

TOOLS FOR DATA COLLECTION: Broadly there are three tools of data collection as part of communication surveys. These are:

1. Interview schedule

2. Questionnaire

3. Interview Guide

Interview schedule and questionnaires both are predesigned list of questions used for communication with the respondents. In the case of *interview schedule*, the list of questions remains in the hands of the interviewer who asks questions from the respondent, gets his/her response, and records the responses. *Questionnaire* is also a list of questions, which is handed over to the respondent, who reads the questions and records the answers himself. For purposes of convenience *questionnaire* will refer to both interview schedule as well as questionnaire.

Interview guide is list of topics that are to be covered during the course of interview. Interview guide is used for purposes of an in-depth interviewing. Questions on the topics are formulated on the spot. Most of the questions are open ended. The interviewer may not use the same wording for each respondent; the number of questions may be different; the sequence of questions may also be different.

GUIDELINES FOR QUESTIONNAIRE DESIGN: A survey is only as good as the questions it asks. Questionnaire design is one of the most critical stages in the survey research process. While common sense and good grammar are important in question writing, more is required in the art of questionnaire design. To assume that people will understand the questions is common error. People may not simply know what is being asked. They may be unaware of topic of interest, they may confuse the subject with something else or the question may not mean the same thing to every respondent. Respondents may simply refuse to answer personal questions. Further, properly wording the questionnaire is crucial, as some problems may be minimized or avoided altogether if a skilled researcher composes the questions.

A good questionnaire forms an integrated whole. The researcher weaves لے کر چلنا questions together so they flow smoothly. He or she includes introductory remarks and instructions for clarification and measures each variable with one or more survey questions.

WHAT SHOULD BE ASKED?

The problem definition will indicate which type of information must be collected to answer the research question; different types of questions may be better at obtaining certain type of information than others.

1. Questionnaire Relevancy
2. Questionnaire Accuracy
3. Avoid Ambiguity, Confusion, and Vagueness.
4. Avoid Double-Barreled Questions
5. Avoid Leading Questions
6. Avoid Loaded Questions
7. Avoid Burdensome Questions that may Tax the Respondent's Memory
8. Arrange Questions in a Proper Sequence
9. Use Filter Question, if Needed
10. Layout of the questionnaire

1. Questionnaire Relevancy: A questionnaire is relevant if no unnecessary information is collected and if the information that is needed to solve the problem is obtained. Asking the wrong or an irrelevant question is a pitfall غلطی to be avoided. If the task is to pinpoint compensation problems, for example, questions asking for

general information about morale may be inappropriate. To ensure information relevancy, the researcher must be specific about data needs and there should be a rationale for each item of information.

2. Questionnaire Accuracy: Once the researcher has decided what should be asked, the criterion of accuracy becomes of primary concern. Accuracy means that the information is reliable and valid. While experienced researchers believe that one should use simple, understandable, unbiased, unambiguous and nonirritating words. Obtaining accurate answer from respondents is strongly influenced by the researcher's ability to design a questionnaire that facilitates recall and that will motivate the respondent to cooperate. Therefore avoid jargon, slang, and abbreviations. The respondents may not understand some basic terminology. Words used in the questionnaire should be readily understandable to all respondents.

3. Avoid Ambiguity, Confusion, and Vagueness: Ambiguity and vagueness مصیبت میں ڈالنا plague ابہام most question writers. A researcher might make implicit assumptions without thinking of respondents' perspectives. For example, the question, "what is your income?" could mean weekly, monthly, or annual: family or personal; before taxes or after taxes; for this year or last year; from salary or from all sources. The confusion causes inconsistencies in how different respondents assign meaning to and answer the question. Another source of ambiguity is the use indefinite words or response categories. Consider the words such as *often, occasionally, usually, regularly, frequently, many, good, fair, and poor*. Each of these words has many meanings. For one person frequent reading of *Time* magazine may be reading six or seven issues a year; for another it may be two issues a year. The word *fair* has great variety of meanings; the same is true for many indefinite words.

4. Avoid Double-Barreled Questions: Make each question about one and only one. A double barreled question consists of two or more questions joined together. It makes the respondent's answer ambiguous. For example, if asked, "Does this company have pension and health insurance benefits?" a respondent at the company with health insurance benefits only might answer either yes or no. The response has an ambiguous meaning and the researcher cannot be certain of the respondent's intentions. When multiple questions are asked in one question, the results may be exceedingly difficult to interpret.

5. Avoid Leading Questions: Make respondents feel that all responses are legitimate باقاعدہ/صحیح. Do not let them aware of an answer that the researcher wants. A leading question is the one that leads the respondent to choose one response over another by its wording. For example, the question, "you don't smoke, do you?" leads respondents to state that they do not smoke. "Don't you think that women should be empowered?" In most the cases the respondent is likely to agree with the statement.

6. Avoid Loaded Questions: Loaded questions suggest a socially desirable answer or are emotionally charged. "Should the city government repair all the broken streets?" Most of the people are going to agree with this question simply because this is highly socially desirable. A question which may be challenging the traditionally set patterns of behavior may be considered as emotionally charged i.e. it is loaded with such material which may hit the emotions of the people. Look at some behaviors associated with masculinity in Pakistani society. Let us ask a husband "Have you ever been beaten up by your wife?" Straight away this question may be considered to be a challenge to the masculinity of the person. Hence it may be embarrassing for the person to admit such an experience. Therefore, even if the husband was beaten up by his wife, he might give a socially desirable answer.

7. Avoid Burdensome Questions that may Tax the Respondent's Memory: A simple fact of human life is that people forget. Researchers writing questions about past behavior or events should recognize that certain questions may make serious demand on the respondent's memory. "How did you feel about your brother when you were 6 years old?" It may very difficult to recall something from the childhood.

8. Arrange Questions in a Proper Sequence: The order of question or the question sequence may serve several functions for the researcher. If the opening questions are interesting, simple to comprehend and easy to answer then respondent's cooperation and involvement can be maintained throughout the questionnaire. If respondent's curiosity is not aroused at the outset, they can become disinterested and terminate the interview. Sequencing specific questions before asking about broader issues is a common cause of question order bias. In some situations it may be advisable to ask general question before specific question to obtain the freest opinion of the respondent. This procedure is known as **funnel technique**.

9. Use Filter Question, if Needed: Asking a question that doesn't apply to the respondent or that the respondent is not qualified to answer may be irritating or may cause a biased response. Including filter question minimizes the chance of asking questions that are inapplicable. **Filter question is that question which screens out respondents not qualified to answer a second question.** For example the researcher wants to know about the bringing up of one's children. "How much time do you spend playing games with your oldest child?" What if the respondent is unmarried? Even if the respondent is married but does not have the child. In both these situations the question is inapplicable to him/her. Before this question the person may put a filter question whether or not the respondent is married.

10. Layout of the questionnaire: There are two format or layout issues: **the overall physical layout of the questionnaire and the format of questions and responses.** Good lay out and physical attractiveness is crucial in mail, Internet, and other self-administered questionnaires. For different reason it is also important to have a good layout in questionnaires designed for personal and telephone interviews. Give each question a number and put identifying information on questionnaire. Never cramp questions together or create a confusing appearance. Make a cover sheet or face sheet for each, for administrative use. Put the time and date of the interview, the interviewer, the respondent identification number, and interviewer's comments and observations on it. Give interviewers and respondents instructions on the questionnaire. Print instructions in a different style from question to distinguish them. Lay out is important for mail questionnaires because there is no friendly interviewer to interact with the respondent. Instead the questionnaire's appearance persuades the respondents. In mail surveys, include a polite, professional cover letter on letterhead stationery, identifying the researcher and offering a telephone number for any questions. Always end with "Thank you for your participation."

Lesson 24:

PILOT TESTING OF THE QUESTIONNAIRE

PILOT TESTING OF THE QUESTIONNAIRE: **Pilot testing also called pre-testing means small scale trial run of a particular component;** here we are referring to pilot testing of the questionnaire. Conventional wisdom suggests that **pre-testing not only is an established practice for discovering errors** but also is useful for extra training the research team.

Pilot testing involves the use of a small number of respondents to test the appropriateness of the questions and their comprehension. The main purpose of pilot testing is to identify potential problems with the methods, logistics, and the questionnaire.

Administering a questionnaire exactly as planned in the actual study often is not possible.

WHAT ASPECTS TO BE EVALUATED DURING PILOT TESTING?

- 1. Reactions of Respondents:**
- 2. Discovering errors in the instrument:**
- 3. Sampling procedure can be checked:**
- 4. Staffing and activities of research team can be checked:**
- 5. Procedure for data processing and analysis can be evaluated:**

1. Reactions of Respondents:

The reactions of the respondents can be looked at from different angles. The researcher may be familiar with the local culture; still getting the first hand experience is always useful. Going to the field, contacting the people, and their reactions to the different aspects of research may be a learning experience.

- **Availability of study population timing.** In case we are doing interviewing then pre-testing might help to find out the most appropriate time when the respondent shall be available. The researcher can plan the interviewing accordingly.
- **Acceptability of the questions asked.** An important purpose of pre-testing is to discover participants' reaction to the questions.
- **Pre-testing will also provide the opportunity to see the acceptability of the wording of the questions in the local cultural context.**
- **Willingness of the respondents to co-operate.** Field testing of the questionnaire will give the idea about the level of cooperation the research team is likely to get from the respondents, particularly if they have to interview them.

