster.	√				
6.	The products of the company go through stringent quality tests.				√	
7.	The company has not done anything to curb pollution.		√			
8.	It does not care about the community near its plant.	√				
9.	The company's stocks are good to buy or own.				√	
10.	The company does not have good labour relations.		√			

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It may be noted that only anchor labels and no numerical values are assigned to the response categories. Once the scale is administered, numerical values are assigned to the response categories. The scale contains statements' some of which are favourable to the construct we are trying to measure and some are unfavourable to it.

For example, out of the ten statements given, statements numbering 1, 2, 4, 6 and 9 in Table 5.7 are favourable statements, whereas the remaining are unfavourable statements. The reason for having a mixture of favourable and unfavourable statements in a Likert scale is that the responses by the respondent should not become monotonous while answering the questions. Generally, in a Likert scale, there is an approximately equal number of favourable and unfavourable statements. Once the scale is administered, numerical values are assigned to the responses. The rule is that a 'strongly agree' response for a favourable statement should get the same numerical value as the 'strongly disagree' response of the unfavourable statement. Suppose for a favourable statement, the numbering is done as Strongly disagree = 1, Disagree = 2, Neither agree nor disagree = 3, Agree = 4 and Strongly agree = 5.

Accordingly, an unfavourable statement would get the numerical values as Strongly disagree = 5, Disagree = 4, Neither agree nor disagree = 3, Agree = 2 and Strong agree = 1. In order to measure the image that the respondent has about the company, the scores are added.

For example, if a respondent has ticked (√) statements numbering from one to ten as shown in Table 5.7, his total score would be 3 + 5 + 4 + 4 + 5 + 4 + 4 + 5 + 4 + 4 = 42 out of 50. Now if there are 100 respondents and 100 statements, the score on the

image of the company can be worked out for each respondent by adding his/her scores on the 100 statements. The minimum score for each respondent will be 100, whereas the maximum score would be 500.

As mentioned earlier, a typical Likert scale comprises about 25-30 statements. In order to select 25 statements from the 100 statements, we need to discard some of them. The rule behind discarding the statements is that those items that are non-discriminating should be removed. The procedure for choosing 25 (say number of statements) is shown.

As mentioned earlier, the score for each of the respondents on each of the statements can be used to measure his/her total score about the image of the company. The data may look as given in Table 5.8.

Table 5.8 Total Score and Individual Score of Each Respondent on Various Statements

Resp. No.	Scores of Statements								100	Total Score
	1	2	3	i	.....	j	.....	
1	-	-	-	5	.....	4	.....	-	410
2	-	-	-	4	.....	2	.....	-	209
3	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
100	-	-	-	-	-	-	-

Table 5.8 shows that the total score for respondent no. 1 is 410, whereas for respondent no. 2 it is 209. This means that respondent no. 1 has a more favourable image for the company as compared to respondent no. 2. Now, in order to select 25 statements, let us consider statements numbering i and j. We note that the statement no. j is more discriminating as compared to statement no. i. This is because the score on statement j is very highly correlated with the total score as compared to the scores on statement i. Therefore, if we have to choose between i and j, we will choose statement no. j. From this we can conclude that only those statements will be selected which have a very high correlation with the total score. Therefore, the 100 correlations are to be arranged in the ascending order of magnitudes corresponding to each statement and only top 25 statements having a high correlation with the total score need to be selected.

Another method of selecting the number of statements from a relatively large number of them is through the use of factor analysis.

4.4.4 Bogardus Scale

The Bogardus scale is also known as the Bogardus social distance scale. This scale was invented by Emory S. Bogardus in the 1930s and is used for measuring social distance.

The development of the social distance scale took place with regard to the relations between the West Coast Caucasian Americans and the immigrant Japanese in the early twentieth century. Bogardus (1931) explains, 'While a number of Americans were openly

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expressing prejudice against the Orientals, there were other Americans who felt that the Japanese were being unjustifiably insulted. [The latter] urged that an investigation of the problem be made, feeling that a scientific inquiry would undermine much of the unfair tactics of those opposed to the Japanese.' Dr Robert Park was hired by the Institute of Social and Religious Research to supervise this study, who in turn appointed Bogardus for this purpose. He was required to advance a quantitative measure of racial attitudes. To make the research work objective with the use of scientific methodology, they used the term 'race relations survey' with special emphasis on the term 'survey'. Moreover, he had 'undertaken the tabooed procedure of penetrating hidden subjective fields of experience and their resultant attitudes... and attempted to make those attitudes ... measurable.'