2. Discovering errors in the instrument:

- **Do the tools provide you the information? Reliability and Suitability for analysis.** Tabulation of the results /of a pretest helps determine whether the questionnaire will meet the objectives of the research.
- **Time taken/needed to interview/conduct the observation.** Pre-testing can indicate the time taken for interview or to conduct the observation. Too long questionnaires may not be recommended and, therefore, need modification. It can also help in estimating average time being taken to collect information from a respondent. Such an exercise can help in budget estimations.
- **If there is any need to revise the format of the tool.** Question arrangement can play a significant role in the success of the instrument. May be we should start with stimulating questions and place sensitive questions last. Such a situation might be handled through pretesting. Therefore, **pre-testing may help in putting questions in proper sequence, using acceptable wording, doing appropriate translation, question spacing, structuring of answers, coding system, and needing instructions for interviewers (probing).**

3. Sampling procedure can be checked:

- **The extent to which instructions given are followed.** Field functionaries are given the instructions for following a sampling procedure. Depending upon the type of sampling to be followed, the field worker must follow the guidelines otherwise the quality of the study will be hampered. During the pre-testing one could see not only the extent to which the instructions are being followed but also locate the problems in carrying out those instructions. Also what could be the solutions to those problems?

- **How much time is needed to locate the respondents?** By following the instructions how easy it is to locate the respondents, and how much time is needed to do that activity. It could help in calculating the overall time for data collection, having relevancy for budgeting the resources.

4. Staffing and activities of research team can be checked:

- **How successful the training has been?** Pre-testing can be seen as a period of extra training. The pre-testing exercise can provide a good opportunity to make an evaluation of the achievement of the objectives of training. For any deficiencies additional training may be provided.
- **What is the work output of each member?** The researcher can calculate the average output of each fieldworker and accordingly calculate the number of workers needed to finish the work on time. It can also help in making the budget estimates.
- **How well the research team works together?** It is a good opportunity to observe the kind of coordination the research team has. The integrated work is likely affect the efficiency of the team. Any shortcomings could be looked after.
- **Is the logistical support adequate?** Of course we are leaving the field functionaries in isolation. They shall be in need of other logistical support like the transportation, boarding, lodging, guidance and supervision. Some of these aspects could also be appraised during the pre-testing

5. Procedure for data processing and analysis can be evaluated:

- **Make dummy tables.** See how can we tabulate the data and use the appropriate statistics for purposes of interpretations

Lesson 25:	INTERVIEWING
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INTERVIEWING: A personal interviewer administering a questionnaire door to door, a telephone interviewer calling from a central location, an observer counting pedestrians in a shopping mall and others involved in the collection of data and the supervision of that process are all **fieldworkers**. The activities they perform vary substantially. The supervision of data collection for a mail survey differs from the data collection in an observation study. Nevertheless there are some basic issues in all kinds of fieldwork. Just for convenience, in this session we shall focus on the interviewing process conducted by personal interviewers. However, many of the issues apply to all fieldworkers, no matter what their specific setting.

WHO CONDUCTS THE FIELDWORK?

Data collection in a sponsored study is rarely carried out by the person who designs the research project. For a student, depending upon the sample size, data collection is usually done by the student himself/herself. However, the data collection stage is crucial, because the research project is no better than the data collected in the field. Therefore, it is important that the research administrator selects capable people who may be entrusted to collect the data.

There are **Field Interviewing Services**, who specialize in data gathering. These agencies perform door-to-door surveys, central location telephone interviewing, and other forms of fieldwork for fee. These agencies typically employ field supervisors who oversee and train interviewers, edit questionnaires completed in the field, and confirm that the interviews have been conducted.

Whether the research administrator hires in-house interviewers or selects a field interviewing service, it is desirable to have fieldworkers meet certain job requirements. Although the job requirements for different types

of surveys vary, normally interviewers should be healthy, outgoing, honest, accurate, responsible, motivated, and of pleasing appearance – well groomed and properly dressed. An essential part of the interviewing process is establishing rapport with the respondent.

In-House Training: After personnel are selected, they must be trained. The training that the interviewer will receive after being selected by a company may vary from virtually no training to one week program. Almost always there will be a **briefing session** on the particular project.

The **objective of training** is to ensure that the data collection instrument is administered uniformly by all fieldworkers. The **goal of training session** is to ensure that each respondent is provided with common information. If the data are collected in a uniform manner from all respondents, the training session will have been success. More extensive training programs are likely to cover the following topics:

1. How to make initial contact with the respondent and secure the interview?
2. How to ask survey questions?
3. How to probe?
4. How to record responses? How to terminate the interview?

The Role of the Interviewer: Survey research interviewing is a specialized kind of interviewing. As with most interviewing, its goal is to obtain accurate information from another person.

The survey interview is a social relationship. Like other social relationships, it involves social roles, norms, and expectations. The interview is a short-term, secondary social interaction between two strangers with the explicit purpose of one person's obtaining specific information from the other. The social roles are those of the interviewer and the interviewee or respondent. Information is obtained in a structured conversation in which the interviewer asks prearranged questions and records answers, and the respondent answers.

The role of interviewer is difficult. They obtain cooperation and build rapport, yet remain neutral and objective. They encroach on respondents' time and privacy for information that may not benefit the respondents. They try to reduce embarrassment, fear, and suspicion so that respondents feel comfortable revealing information. They explain the nature of the survey research or give hints about social roles in an interview. Good interviewers monitor the pace and direction of the social interaction as well as content of the answers and the behavior of the respondents.

Survey interviewers are nonjudgmental and do not reveal their opinions, verbally or nonverbally. If the respondent asks for an interviewer's opinion, he or she politely redirects the respondent and indicate that such questions are inappropriate.

STAGES OF AN INTERVIEW

- ***Making Initial Contact and Securing the Interview***
- ***Asking the Questions***
- ***Probing ---- تفشیش کرنا***
- ***Recording the Responses***
- ***Terminating the Interview***

Making Initial Contact and Securing the Interview

The interview proceeds through stages, beginning with introduction and entry. Interviewers are trained to make appropriate opening remarks that will convince the person that his or her cooperation is important.

Asslaam-o-Alaykum, my name is _____ and I am working for a National Survey Company. We are conducting a survey concerning “women empowerment.” I would like to get a few of your ideas.

For the initial contact in a telephone interview, the introduction might be:

Asslaam-o-Alaykum, my name is _____. I am calling from Department of Social Research, Virtual University.

By indicating that telephone call is a long distance, interviewers attempt to capitalize on the fact that most people feel a long distance call is something special, unusual, or important. Giving one’s personal name personalizes the call.

Personal interviewers may carry a letter of identification that will indicate that the study is bona fide research project and not a salesman’s call. The name of the research agency is used to assure the respondent that the caller is trustworthy.

Asking the Questions

The purpose of the interview is, of course, to have the interviewer ask questions and record the respondent’s answers. Training in the art of stating questions can be extremely beneficial, because interviewer bias can be a source of considerable error in survey research.

There are five major principles for asking questions:

- Ask the questions exactly as they are worded in the questionnaire.
- Read each question very slowly.
- Ask the question in the order in which they are presented in the questionnaire.
- Repeat questions those are misunderstood or misinterpreted.
- Do not take shortcuts when the task becomes monotonous.

Although interviewers are generally trained in these procedures, when working in the field many interviewers do not follow them exactly. Interviewers may shorten questions or rephrase unconsciously when they rely on their memory of the question rather than reading the question as it is worded. If the respondents do not understand a question, they will usually ask for some clarification. The recommended procedure is to repeat the question, or if the respondent does not understand a word, the interviewer should respond with “just whatever it means to you.

Often the respondents volunteer information relevant to a question that is supposed to be asked at a later point in the research. In this situation the response should be recorded under the question that deals specifically with that subject. Then rather than skip the question that was answered out of sequence, the interviewers should be trained to say something like “We have briefly discussed this, but let me ask you....” By asking every question, the interviewer can be sure that complete answers are recorded.

Probing: Probing means the verbal prompts made by field worker when the respondent must be motivated to communicate his or her answer or to enlarge on, clarify or explain an answer. **Probing may be needed for two types of situations. First, it is necessary** when the respondent must be motivated to enlarge on, clarify, or explain his or her answer. The interviewer must encourage the respondent to clarify or expand on answers by providing a stimulus that will not suggest the interviewer’s own ideas. **The ability to probe with neutral stimuli is the mark of an experienced interviewer. Second, probing may be necessary** in situations in which he

respondent begins to ramble or lose track of the question. In such cases the respondent must be led to focus on specific content of the interview and to avoid irrelevant and unnecessary information. Probing is also needed when the interviewer recognizes an irrelevant or inaccurate answer.

He interviewer has several possible probing tactics to choose from, depending on the situation:

- **Repetition of the question.** The respondent who remains completely silent may not have understood the question or may not have decided how to answer it. Mere repetition may encourage the respondent to answer in such cases. For example, if the question is “What is there that you do not like about your supervisor?” and the respondent does not answer, the interviewer may probe: “just to check, is there anything you do not like about your supervisor?”
- **An expectant pause.** If the interviewer believes the respondent has more to say, the “silent probe,” accompanied by an expectant look may motivate the respondent to gather his/her thoughts and give a complete response.
- **Repetition of the respondent’s reply.** As the interviewer records the response, he or she may repeat the respondent’s reply verbatim. This may stimulate the respondent to expand on the answer.
- **Neutral questions or comments.** Asking neutral question may indicate the type of information that the interviewer is seeking. For example, if the interviewer believes that the respondent’s motives should be clarified, he or she might ask, “Why do you feel that way?” If the interviewer feels that there is a need to clarify a word or phrase, then he/she might ask, “What do you mean by _____?”

Recording the Responses: The rules for recording responses to closed ended questions vary with the specific question. The general rule, however, is to place a check in the box that correctly reflects the respondent’s answer.

The general instructions for recording answers to open-ended response questions is to record the answer verbatim, a task that is difficult for most people. Some of the suggestions are:

- Record responses during the interview.
- Use the respondent’s own words.
- Do not summarize or paraphrase the respondent’s answer.
- Include everything that pertains to the question objectives.
- Include all your probes.

Terminating the Interview: Fieldworkers should not close the interview before all the information has been secured. The interviewer whose departure is hasty will not be able to record those spontaneous comments respondents sometimes offer after all formal questions have been asked. Avoiding hasty departures is also a matter

of courtesy. Fieldworkers should also answer to the best of their ability any questions the respondent has concerning the nature and purpose of the study. Always leave by observing the local cultural customs. “Don’t burn

your bridges.” Because the fieldworker may be required to re-interview the respondent at some future time, he or she should leave the respondent with positive feeling about having cooperated in a worthwhile undertaking. It

is extremely important to thank the respondent for his or her cooperation. The interviewer then goes to a quiet and private place to edit the questionnaire and record other details such as the date, time, and place of interview; a thumbnail sketch of the respondent and interview situation, the respondent's attitude; and any unusual circumstances. The interviewer also records personal feelings and anything that was suspected.

PRINCIPLES OF INTERVIEWING (The Basics)

- *Have integrity and be honest.* This is the cornerstone of all professional inquiry, regardless of its purpose.
- *Have patience and tact.* Interviewers ask for information from people they do not know. Thus all the rules of human relations that apply to inquiry situations – patience, tact, courtesy – apply “in spades” to interviewing.
- *Have attention to accuracy and detail.* Among the greatest interviewing “sins” are inaccuracy and superficiality, for the professional analyst can misunderstand, and in turn mislead, a client. Do not record the answer unless you fully understand it yourself. Probe for clarification and detailed full answers.
- *Exhibit a real interest in the inquiry at hand, but keep your opinions to yourself.* Impartiality is imperative.
- *Be a good listener.* Some interviewers talk too much, wasting time when respondents could be supplying more pertinent facts or opinions on the topic.
- *Keep the inquiry and respondents' responses confidential.* Do not discuss the studies you are doing with relatives, friends, or associates. Never quote one respondent's opinion to another.
- *Respect others' rights.* Survey research depends on the goodwill of others to provide information. There should be no coercion زبردستی. Impress on prospective respondents that their cooperation is important and valuable.

INTERVIEW BIAS -----میلان/طرف داری/ارحجان

- Information obtained during interview should be as free as possible of bias.
- Bias could be introduced by the interviewer, interviewee, or the situation.

Interviewer Bias :Interviewer bias falls into six categories:

1. Interviewer could bias the data if proper rapport is not established Errors by the respondent – forgetting, embarrassment, misunderstanding, or lying because of the presence of others.
2. Unintentional errors or interviewer sloppiness – contacting the wrong person, misreading a question, omitting questions, reading questions in the wrong order, recording wrong answer, or misunderstanding the respondent.
3. Intentional subversion by the interviewer – purposeful alteration of answers, omission or rewording of questions, or choice of an alternative respondent.
4. Influence due to the interviewer's expectations about a respondent's appearance, living situation, or other answers.
5. Failure of an interviewer to probe or to probe properly.
6. Influence on the answers due to the interviewer's appearance, tone, attitude, reactions to answers, or comments made outside of the interview schedule.

Interviewee Bias: Errors made by the respondent can be

1. Interviewees can bias the data when they do not come out with their true opinion but provide information that they think what the interviewer expects of them or would like to hear.
2. They do not understand the question, they may feel difficult or hesitant to clarify.

3. Some interviewees may be turned off because of the personal liking, or the dress of the interviewer, or the manner in which questions are put. So they may not provide truthful answers.

4. Some may provide socially undesirable answers.

Situational Bias: Situational biases in terms of:

1. Non-participants – Unwillingness or inability to participate. Bias the sample.

2. Trust levels and rapport established by different interviewers. Elicit answers of different degrees of openness.

3. The physical setting of the interview. Respondent may not feel comfortable to be interviewed at work.

SOME TIPS FOR INTERVIEWING

- Know the culture of the people in advance.
- Appearance – wear acceptable dress.
- Pleasantness and flexibility.
- Carry the letter of authority.
- Establish credibility and rapport. Motivating individuals to respond.
- Familiarity with the questionnaire.
- Following the question wording/ question order
- Recording responses exactly.
- Probing for responses.
- Closing the interview. No false promises. Also don't burn your bridges.
- Edit the questionnaire in the first available opportunity.

Lesson 26:

SAMPLE AND SAMPLING TERMINOLOGY

SAMPLE: A sample is a subset, or some part, of a larger whole. A larger whole could be anything out which sample is taken. That 'whole' could be a bucket of water, a bag of sugar, a group of organizations, a group of students, a group of customers, or a group mid-level managers in an organization. A complete group of entities sharing some common set of characteristics is population. In other words, the totality out of which sample is drawn is referred to as **population**.

WHY SAMPLE?

1. *Saves Cost, Labor, and Time*
2. *Quality Management/supervision*
3. *Accurate and Reliable Results*
4. *Sampling may be the Only Way*
5. *Determine the Period of Study*

1. Saves Cost, Labor, and Time

Applied research projects usually have budget and time constraints. Since sample can save financial cost as well as time, therefore, to go for sample study is pragmatic. Of course, a researcher investigating a population with an extremely small number of population elements may elect to conduct a study on the total population rather than a sample because cost, labor, and time constraints are relatively insignificant. Although sample study cuts costs, reduces labor requirements, and gathers vital information quickly, yet there could be other reasons.

2. Quality Management/supervision

Professional fieldworkers are a scarce commodity. In a large study rather than employing less qualified staff it may be advisable to do a sample study and employ highly qualified professional fieldworkers. It can certainly affect the quality of the study. At the same time it may be easier to manage a small group and produce quality information. Supervision, record keeping, training, and so forth would all be more difficult in a very large study.

3. Accurate and Reliable Results

Another major reason for sampling is that samples, if properly selected, are sufficiently accurate in most of the cases. If the elements of a population are quite similar, only a small sample is necessary to accurately portray

the characteristics of interest. Most of us have had blood samples taken from the finger, the arm, or another part of body. The assumption is that blood is sufficiently similar through out the body, the characteristics of the blood can be determined on the basis of sample.

When the elements of population are highly homogenous, samples are highly representative of the population. Under these circumstances almost any sample is as good as another. Samples may be more accurate than census. In a census study of large population there is a greater likelihood of non-sampling errors. In a survey mistakes may occur that are unrelated to the selection of people in the study. For example, a response may be coded incorrectly, or the keyboard operator might make data entry error. Interviewer mistakes, tabulation errors, and other non-sampling errors may increase during census because of the increased volume of work. In sample increased accuracy is possible because the fieldwork and tabulation of the data can be closely supervised than would be possible in a census. In field survey, a small, well trained, closely supervised group may do a more careful and accurate job of collecting information than a large group of nonprofessional interviewers trying to contact everyone.

4. Sampling may be the Only Way

Many research projects, especially those in quality control testing, require the destruction of the items being tested. If the manufacturer of firecrackers wished to find out whether each product met a specific production standard, there would be no product left after testing. Similarly, consider the case of electric bulbs. In testing the life of bulbs, if we were to burn every bulb produced, there would be none left to sell. This is destructive sampling.

5. Determine the Period of Study

Interviewing every element of a large population without sampling requires lot of time, may be a year or more. In such a long period study, even the seasonal variation may influence the response pattern of the respondents. For example, if the study was aimed at measuring the level of unemployment in a given large city, the unemployment rate produced by the survey data would not refer to the city as of the beginning of interviewing or as of the end. Researcher may be forced to attribute the unemployment to some hypothetical date, representing to the midpoint of the study period. Hence it will be difficult to determine the exact timing to which the data of the study pertains.

SAMPLING TERMINOLOGY

There are a number of technical terms used in books on research and statistics which need explanation. Some of the important terms are:

Element: An element is that unit about which information is collected and which provides the basis of analysis.

Typically, in survey research, elements are people or certain types of people. It is that unit about which information is collected and that provides the basis of analysis. It can be a person, groups, families, organizations, corporations, communities, and so forth.

Population: A population is the theoretically specified aggregation of study elements. It is translating the abstract concept into workable concept. For example, let us look at the study of “college students.” Theoretically who are the college students? They might include students registered in government colleges and/or private colleges, students of intermediate classes and/or graduate classes, students of professional

colleges and/or non-professional colleges, and many other variations. In this way the pool of all available elements is population.

Target Population: Out of the conceptual variations what exactly the researcher wants to focus on. This may also be called a target population. Target population is the complete group of specific population elements relevant to the research project. Target population may also be called *survey population* i.e. that aggregation of elements from which the survey sample is actually selected. At the outset of the sampling process, it is vitally important to carefully define the target population so the proper source from which the data are to be collected can be identified. In our example of ‘college students’ finally we may decide to study the college students from government institutions located in Lahore, who are studying social sciences, who are aged 19 years of age, and hailing from rural areas.

Sampling: The process of using a small number of items or parts of a larger population to make conclusions about

the whole population. It enables the researchers to estimate unknown characteristics of the population.