The Bogardus scale is a psychological testing scale to measure through experiment or observation people's willingness to contribute and take part in social meetings of varying degrees of closeness with people from different social backgrounds such as ethnic and racial groups. This technique is mostly applied to the study of social groups, social values and ethnic relations. The Bogardus scale helps in measuring the respondent's response towards a particular social relationship like aggression, warmth, familiarity and indifference by acquiring views about various religious groups. For instance, would a group of people be accepted as a fellow citizen or a neighbour in another country through marriage? Further, the scales make the supposition that the qualities that are being measured maybe seen as a continuum of social distance. There are other examples of social distance scaling techniques like the socio-metric measurement and occupational prestige scales.

According to Bogardus, social distance is a function of emotional detachment between the members of two groups wherein it is basically a measure of how sympathetic the members of two group are towards each other. The scale also measures the extent wherein a score of 1.00 is taken to indicate no social distance.

It was important for Bogardus to distinguish between 'feeling' and 'thinking' since social distance for him put emphasis on the feeling reactions of one group of people toward some other group of people. Feelings, he explained, are 'spontaneous expressions of the autonomic nervous system to whatever is happening in the organism. They are expressions in part of the urge for security.' Moreover, feelings had a predictive power sheds more light on attitudes than anything else except the actual behaviour of the person. The test of the working of the scale was to capture the respondent's 'first the inclusion of thoughts or 'without thinking'. 'Feeling reactions', he wrote, 'indicate how a person would express himself toward his fellows if he acted "without thinking", "just the way he feels", and without regard to politeness, social amenities, or his own status'. (Bogardus, 1947).

The Bogardus social distance scale, hence, validates the point that scales can be used as an important data reduction tool.

4.5 MEASUREMENT ERROR

Measurement error occurs when the observed measurement on a construct or concept deviates from its true values. The following is a list of the sources of measurement errors.

- There are factors like mood, fatigue and health of the respondent which may influence the observed response while the instrument is being administered.

Check Your Progress

4. What is the difference between single item scale and multiple item scale?
5. When is the paired comparison technique useful?
6. How is the non-comparative scale categorized?
7. State the difference between Likert and Semantic differential scale.
8. What does the Bogardus social distance scale validate?

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- The variations in the environment in which measurements are taken may also result in a departure from the true value.
- There are situations when a respondent may not understand the question being asked and the interviewer may have to rephrase the same. While rephrasing the question, the interviewer's bias may get into the responses. Also, how the questionnaire is administered (telephone survey, personal interview with questionnaire or mail survey) will have its own impact on the responses.
- At times, some of the questions in the questionnaire may be ambiguous and some may be very difficult for the respondents to understand. Both of them can cause deviation from the correct response, thereby giving rise to measurement error.
- At times, the errors may be committed at the time of coding, entering of data from questionnaire to the spreadsheet on the computer and at the tabulation stage.

The observed measurement in any research need not be equal to the true measurement. The observed measurement can be written as

$$O = T + S + R$$

- Where,
- O = Observed measurement
 - T = True score
 - S = Systematic error
 - R = Random error

It may be noted that the total error consists of two components—systematic error and random error. Systematic error causes a constant bias in the measurement. Suppose there is a weighing scale that weighs 50 gm less for every one kg of product being weighed. The error would consistently remain the same irrespective of the kind of product and the time at which product is weighed. Random error on the other hand involves influences that bias the measurements but are not systematic. Suppose we use different weighing scales to weigh one kg of a product and if systematic error is assumed to be absent, we may find that recorded weights may fall within a range around the true value of the weight, thereby causing random error.

4.5.1 Criteria for Good Measurement

There are three criteria for evaluating measurements: reliability, validity and sensitivity. We have already studied reliability and validity in unit two. Here, we will study reliability and validity with regard to scales.

Reliability

Reliability is concerned with consistency, accuracy and predictability of the scale. It refers to the extent to which a measurement process is free from random errors. The reliability of a scale can be measured using the following methods:

Test-retest reliability: In this method, repeated measurements of the same person or group using the same scale under similar conditions are taken. A very high correlation between the two scores indicates that the scale is reliable. However, the following issues should be kept in mind before arriving at such a conclusion.