Sampling Frame: In actual practice the sample will be drawn from a list of population elements that is often different from the target population that has been defined. A sampling frame is the list of elements from which the sample may be drawn. A simple example could be listing of all college students meeting the criteria of target population and who are enrolled on the specified date. A sampling frame is also called the *working population* because it provides the list that can be worked with operationally. In our example, such a list could be prepared with help of the staff of the selected colleges.

Sampling Frame Error: A sampling frame error occurs when certain sample elements are excluded or when the entire population is not accurately represented in the sampling frame. The error that occurs when certain sample elements are not listed or available and are not represented in the sampling frame.

Sampling Unit: A sampling unit is that element or set of elements considered for selection in some stage of sampling. Sampling may be done in single stage or in multiple stages. In a simple, single-stage sample, the sampling units are the same as the elements. In more complex samples, however, different levels of sampling units may be employed. For example, a researcher may select a sample of *Mohallahs* in a city, and then select a sample of households from the selected *Mohallahs*, and finally may select a sample of adults from the selected households. The sampling units of these three stages of sampling are respectively *Mohallah*, households, and adults, of which the last of these are the elements. More specifically, the terms “primary sampling units,” “secondary sampling units,” and “final sampling units” would be used to designate the successive stages.

Observation Unit: An observation unit, or unit of data collection, is an element or aggregation of elements from which the information is collected. Often the unit of analysis and unit of observation are the same – the individual

person – but this need not be the case. Thus the researcher may interview heads of household (the observation units) to collect information about every member of the household (the unit of analysis).

Parameter: A parameter is the summary description of a given variable in a population. The mean income of all families in a city and the age distribution of the city’s population are parameters. An important part portion of survey research involves the estimation of population parameters on the basis of sample observation.

Statistic: A statistic is the summary description of a given variable in a survey sample. Thus the mean income computed from the survey sample and the age distribution of that sample are statistics. Sample statistics are used to make estimates of the population parameters.

Sampling Error: Probability sampling methods seldom, if ever, provide statistics exactly equal to the parameters that they are used to estimate. Probability theory, however, permits us to estimate the error to be expected for a given sample (more information to be sought from professional in Statistics).

Lesson 27:	PROBABILITY AND NON-PROBABILITY SAMPLING
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PROBABILITY AND NON-PROBABILITY SAMPLING: There are several alternative ways of taking a sample. The major alternative sampling plans may be grouped into probability techniques and non-probability techniques.

In **probability sampling** every element in the population has a *known nonzero probability* of selection. The simple random is the best known probability sample, in which each member of the population has an equal probability of being selected. Probability sampling designs are used when the representativeness of the sample is of importance in the interest of wider generalizeability.

When time or other factors, rather than generalizeability become critical then non-probability sampling is generally used. In **non-probability sampling** the probability of any particular element of the population being chosen is *unknown*. The selection of units in non-probability sampling is quite arbitrary, as researchers rely heavily on personal judgment. It should be noted that *there are no appropriate statistical techniques for measuring random sampling error from a non-probability sample*. Thus projecting the data beyond the sample is statistically inappropriate. Nevertheless, there are occasions when non-probability samples are best suited for the researcher's purpose.

Types of non-probability sampling: In non-probability sampling designs, the elements in the population do not have any probabilities attached to their being chosen as sample subjects. This means that the findings from the study of the sample cannot be confidently generalized to the population. Sometimes non-probability could be the only way to collect the data.

1. **Convenience Sampling**
2. **Purposive Sampling**
3. **Quota Sampling**
4. **Snowball Sampling**
5. **Sequential Sampling**
6. **Theoretical Sampling**

1. **Convenience Sampling:** Convenience sampling (also called *haphazard or accidental sampling*) refers to sampling by obtaining units or people who are most conveniently available. For example, it may be convenient and economical to sample employees in companies in a nearby area. The person-on-the street interview conducted by TV programs is another example. Another example of haphazard sample is that of a newspaper that asks the readers to clip a questionnaire from the paper and mail it in but the sample cannot be used to generalize accurately to the population.

Convenience samples are least reliable but normally the cheapest and easiest to conduct. Convenience sampling is most often used during the exploratory phase of a research project.

2. **Purposive Sampling:** Depending upon the type of topic, the researcher lays down the criteria for the subjects to be included in the sample. Whoever meets that criteria could be selected in the sample. The

researcher might select such cases or might provide the criteria to somebody else and leave it to his/her judgment for the actual selection of the subjects. That is why such a sample is also called as **judgmental or expert opinion sample**.

3. **Quota Sampling:** A sampling procedure that ensures that certain characteristics of a population sample will be represented to the exact extent that the researcher desires. In this case the researcher first identifies relevant categories of people (e.g. male and female; or under age 30, ages 30 to 60, over 60, etc) then decides how many to get in each category. Thus the number of people in various categories of sample is fixed. This is quota sampling. Once the quota has been fixed then the researcher may use convenience sampling. The convenience sampling may introduce **bias**. Speed of data collection, lower costs, and convenience are the major advantages of quota sampling compared to probability sampling. Quota sampling becomes necessary when a subset of a population is underrepresented, and may not get any representation if equal opportunity is provided to each.

4. **Snowball Sampling:** Snowball sampling (also called *network*, *chain referral*, or *reputational sampling*) is a method for identifying and sampling (or selecting) cases in the network. It is based on an analogy to a snowball, which begins small but becomes larger as it is rolled on wet snow and picks up additional snow. It begins with one or a few people or cases and spreads out on the basis of links to the initial cases. This design has been found quite useful where respondents are difficult to identify and are best located through referral networks. In the initial stage of snowball sampling, individuals are discovered and may or may not be selected through probability methods. This group is then used to locate others who possess similar characteristics and who, in turn, identify others. The “snowball” gather subjects as it rolls along. For example, a researcher examines friendship networks among teenagers in a community.

5. **Sequential Sampling:** Sequential sampling is similar to purposive sampling with one difference. In purposive sampling, the researcher tries to find as many relevant cases as possible, until time, financial resources, or his or her energy is exhausted. The principle is to get every possible case. For example, a researcher locates and plans in-depth interviews with 60 widows over 70 years old who have been living without a spouse for 10 or more years. Depending on the researcher’s purposes, getting an additional 20 widows whose life experiences, social background, and worldview differ little from the first 60 may be unnecessary.

6. **Theoretical Sampling:** In theoretical sampling, what the researcher is sampling (e.g. people, situation, events, time periods, etc.) is carefully selected, as the researcher develops grounded theory. A growing theoretical interest guides the selection of sample cases. The researcher selects cases based on new insights they may provide. For example, a field researcher may be observing a site and a group of people during week days. Theoretically, the researcher may question whether the people act the same at other times or when other aspects of site change. He or she could then sample other time periods (e.g. nights and weekends) to get more full picture and learn whether important conditions are the same.

Lesson 28:	TYPES OF PROBABILITY SAMPLING
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TYPES OF PROBABILITY SAMPLING: Probability samples that rely on random processes require more work than nonrandom ones. A researcher must identify specific sampling elements (e.g. persons) to include in the sample. For example, if conducting a telephone survey, the researcher needs to try to reach the specific sampled person, by calling back several times, to get an accurate sample.

Random samples are most likely to yield a sample that truly represents the population. In addition, random sampling lets a researcher statistically calculate the relationship between the sample and the population – that is the **size of sampling error**. A non-statistical definition of the sampling error is the deviation between sample result and a population parameter due to random process.

1. Simple Random Sample:
2. Systematic Random Sample:
3. Stratified Random Sample:
4. Multistage Sampling:
5. Cluster Sampling:
6. Double Sampling:

1. **Simple Random Sample:**

- Assumption –homogeneous population.
- Develop an accurate sampling frame.
- Locate the exact element/s to be selected i.e. decide the sample size.
- Number all the elements in the sampling frame.
- Use the list/table of random numbers.

2. **Systematic Random Sample:**

- Short cut for simple random sampling.
- Number each element in the sampling frame.
- Instead of using the table of random numbers, researcher develops a system for the selection of elements.
- Calculate the sampling interval. Basis of random selection
- Sample size/Population size X 100 i.e. sample as % of Pop.
- Begin with a random start.
- Draw sample by choosing every Nth case.
- If elements are organized in some pattern in the sampling frame then problem. Possible periodicity in population.

3. **Stratified Random Sample:**

- In case population is heterogeneous, then stratify. Each stratum in itself becomes homogeneous.
- Researcher's decision about homogeneity of the population.
- Draw the sample from each stratum by using simple random sampling procedure.

Reasons for stratification: There are three reasons why a researcher chooses a stratified random sample:

- To increase a sample's statistical efficiency. Each stratum gets represented. Reduces random sampling error makes the sample representative.
- Provides adequate data for analyzing the various subpopulations.
- Enables to use different research procedures in different strata.

Stratification Process: The ideal stratification would be based on the primary variable (the dependent variable) under study. The criterion is identified as an efficient basis for stratification. The criterion for stratification is that it is a characteristic of the population elements known to be related to the dependent variable or other variables of interest. The variable chosen should increase homogeneity within each stratum and increase heterogeneity between strata. Next, for each separate subgroup or stratum, a list of population

elements must be obtained. Serially number the elements within each stratum. Using a table of random numbers or some other device, a separate simple random sample is taken within each stratum. Of course the researcher must determine how large a sample must be drawn from each stratum.

4. **Cluster Sampling:**

- Purpose: sample economically and retaining probability sampling.
- Heterogeneity within clusters but homogeneity between clusters.
- Random selection of clusters.
- Random selection of elements within the selected clusters.
- Cluster sampling addresses two problems
- Researchers lack good sampling frame for dispersed population
- Reaching each sampled element is costly.
- The unit costs of cluster sampling are much lower than those of other probability sampling designs.
- However, cluster sampling exposes itself to greater biases at each stage of sampling.

5. **Multistage Sampling**

- Researcher draws several samples in stages. For example:
- Cluster sampling is usually multistage
 - Stage 1– Random sampling of big clusters
 - Stage 2– Random sampling of small clusters within the big ones
 - Stage 3– Random sampling of elements within the selected small clusters
- City blocks – households – individuals

6. **Double Sampling:**

- When further information is needed from a subset of the group from which some information has already been collected for the same study.
- Want to examine the matter in more detail.
- Sub-sample of the primary sample

What is the Appropriate Sample Design? The most common criteria for appropriate sample design is:

1. **Degree of Accuracy**
2. **Resources**
3. **Advance Knowledge of the Population**
4. **National versus Local Project (Geographic proximity of population)**
5. **Need for Statistical Analysis**

1.**Degree of Accuracy:** Selecting a representative sample is important to all researchers.

2.**Resources:** The costs associated with different sampling techniques vary tremendously. If the researcher's financial and human resources are restricted then this limitation of resources will eliminate certain methods.

3.**Advance Knowledge of the Population:** Advance knowledge of population characteristics is an important criterion. A lack of adequate list may automatically rule out any type of probability sampling.

4.**National versus Local Project:** Geographic proximity of population elements will influence sample design. When population elements are unequally distributed geographically a cluster sampling may become more attractive.

5.**Need for Statistical Analysis:** The need for statistical projections based on the sample is often a criterion.

Lesson 29:

DATA ANALYSIS

DATA ANALYSIS:

- Data processing and analysis is part of research design –decisions already made.
- During analysis several interrelated procedures are performed to summarize and rearrange data.
- Goal of most research is to provide information.
- **Information:** a body of facts that are in a format suitable for decision making.

- **Data:** simply recorded measures of certain phenomenon.

STAGES OF DATA ANALYSIS

1. **Editing**
2. **Coding**
3. **Data Entry**
4. **Data Cleaning**

Transformation of raw data into information

- It is a lengthy process. Starts with: Editing, coding, and data storage.
- For storage and processing, many advantages to use computer.
- For computer storage follow the coding procedure.

Errors

- Possibility of mistakes by fieldworker's e.g. Recording improbable answer, Interviewing ineligible respondent, Contradictory answers
- Editing should take care of such mistakes prior to coding

1. Editing

- Process of checking and adjusting the data for omissions, legibility and consistency.
- Purpose is to ensure the completeness, consistency and readability of data to be transferred storage.
- Editor may have to reconstruct some data (weekly income converted into monthly income)
- Bring to light the hidden values without bias.
- Editing is not coding because Coding is assignment of numbers of symbols to previously edited data.
- Editing can be field editing or In-house Editing.

• ***Field Editing***

- Fieldworkers and then supervisors to do the field edits.
- Do the editing the same day.
- Catch technical omissions (blank page)
- Check legibility of hand writing.
- Clarify inconsistent responses.
- Supervisor can question the interviewers.
- Callback if needed.
- Do the interviewers need additional training?

• ***In-House Editing***

- Rigorously investigates the results of data collection.
- For mailed questionnaire in-house editing is the only option.

- ***Editing for consistency:*** Adjust the inconsistent and contradictory responses and Editor should adjust for consistency.
- ***Editing for completeness:*** Editor to complete the missing answer.
- Editing questions answered out of order.
- Tabulation of “don't know”

2. Coding

- Coding involves assigning numbers or other symbols –responses can be grouped into classes or categories
- Helps in efficient analysis of data.
- Keep the data in raw form so far it is possible. Computer can help in grouping.

- Codes allow data processing in a computer.
- Organize data into field, record and file.
 - **A field:** collection of characters (single No., letter, symbol) representing single type of data.
 - **A record:** collection of related fields.
 - **A file:** collection of related records.
- File, records, and fields are stored on magnetic tapes, floppy disks, or hard drives.
- Researchers use a coding procedure and codebook.
- A **coding procedure** is a set of rules stating that certain numbers are assigned to variable attributes. For example, a researchers codes males as 1 and females as 2.
- A **codebook** is a document (i.e. one or more pages) describing the coding procedure and the location of data for variables in a format that computers can use.
- A survey researcher pre-codes a questionnaire before collecting the data. Pre-coding means placing the code categories (e.g. 1 for male, 2 for female) on the questionnaire. Next, the researcher transfers the information from each questionnaire into a format that computers can read.
- **Code Construction:** When the question has a fixed-alternative (closed ended) format, the number of categories requiring codes is determined during the questionnaire design stage. The codes 8 and 9 are conventionally given to “don’t know” (DK) and “no answer” (NA) respectively.
- **There are two basic rules for code construction.**
 - Coding categories should be exhaustive i.e. coding category provided for every possible response.
 - Coding categories should be mutually exclusive and independent.
- A major objective in code-building process is to accurately transfer the meaning from written answers to numeric codes.
- **Code Book:** A book identifying each variable in a study and its position in the data matrix. The book is used to identify a variable’s description, code name, and field.
- **Production Coding:** Transferring the data from the questionnaire or data collection form after the data have been collected is called production coding. Depending upon the nature of the data collection form, codes may be written directly on the instrument or on a special coding sheet.

3. Data Entries

- The process of transforming data from the research project to computers.
- Optical scanning systems may be used to read material directly to the computer’s memory into the computer’s memory. Optical scanners process the marked-sensed questionnaires and store the answers in a file.

4. Cleaning Data

- The final stage in the coding process is the error checking and verification, or “data cleaning” stage.
- Error checking and verification –make sure that all codes are legitimate.
- No errors in coding process, as well as entering data into a computer.

Lesson 30:	DATA TRANSFORMATION
DATA TRANSFORMATION:	

Data transformation is the process of changing data from their original form to a format that is more suitable to perform a data analysis that will achieve the research objectives.

- Researchers often modify the values of a scalar data or create new variables.
- Collapsing or combining categories of a variable is a common data transformation that reduces the number of categories. For example five categories of Likert scale response categories to a question may be combined like: the “strongly agree” and the “agree” response categories are combined. The “strongly disagree” and the “disagree” response categories are combined into a single category. The result is the collapsing of the five-category scale down to three. We had constructed number of statements on each element with 5 response categories using **Likert scale i.e. strongly agree, agree, undecided, disagree, and strongly disagree.**
- Creating new variables by re-specifying the data numeric or logical transformations is another important data transformation.
- The researchers have created numerous different scales and indexes to measure social phenomenon. For example scales and indexes have been developed to measure the degree of formalization in bureaucratic organization, the prestige of occupations, the adjustment of people in marriage, the intensity of group interaction, the level of social activity in a community and the level of socio-economic development of a nation.

Keep it in mind that

- **Very social phenomenon can be measured.** Some constructs can be measured directly and produce precise numerical values (e.g. family income). Other constructs require the use of surrogates or proxies that indirectly measure a variable (e.g. job satisfaction).
- **A lot can be learned from measures used by other researchers.** We are fortunate to have the work of thousands of researchers to draw on. It is not always necessary to start from a scratch. We can use a past scale or index or we can modify it for our own purposes. The process of creating measures for a construct evolves over time.
- **Measurement is an ongoing process with constant change;** new concepts are developed, theoretical definitions are refined, and scales or indexes that measure old or new constructs are improved.

INDEXES AND SCALES

- **Scales and indexes are often used interchangeably.** One researcher’s scale is another’s index.
- Both produce ordinal or interval level measures of variable. To add to the confusion, scale and index techniques can be combined in one measure.
- **Scales and indexes give a researcher more information about variables and make it possible to assess the quality of measurement.**
- Scales and indexes increase reliability and validity.
- They aid in **data reduction**; that is condense and simplify the information that is collected.

A scale is a measure in which the researcher captures the intensity, direction, level, or potency of a variable construct. It arranges responses or observation on a continuum. A scale can use single indicator or multiple indicators. **Most are at the ordinal level of measurement.**

An index is a measure in which a researcher adds or combines several distinct indicators of a construct into a single score. This composite score is often a simple sum of multiple indicators. It is used for content or convergent validity. **Indexes are often measured at the interval or ratio level.**

Researchers sometimes combine the features of scales and indexes in a single measure. This is common when a researcher has several indicators that are scales. He or she then adds these indicators together to yield a single score, thereby an index.

UNIDIMENSIONALITY: It means that all the items in a scale or index fit together or measure a single construct. It says if you combine several specific pieces of information into a single score or measure, have all the pieces measure the same thing (Each sub dimension is part of the construct’s overall content). **For example,** we define the construct “feminist ideology” as a general ideology about gender. Feminist ideology is a highly abstract and general construct. It includes a specific beliefs and attitudes towards

social, economic, political, family, sexual relations. The ideology's five belief areas parts of a single general construct. The parts are mutually reinforcing and together form a system of beliefs about dignity, strength, and power of women.

INDEX CONSTRUCTION: An index is combination of items into a single numerical score. Various components or subgroups of a construct are each measured and then combined into one measure.