- What should be the appropriate time difference between the two observations is a question which requires attention. If the time difference between two consecutive observations is very small (say two or three weeks) it is very likely that the respondents would remember the previous answer and may give the same answer

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when the instrument is administered the second time. This will make the instrument reliable, which may not actually be the case. However, if the difference between the two observations is very large (say more than a year) it is quite likely that the respondent's answers to the various questions of the instrument might have actually undergone a change, resulting in poor reliability of the scale. Therefore, the researcher has to be very careful in deciding upon the time difference between the two observations. Generally, it is thought that a time difference of about five to six months is an ideal period.

- Another problem in this test is that the first measurement may change the response of the subject to the second measurement.
- The situational factors working on two different time periods may not be the same, which may result in different measurement in the two periods.
- The second reading on the same instrument from the same subject may produce boredom, anger or attempt to remember the answers given in an initial measurement.
- A favourable response with a brand during the period between the two tests might cause a shift in the individual rating by the subject.

Split-half reliability method: This method is used in the case of multiple item scales. Here the number of items is randomly divided into two parts and a correlation coefficient between the two is obtained. A high correlation indicates that the internal consistency of the construct leads to greater reliability. Another measure which is used to test the internal consistency of a multiple item scale is the coefficient alpha (α) commonly known as cronbach alpha. The cronbach alpha computes the average of all possible split-half reliabilities for a multiple item scale. This coefficient demonstrates whether the average score of all split-half of reliabilities converge to a certain point or not.

The coefficient alpha does not address validity. However, many researchers use this as a sole indicator of validity. The alpha coefficient can take values between 0 and 1. The following values of alpha with their interpretation are suggested below:

$\alpha = 0$ means	There is no consistency between the various items of a multiple item scale
$\alpha = 1$ means	There is complete consistency between various items of a multiple item scale
$0.80 \leq \alpha \leq 0.95$ implies	There is very good reliability between the various items of a multiple item scale
$0.70 \leq \alpha \leq 0.80$ implies	There is good reliability between the various items of a multiple item scale
$0.60 \leq \alpha \leq 0.70$ implies	There is fair reliability between the various items of a multiple item scale
$\alpha < 0.60$ means	There is poor reliability between the various items of a multiple item scale

Validity

The validity of a scale refers to the question whether we are measuring what we want to measure. Validity of the scale refers to the extent to which the measurement process

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is free from both systematic and random errors. The validity of a scale is a more serious issue than reliability. There are different ways to measure validity.

- **Content validity:** This is also called face validity. It involves subjective judgement by an expert for assessing the appropriateness of the construct. For example, to measure the perception of an individual towards Kingfisher Airlines, a multiple item scale is developed. A set of 15 items is proposed. These items when combined in an index measure the perception of Kingfisher Airlines. In order to judge the content validity of these 15 items, a set of experts may be requested to examine the representativeness of the 15 items. The items covered may be lacking in the content validity if we have omitted behaviour of the crew, food quality, and food quantity, etc., from the list. In fact, conducting the exploratory research to exhaust the list of items measuring perception of the airline would be of immense help in such a case.
- **Concurrent validity:** It is used to measure the validity of the new measuring techniques by correlating them with the established techniques. It involves computing the correlation coefficient of two measures of the same phenomena (for example, perception of an airline and image of a company) which are administered at the same time. We prepare a 15 item scale to measure the perception of Kingfisher Airline, which is assumed to be a valid one. Suppose a researcher proposes an alternative and shorter technique. The concurrent validity of the new technique would be established if there is a high correlation between the two techniques when administered at the same time under similar or identical conditions.
- **Predictive validity:** This involves the ability of a measured phenomenon at one point of time to predict another phenomenon at a future point of time. If the correlation coefficient between the two is high, the initial measure is said to have a high predictive ability. As an example, consider the use of the Common Admission Test (CAT) to shortlist candidates for admission to the MBA programme in a business school. The CAT scores are supposed to predict the candidate's aptitude for studies towards business education.