There are many types of indexes. For example, if you take an exam with 25 questions, the total number of questions correct is a kind of index. It is a composite measure in which each question measures a small piece of knowledge, and all the questions scored correct or incorrect are totaled to produce a single measure. One way to demonstrate that indexes are not a very complicated is to use one. Answer yes or no to the seven questions that follow on the characteristics of an occupation. Base your answers on your thoughts regarding the following four occupations: long-distance truck driver, medical doctor, accountant, telephone operator. Score each answer 1 for yes and 0 for no.

1. Does it pay good salary?
2. Is the job secure from layoffs or unemployment?
3. Is the work interesting and challenging?
4. Are its working conditions (e.g. hours, safety, time on the road) good?
5. Are there opportunities for career advancement and promotion?
6. Is it prestigious or looked up to by others?
7. Does it permit self-direction and the freedom to make decisions?

Total the seven answers for each of the four occupations. Which had the highest and which had the lowest score? The seven questions are our operational definition of the construct good occupation.

Each question represents a subpart of our theoretical definition. Creating indexes is so easy that it is important to be careful that every item in the index has face validity. Items without face validity should be excluded. Each part of the construct should be measured with at least one indicator. Of course, it is better to measure the parts of a construct with multiple indicators.

WEIGHTING: An important issue in index construction is whether to weight items. Unless it is otherwise stated, assume that an index is un-weighted. Likewise, unless we have a good reason for assigning different weights, use equal weights. A weighted index gives each item equal weight. It involves adding up the items without modification, as if each were multiplied by 1 (or - 1 for negative items that are negative).

Lesson 31:	DATA PRESENTATION
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Tables and graphs (pictorial presentation of data) may simplify and clarify the research data. Tabular and graphic representation of data may take a number of forms, ranging from computer printouts to elaborate pictographs. The purpose of each table or graph, however, is to facilitate the summarization and communication of the meaning of the data. Although there are a number of standardized forms for presenting data in table or graphs, the creative researcher can increase the effectiveness of particular presentation. Bar charts, pie charts, curve diagrams, pictograms, and other graphic forms of presentation create a strong visual impression.

Commercial packages eliminate the need to write a new program every time you want to tabulate and analyze data with a computer. SAS, Statistical Package for the Social Sciences (SPSS), SYSTAT, Epi. Info. And MINITAB is commonly used statistical packages. These user friendly packages emphasize statistical calculations and hypothesis testing for varied types of data. They also provide programs for entering and editing data. Most of these packages contain sizeable arrays of programs for descriptive analysis and univariate, bivariate, and multivariate statistical analysis.

RESULTS WITH ONE VARIABLE (FREQUENCY DISTRIBUTION): Several useful techniques for displaying data are in use. The easiest way to describe the numerical data of one variable is with a frequency distribution. It can be used with nominal-, ordinal-, interval-, or ratio-level data and takes many forms. For example we have data of 400 students. We can summarize the data on the gender of the students at a glance with raw count or a frequency distribution. We can present the same information in a

graphic form. Some common types of graphic presentations are the histograms, bar chart, and pie chart. Bar charts or graphs are used for discrete variables. They can have vertical or horizontal orientation with small space between the bars. The terminology is not exact, but histograms are usually upright bar graphs for interval or ratio data.

Table 1: Frequency distribution of students

Gender	Frequency	Percent
Male	300	75
Female	100	25
Total	400	100

The presented data has to be interpreted. The purpose of interpretation is to explain the meanings of the data so that we can make inferences and formulate conclusions.

In order for interpretation, the data have to be meaningfully analyzed. For purposes of analysis the researchers use statistics. The word statistics has several meanings. It can mean a set of collected numbers (e.g. numbers telling how many people living in a city) as well as a branch of applied mathematics used to manipulate and summarize the features of numbers.

Descriptive statistics describe numerical data. They can be categorized by the number of variables involved: univariate, bivariate, or multivariate (for one, two, and three or more variables). Univariate statistics describe one variable.

Researchers often want to summarize the information about one variable into a single number. They use three measures of central tendency, or measures of the center of the frequency distribution: mean, median and mode, which are often called averages (a less precise and less clear way to say the same thing). The mode is simply the most common or frequently occurring number. The median is the middle point. The mean also called the arithmetic average, is the most widely used measure of central tendency. A particular central tendency is used depending upon the nature of the data.

Univariate table for age

• Table 2: Age of the respondents

Age (Yrs.)	Frequency	Percent
Under 40	1000	33.3
40 – 60	1000	33.3
61 +	1000	33.3
Total	3000	100

Univariate table for attitude

• Table 3: Attitude towards women empowerment

Attitude	Frequency	Percent
Hi Favorable	1100	37
Med Favorable	1050	35
Lo Favorable	850	28
Total	3000	100

BIVARIATE TABLES: The bivariate contingency table is widely used. The table is based on cross-tabulation (cross classification); that is the cases are organized in the table on the basis of two variables at the same time.A contingency table is formed by cross-tabulating the two or more variables.

CONSTRUCTING PERCENTAGE TABLES: It is to construct a percentage table, but there are ways to make it look professional. Let us take two variables like the age of the respondents and their attitude towards “women empowerment.” Assuming that age affects the attitude towards women empowerment let us hypothesize: the lower the age, the higher the favorable attitude towards “women empowerment.” The age range of the respondents is 25 to 70, and the attitude index has three categories of “highly favorable,” “medium favorable,” and “low favorable.” The age variable has so many categories that making a table with that number becomes unwieldy and meaningless. Therefore, we regroup (recode) the age categories into three i.e. under 40 years, 40 – 60 years, and 61 + years.

Bivariate table

• Table 4: Age by attitude towards women empowerment

	Age (in years)						
Level of attitude	under 40		40 –60		61 +		Total
	F	%	F	%	F	%	
Hi Favorable	600	60	300	30	200	20	1100 37
Med. Favorable	300	30	500	50	250	25	1050 35
Lo Favorable	100	10	200	20	500	50	800 28
Total	1000	100	1000	100	1000	100	3000 100

Lesson 32:

THE PARTS OF THE TABLE

Each table has following seven parts

1. Give each table a number.
2. Give each table a title.
3. Label the row and columns variables and give name to each of the variable categories.
4. Include the totals of the columns and rows. These are called *marginals*.
5. Each place that corresponds to the intersection of a category for each variable is a *cell of a table*.
6. The numbers with the labeled variable categories and the totals are called the *body of the table*.
7. If there is missing information, report the number of missing cases near the table.

Researchers convert raw count tables into percentages to see bi-variate relationship. **There are three ways to percentage a table: by row, by column, and for the total.**

Reading a percentage Table: Once we understand how table is made, reading it and figuring out what it says are much easier. To read a table, first look at the title, the variable labels, and any background information. Next, look at the direction in which percentages have been computed – in rows or columns.

Researchers read percentaged tables to make comparisons. Comparisons are made in the opposite direction from that in which percentages are computed. **A rule of thumb is to compare across rows if the table is percentaged down (i.e. by column) and to compare up and down in columns if the table is percentaged across (i.e. by row).**

It takes practice to see a relationship in a percentaged table.

- **If there is no relationship in a table, the cell percentages look approximately equal across rows or columns.**
- **A linear relationship looks like larger percentages in the diagonal cells.**
- **If there is curvilinear relationship, the largest percentages form a pattern across cells.** For example, the largest cells might be the upper right, the bottom middle, and the upper left. It is easiest to see a relationship in a moderate-sized table (9 to 16 cells) where most cells have some cases (at least five cases are recommended) and the relationship is strong and precise.

Linear relationship

• Table 4: Age by attitude towards women empowerment

Age (in years)								
Level of attitude	under 40		40 –60		61 +		Total	
	F	%	F	%	F	%	F	%
Hi Favorable	600	60	300	30	200	20	1100	37
Med. Favorable	300	30	500	50	250	25	1050	28
Lo Favorable	100	10	200	20	500	50	800	28
Total	1000	100	1000	100	1000	100	3000	100

• **Larger percentages in the diagonal cells**

Statistical Control: Showing an association or relationship between two variables is not sufficient to say that an independent variable *causes* a dependent variable. In addition to temporal order and association, a researcher must eliminate **alternative explanations** (Explanations that can make the hypothetical relationship spurious). In experimental research, researchers do this **by choosing a research design** that physically controls potential alternative explanations for results (i.e. that threaten internal validity). In non-experimental research, a researcher controls for alternative explanations with **statistics**. He or she measures possible alternative explanations with *control variables*, and then examines the control variables with multivariate tables and statistics that help him or her to decide whether a bivariate relationship is spurious.

A researcher controls for alternative explanation in multivariate (more than two variables) analysis by introducing a third (sometimes fourth, or fifth) variable.

Statistical control is a key idea in advanced statistical techniques. A measure of association like the correlation co-efficient only suggests a relationship. Until a researcher considers control variables, the bivariate relationship could be spurious. Researchers are cautious in interpreting bivariate relationships until they have considered control variables.

After they introduce control variables, researchers talk about the *net effect* of an independent variable.

There are two ways to introduce control variables: trivariate percentaged tables and multiple regression analysis.

1. Constructing Trivariate Tables:
2. Multiple Regression Analysis:

1. **Constructing Trivariate Tables:**

Trivariate tables differ slightly from bivariate tables; they consist of multiple bivariate tables. A trivariate table has a bivariate table of the independent and dependent variable for each category of the control variable. These new tables are called *partials*. The number of partials depends on the number of categories in control variable. **Partial tables look like bivariate tables but they use a subset of the cases.**

Trivariate tables have three limitations.

1. First, they are difficult to interpret if a control variable has more than four categories.
2. Second, control variables can be at any level of measurement, but interval or ratio control variables must be grouped (i.e. converted to an ordinal level), and how cases are grouped can affect the interpretation of effects.
3. Finally, the total number of cases is a limiting factor because the cases are divided among cells in partials. The number of cells in the partials equals the number of cells in the bivariate relationship multiplied by the number of categories in the control variables.

An example of a trivariate table with “gender” as control variable for the bivariate table is shown here:

Partial table for males								
Level of Attitude	Age (in years)						Total	
	Under 40		40—60		61+			
	F	%	F	%	F.	%	F.	%.
High	300	60	200	33	30	6	530	33
Medium	140	28	270	45	120	24	530	33
Low	60	12	130	22	350	70	540	34
Total	500	100	600	100	500	100	1600	100

Partial table for females								
Level of Attitude	Age (in years)						Total	
	Under 40		40—60		61+			
	F	%	F	%	F.	%	F.	%.
High	350	70	200	50	20	4	570	41
Medium	150	30	150	38	220	44	520	37
Low	-	-	50	12	260	52	310	22
Total	500	100	400	100	500	100	1400	100

The replication pattern is the easiest to understand. It is when the partials replicate or reproduce the same relationship that existed in the bivariate table before considering the control variable. It means that the control variable has no effect.

The specification pattern is the next easiest pattern. It occurs when one partial replicates the initial bivariate relationship but other partials do not.

The interpretation pattern describes the situation in which the control variable intervenes between the original independent variable and the dependent variables.

The suppressor variable pattern occurs when the bivariate tables suggest independence but a relationship appears in one or both of the partials.

Multiple Regression Analysis: Multiple regression controls for many alternative explanations of variables simultaneously (it is rarely possible to use more than one control variable using percentage tables). Multiple regression is a technique whose calculation you may have learnt in the course on statistics.

Lesson 33:	EXPERIMENTAL RESEARCH
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EXPERIMENTAL RESEARCH

- Experimental research **builds on the principles of positivist approach** more directly than do the other research techniques.
- The purpose of experimental research is to allow the researcher to *control* the research situation so that *causal* relationships among variables may be evaluated.
- The goal of the experimental design is the confidence that it gives the researcher that his experimental treatment is the cause of the effect he measures.
- Experimentation is a research design that allows evaluation of causal relationship among variables.

To establish that variable X causes variable Y, *all three* of the following conditions should be met:

1. Both X and Y should co-vary (i.e. when one goes up, the other should also simultaneously go up (or go down)).
2. X (the presumed causal factor) should precede Y. In other words, there must be a time sequence in which the two occur.
3. No other factor should possibly cause the change in the dependent variable Y.

The Language of Experiments: Experimental research has its own language or set of terms and concepts. One important term frequently used is *subjects* or *test units*. In experimental research, the cases or people used in research projects and on whom variables are measured are called the *subjects* or *test units*. In other words these are those entities whose responses to the experimental treatment are measured or observed. Individuals, organizational units, sales territories, or other entities may be the test units. Similar terminology is used on different component parts of the experiments.

Parts of Experiments: We can divide the experiments into seven parts and for each part there is a term. Not all experiments have all these parts, and some have all seven parts plus others. The following seven usually make up a true experiment.

1. **Treatment or independent variable.**
2. **Dependent variable.**
3. **Pretest.**
4. **Posttest.**
5. **Experimental group.**
6. **Control group.**
7. **Assignment of subjects.**

1. **Treatment or independent variable:** The experimenter has some degree of control over the independent variable. The variable is independent because its value can be manipulated by the experimenter to whatever he or she wishes it to be. Its value may be changed or altered independently of any other variable.
2. **Dependent Variable:** The criterion or standard by which the results are judged. It is assumed that the changes in the dependent variable are consequence of changes in the independent variable. For example, measures of turnover, absenteeism, or morale might be alternative choices for the dependent variable, depending on the purpose of the training.

The outcomes in the experimental research are the physical conditions, social behaviors, attitudes, feelings, or beliefs of subjects that change, in response to treatment. Dependent variables can be measured by paper-and-pencil indicators, observations, interviews, or physiological responses (e.g. heartbeat, or sweating palms). Selection of dependent variable is crucial decision in the design of an experiment.

3. **Pretests:** The *pretest* is the measurement of the dependent variable prior to the introduction of the treatment.
4. **Posttests:** The *posttest* is the measurement of the dependent variable after the treatment has been introduced into the experimental situation.
5. **Experimental Group:** Experimental researchers often divide subjects into two or more groups for purposes of comparison. A simple experiment has only two groups, only one of which receives the treatment. The experimental group is the group that receives the treatment or in which the treatment is present.
6. **Control Groups:** The group that does not receive the treatment is called the “control group.” When the independent variable takes on many different values, more than one experimental group is used. In the simplest type of experiment, only two values of the independent variable are manipulated.

Assignment of Subjects/Test Units: *Random assignment (Randomization) is a method for assigning the cases (e.g. individuals organizations) to groups for the purpose of making comparisons.* It is a way to divide or sort a collection of cases into two or more groups in order to increase one’s confidence that the groups do not differ in a systematic way. It is a mechanical method; the assignment is automatic, and the researcher cannot make assignments on the basis of personal preference or the features of specific cases. *Random assignment is random in statistical/mathematical sense, not in everyday sense. In everyday speech, random means unplanned, haphazard, or accidental, but it has a special meaning in mathematics. In probability theory, random describes a process in which each case has a known chance of being selected.*

Random assignment or randomization is unbiased because a researcher’s desire to confirm a hypothesis

Three Types of Controls:

1. **Manipulation of the Independent Variable:**
 2. **Holding Conditions Constant**
 3. **Control over the Composition of Groups:**
1. **Manipulation of the Independent Variable:** In order to examine the causal effects of an independent variable on a dependent variable, certain manipulations need to be tried. Manipulation simply means control over the stimulus that is we create different levels of the independent variable to assess the impact on the dependent variable
 2. **Holding Conditions Constant:** When we postulate cause-and-effect relationships between two variables X and Y, it is possible that some other factor, say A, might also influence the dependent variable Y. In such a case, it will not be possible to determine the extent to which Y occurred only because of X, since we do not know how much of the total variation of was caused by the presence of the other factor A. If the true effect of the X is to be assessed, then the effect of A has to be controlled. *This is also called as controlling the effect of contaminating factors or confounding factors.*
 3. **Control over the Composition of Groups:** If the experimental and control groups have such characteristics that could contaminate the results then the researcher may have to take note of such factors, if there are any. The group differences should not confound the effect of X variable that happens to be under study. The experimental and control groups need to be balanced. For this purpose the researcher may use **random selection** of the subjects and allocating to different groups. Finally the experimental and control groups should also be selected randomly. Another way to have identical groups is by following the procedure of **matching**.

Random Assignment: *Random assignment* is a method for assignment cases (e.g. individuals, organizations) to groups for the purpose of making comparisons. It is a way to divide or sort a collection of cases into two or more groups in order to increase one's confidence that the groups do not differ in a systematic way. It is

mechanical method; the assignment is automatic, and the researcher cannot make assignments on the basis of personal preference or the features of specific cases.

Random assignment is random in a statistical or mathematical sense, not in an everyday sense. In everyday speech, random means unplanned, haphazard, or accidental, but it has a specialized meaning in mathematics. In probability theory, *random* describes a process in which each case has a known chance of being selected. Random assignment lets a researcher calculate the odds that a specific case will be sorted into one group over another.

Random assignment or randomization is unbiased because a researcher's desire to confirm a hypothesis or a research subject's personal interest does not enter into selection process.

Matching: It implies to match the characteristics (such as age, sex) of the cases in each group. Matching is an alternative to random assignment, but it is an infrequently used one.

Lesson 34:	EXPERIMENTAL RESEARCH (CONT.)
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Steps in Conducting an Experiment

Following the basic steps of the research process, experimenters decide on a topic, narrow it into a testable research problem or question, and then develop a hypothesis with variables. Once a researcher has the hypothesis, the steps of experimental research are clear. **Broadly there are about 12 steps in conducting an experiment, which are as below:**

1. **Begin with a straightforward hypothesis** that is appropriate for experimental research.
2. **Decide on an experimental design** that will test the hypothesis within practical limitations.
3. **Decide how to introduce the treatment or the independent variable.**
4. **Develop a valid and reliable measure of the dependent variable.**
5. **Set up an experimental setting and conduct a pilot test** of the variable measures.
6. **Locate appropriate subjects or cases.**
7. **Randomly assign subjects to groups.**
8. **Gather data for the pretest measure** of the dependent variable for all groups.
9. **Introduce the treatment to the experimental group only and monitor all groups.**
10. **Gather data for posttest measure of the dependent variable.**
11. **Debrief the subjects by informing them of the true purpose and reasons for the experiment.**
12. **Examine data collected and make comparisons between different groups.**

Types of Designs:

Researchers combine parts of experiment (e.g. pretests, control groups, etc.) together into an experimental design. For example some designs lack pretests, some do not have control groups, and others have many experimental groups. Certain widely used standard designs have names.

Classical Experimental Design: All designs are variations of the classical experimental design, which has random assignment of subjects, a pretest and a posttest, an experimental group, and a control group.

1. **Quasi Experimental Designs**
2. **True Experimental Designs**
3. **Solomon's Four Group Design**

1. Quasi-Experimental Designs:

- 1.1. **One-shot Case Study Design:** Also called **the one-group posttest-only** design.