Sensitivity

The sensitivity of a scale is an important measurement concept, particularly when changes in attitudes are under investigation. Sensitivity refers to an instrument's ability to accurately measure the variability in a concept. A dichotomous response category such as agree or disagree does not allow the recording of any attitude changes. A more sensitive measure with numerous categories on the scale may be required. For example, adding strongly agree, agree, neither agree nor disagree, disagree and strongly disagree categories will increase the sensitivity of the scale.

The sensitivity of scale based on a single question or a single item can be increased by adding questions or items. In other words, because composite measures allow for a greater range of possible scores, they are more sensitive than a single-item scale. Therefore, the sensitivity of the scale is generally increased by adding more response points or by adding scale items.

Check Your Progress

9. When does a measurement error occur?
10. List two sources of measurement errors.
11. Define validity of the scale.
12. Why does the sensitivity of the scale generally increase by adding more response points or by adding scale items?

4.6 SUMMARY

NOTES

In this unit, you have learnt that,

- The term 'measurement' means assigning numbers or some other symbols to the characteristics of certain objects. When numbers are used, the researcher must have a rule for assigning a number to an observation in a way that provides an accurate description.
- Scaling is an extension of measurement. Scaling involves creating a continuum on which measurements on objects are located.
- There are four types of measurement scales—nominal, ordinal, interval and ratio scales. The choice of the measurement scale has implications for the statistical technique to be used for data analysis.
- In the nominal scale there is a strict one-to-one correspondence between the numbers and the objects. Each number is assigned to only one object and each object has only one number assigned to it.
- An ordinal scale tells us the relative positions of the objects and not the difference between the magnitudes of the objects.
- In the ordinal scale, the assigned ranks cannot be added, multiplied, subtracted or divided. One can compute median, percentiles and quartiles of the distribution. The other major statistical analysis which can be carried out is the rank order correlation coefficient, sign test.
- The interval scale measurement is the next higher level of measurement. It takes care of the limitation of the ordinal scale measurement where the difference between the score on the ordinal scale does not have any meaningful interpretation.
- As the interval scale data can be converted into the ordinal and the nominal scale data, therefore all the techniques applicable for the ordinal and the nominal scale data can also be used for interval scale data.
- Ratio scale is the highest level of measurement and takes care of the limitations of the interval scale measurement, where the ratio of the measurements on the scale does not have a meaningful interpretation. The ratio scale measurement can be converted into interval, ordinal and nominal scale. But the other way round is not possible.
- An attitude is viewed as an enduring disposition to respond consistently in a given manner to various aspects of the world, including persons, events and objects. A company is able to sell its products or services when its customers have a favourable attitude towards its products/services.
- The affective component summarizes a person's overall feeling or emotions towards the objects. The examples for this component could be: the food cooked in a pressure cooker is tasty, taste of orange juice is good or the taste of bitter gourd is very bad.
- In the single item scale, there is only one item to measure a given construct.
- In multiple item scale, there are many items that play a role in forming the underlying construct that the researcher is trying to measure. This is because each of the item forms some part of the construct (satisfaction) which the researcher is trying to measure.

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- In comparative scales it is assumed that respondents make use of a standard frame of reference before answering the question.
- Paired comparison technique is useful when the number of items is limited because it requires a direct comparison and overt choice.
- In the rank order scaling, respondents are presented with several objects simultaneously and asked to order or rank them according to some criterion.
- In the non-comparative scales, the respondents do not make use of any frame of reference before answering the questions.
- In the itemized rating scale, the respondents are provided with a scale that has a number of brief descriptions associated with each of the response categories. The response categories are ordered in terms of the scale position and the respondents are supposed to select the specified category that describes in the best possible way an object is rated.
- The difference between Likert and Semantic differential scale is that in Likert scale, a number of statements (items) are presented to the respondents to express their degree of agreement/disagreement. However, in the semantic differential scale, bipolar adjectives or phrases are used.
- The Stapel scale is used to measure the direction and intensity of an attitude. At times it, may be difficult to use semantic differential scales because of the problem in creating bipolar adjectives. The Stapel scale overcomes this problem by using only single adjectives.
- Likert scale is a multiple item agree-disagree five-point scale. The respondents are given a certain number of items (statements) on which they are asked to express their degree of agreement/disagreement.
- To construct a Likert scale to measure a particular construct, a large number of statements pertaining to the construct are listed. These statements could range from 80 to 120.
- The Bogardus scale is also known as the Bogardus social distance scale. This scale was invented by Emory S. Bogardus in the 1930s and is used for measuring social distance.
- According to Bogardus, social distance is a function of emotional detachment between the members of two groups wherein it is basically a measure of how sympathetic the members of two group are towards each other.
- The Bogardus social distance scale, hence, validates the point that scales can be used as an important data reduction tool.
- Measurement error occurs when the observed measurement on a construct or concept deviates from its true values.
- Reliability is concerned with consistency, accuracy and predictability of the scale. It refers to the extent to which a measurement process is free from random errors.
- The sensitivity of a scale is an important measurement concept, particularly when changes in attitudes are under investigation. Sensitivity refers to an instrument's ability to accurately measure the variability in a concept.

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4.7 KEY TERMS

- **Measurement:** It means assigning numbers or some other symbols to the characteristics of certain objects.
- **Scaling:** It is an extension of measurement; it involves creating a continuum on which measurements on objects are located.
- **Ordinal scale measurement:** It tells whether an object has more or less of characteristics than some other objects.
- **Balanced scale:** It is the one which has equal number of favourable and unfavourable categories.
- **Reliability:** It refers to the extent to which a measurement process is free from random errors.
- **Validity of the scale:** It refers to the extent to which the measurement process is free from both systematic and random errors.
- **Content validity:** It is also called face validity in which an expert provides subjective judgement to assess the appropriateness of the construct.
- **Sensitivity:** It refers to an instrument's ability to accurately measure the variability in a concept.

4.8 ANSWERS TO 'CHECK YOUR PROGRESS'

1. The term 'measurement' means assigning numbers or some other symbols to the characteristics of certain objects.
2. There are four types of measurement scales—nominal, ordinal, interval and ratio scales.
3. The three components of attitude are: Cognitive component, affective component and intention or action component.
4. In the single item scale, there is only one item to measure a given construct whereas in multiple item scale, there are many items that play a role in forming the underlying construct that the researcher is trying to measure.
5. Paired comparison technique is useful when the number of items is limited because it requires a direct comparison and overt choice.
6. The non-comparative scales are divided into two categories, namely, the graphic rating scales and the itemized rating scales.
7. The difference between Likert and Semantic differential scale is that in Likert scale, a number of statements (items) are presented to the respondents to express their degree of agreement/disagreement. However, in the semantic differential scale, bipolar adjectives or phrases are used.
8. The Bogardus social distance scale, hence, validates the point that scales can be used as an important data reduction tool.
9. Measurement error occurs when the observed measurement on a construct or concept deviates from its true values.

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10. The following are the sources of measurement errors:
 - There are factors like mood, fatigue and health of the respondent which may influence the observed response while the instrument is being administered.
 - The variations in the environment in which measurements are taken may also result in a departure from the true value.
11. Validity of the scale refers to the extent to which the measurement process is free from both systematic and random errors.
12. The sensitivity of scale based on a single question or a single item can be increased by adding questions or items. In other words, because composite measures allow for a greater range of possible scores, they are more sensitive than a single-item scale. Therefore, the sensitivity of the scale is generally increased by adding more response points or by adding scale items.

4.9 QUESTIONS AND EXERCISES

Short-Answer Questions

1. What are the problems faced by a researcher while conducting research work?
2. What is scaling?
3. Write a note on the nominal scale of measurement.
4. How would you differentiate between an ordinal scale and an interval scale?
5. List the various forms of presenting the scales.
6. When is a Stapel scale used?
7. Distinguish between single-item and multiple-item scale. Should one prefer a multiple-item scale over the single-item scale? Give reasons.
8. Write a note on the Likert scale.
9. What according to Bogardus is the reason behind social distance between two groups of people?
10. What is test-retest reliability? What problems can be faced by the researchers by using the test-retest reliability measure?

Long-Answer Questions

1. What is measurement? Distinguish between the four types of measurement scales.
2. Describe attitude and its three components.
3. Discuss the various classifications of scales.
4. Explain the Likert scale in detail.
5. What led to the development of Bogardus social distance scale? What does the scale measure?
6. Explain measurement error and explain the criteria for good measurement.
7. What is an itemized rating scale? What are the various issues involved in constructing an itemized rating scale?
8. Briefly explain the concepts of reliability and validity.



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