The one-shot case study design **has only one group, a treatment, and a posttest**. Because it is only one group, **there is no random assignment**.

- 1.2. **One Group Pretest-posttest Design:** This design has one group, a pretest, a treatment, and a posttest. It lacks a control group and random assignment.

- 1.3. **Two Groups Posttest-only Design:** It has two groups, a random assignment of subjects, a posttest, and a treatment. It has all parts of the classical design except a pretest.
2. **True Experimental Designs:** Experimental designs, which have at least two groups, a random assignment of subjects to experimental and control groups, only experimental group is exposed to treatment, both groups record information before and after the treatment, are known as ex-post facto experimental designs.
 - 2.1. **Pretest and Posttest Experimental and Control Group Design:** Two groups, one control group and the other experimental group, are formed randomly. Both the groups are exposed to pretest and posttest. The experimental group is exposed to treatment while the control group is not. Measuring the difference between the differences in the post- and pretests of the two groups would give the net effects of the treatment.
3. **Solomon's Four Group Design:** To gain more confidence in internal validity in experimental designs, it is advisable to set up two experimental groups and two control groups. One experimental group and one control group can be given the both pretest and the posttest. The other two groups will be given only the posttest.

Lesson 35:	EXPERIMENTAL RESEARCH (CONT.)
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Validity in Experiments: Experiments are judged by two measures; internal validity and external validity.

The first, internal validity indicates whether the independent variable was the sole cause of the change in the dependent variable. It implies the researcher's ability to eliminate alternative explanations of the dependent variable. Variables, other than the treatment, that affect the dependent variable are threats to internal validity. They threaten the researcher's ability to say that the treatment was the true causal factor producing change in the dependent variable.

The second measure, external validity, indicates the extent to which the results of the experiment are applicable in the real world.

Internal validity is high in the laboratory experiment, reason being the control over all the confounding factors. External validity (generalisability) is not sure because of the effect of variety of factors. Field experiments have more external validity but less internal validity because it is closer to the real situations.

Factors Affecting Internal Validity: There are eight major types of extraneous variables that may jeopardize internal validity:

1. History effect
2. Maturation effect
3. Testing effect
4. Instrumentation effect
5. Selection bias effect
6. Selection bias effect
7. Statistical regression
8. Mortality
9. Mechanical loss

1. History Effect: A specific event in the external environment occurring between the first and second measurement that is beyond the control of the experimenter and that affects the validity of an experiment. The researcher does not have control on such happenings which have an impact on the X and Y relationship.

2. Maturation Effect: Cause and effect relationship can also be contaminated by the effects of the passage of time – another uncontrollable variable. Such contamination is called **maturation effect**. Examples of maturation processes could include *growing older, getting tired, feeling hungry, and getting bored*.

3. Testing Effects: Frequently, to test the effects of treatment, subjects are given what is called a **pretest**. That is, a measure of the dependent variable is taken (pretest), then the treatment given, and after that a

second test, called **posttest**, administered. The difference between the posttest and the pretest scores is then attributed to the treatment. It is also called **sensitization** through previous testing.

4. Instrumentation Effects: Instrumentation effects are yet another source of threat to internal validity. These might arise because of a change in the measuring instrument between pretest and posttest, and not because of the instrument's differential impact at the end.

5. Selection Bias Effect: Selection bias is the threat that subjects will not form equivalent groups. It is a problem in design without random assignment, hence differential selection of the subjects for the comparison groups. It occurs when subjects in one experimental group have a characteristic that affects the dependent variable.

6. Statistical Regression: Statistical regression is not easy to grasp intuitively. It is a problem of extreme values or a tendency for random error to move group results towards the average. If extremes are taken then they tend to regress toward the mean. Those who are on either end of the extreme would not truly reflect the cause and effect relationship.

One situation arises when subjects are unusual with regard to dependent variable. Because they begin as unusual or extreme, subjects are likely to respond further in the same direction.

If participants chosen for experimental group have extreme scores on the dependent variable to begin with then the laws of probability say that those with very low scores on a variable have a greater probability to improve and scoring closer to mean on the posttest after treatment. This phenomenon of low scorers tending to score closer to the mean is known as "regressing toward the mean."

7. Mortality: Mortality, or attrition, arises when some subjects do not continue throughout the experiment. Although the word mortality means death, it does not necessarily mean that subjects have died.

8. Mechanical Loss: A problem may be experienced due to equipment failure.

9. Experimenter Expectancy: In addition to the usually listed eight factors affecting the internal validity sometimes **experimenter expectancy** may threaten the causal logic of the relationship between the variables. A researcher may threaten internal validity, not purposefully unethical behavior but by indirectly communicating experimenter expectancy to the subjects. Researchers may highly committed to the hypothesis and indirectly communicate desired findings to subjects. **The double-blind experiment is designed to control experimenter expectancy.**

External Validity: Even if the researcher eliminates all concerns for internal validity, external validity remains a potential problem. External validity is the ability to generalize experimental findings to real life situations. Without external validity, the findings are of little use for both basic and applied research i.e. we shall not be able to develop any theories that could be applicable to similar other situations.

Reactivity: A Threat to External Validity: Subjects may react differently in an experiment than they would in real life; because they know they are in a study. **The Hawthorn Effect**, a specific kind of reactivity to the experimental situation is a good example in this respect. The experiment was conducted in the Hawthorn Electric Company where the performance of the participants was supposed to change due to the change in the environmental conditions i.e. improvement on the environmental conditions will have a positive effect on the performance. Here the workers did not respond to treatment (modification of working conditions) but to the additional attention they received (being in the experiment and being the focus of attention).

Demand characteristic is another type of reactivity. Here the participants change their behavior as a reaction to the demands of the experimenter who may have inadvertently told the subjects about the expected outcome of the treatment.

Ethical Issues in Lab Experiments: The following actions may be unethical:

- Putting pressure on individuals to participate in experiments through coercion or apply social pressure.
- Asking demeaning questions from the subjects that hurt their self respect.
- Deceiving subjects by deliberately misleading them as to the true purpose of research.
- Exposing participants to physical or mental stress.

- Not allowing subjects to withdraw from the experiment when they want to.
- Using research results to disadvantage the participants, or for purposes not to their liking.
- Not explaining the procedures to be followed in the experiment.
- Exposing subjects to hazardous and unsafe environments.
- Not debriefing the participants fully and accurately after the experiment is over.
- Not preserving the privacy and confidentiality of the information given by the participants.
- Withholding benefits from the control group.

Human Subjects Committee: In order to protect the rights of participating subjects the research institutions have usually set up Ethics Committees. Sometime project specific ethics committees are also formed. Such committees try to look after the rights of the subjects participating in the experiments, as well as in other research techniques.

Lesson 36:	NON-REACTIVE RESEARCH
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NON-REACTIVE RESEARCH: Experiments and surveys research are both *reactive*; that is, the people being studied are aware of the fact that they are being studied. In *non-reactive* research, those being studied are not aware that they are part of a research project. Such a research is largely based on positivistic principles but is also used by interpretive and critical researchers.

The Logic of Non-Reactive Research

The critical thing about *non-reactive or unobtrusive measures* (i.e. the measures that are not obtrusive or intrusive) is that the people being studied are not aware of it but leave evidence of their social behavior or actions ‘naturally.’ The researcher infers from the evidence to behavior or attitudes without disrupting those being studied. Unnoticed observation is also a type of non-reactive measure. For example, a researcher may be observing the behavior of drivers from a distance whether drivers stopped at red sign of the traffic lights. The observations can be made both at the day time and at night. It could also be noted whether the driver was a male or a female; whether the driver was also or with passengers; whether other traffic was present; and whether the car came to a complete stop, a slow stop, or no stop.

Varieties of Non-Reactive Observations

Non-reactive measures are varied and researchers have been creative in inventing indirect ways to measures behaviors. Because the measures have little in common except being non-reactive, they are best learned through examples like:

Physical Traces:

- **Erosion:** Wear and tear suggests a greater use. For example, a researcher examines children’s toys at a children’s play centre that were purchased at the same time. Worn out toys suggest greater interest of children in them.
- **Accretion:** Accumulation of physical evidence suggests behavior. A researcher examines the soft drink cans or bottles in the garbage collection. That might indicate the brands and types of soft drinks that are very popular.

Archives:

- **Running Records:** Regularly produced public records may reveal lot of information. For example, a researcher may examine marriage records for brides’ and grooms’ recorded ages. The differences might indicate that males marrying younger females are greater than the other way around.
- **Other Records:** Irregular or private records can reveal a lot. For example, a researcher may look into the number of reams of paper purchased by a college principal’s office for the last 10 years and compare it with students’ enrollment.

Observations:

- **External Appearance:** How people appear may indicate social factors. For example, a researcher watches students to see whether they are more likely to wear their college’s colors and symbols after the college team won or lost.

- **Count Behaviors:** Counting how many people do something can be informative. For example a researcher may count the number of men and women who come to a full stop and those who come to a rolling stop at a traffic stop sign. This suggests gender difference in driving behavior.
- **Time Duration:** How long people take to do things may indicate their intention. For example a researcher may measure how long men and women pause in front of a particular painting. Time taken may indicate their interest in the painting.

Recording and Documentation: Creating non-reactive measures follows the logic of quantitative measurement, although qualitative researchers also use non-reactive observations. A researcher first conceptualizes a construct, and then links the construct to non-reactive empirical evidence, which is its measure. The operational definition of the variable includes how the researcher systematically notes and records observations.

Content Analysis: **Content analysis is a technique for gathering and analyzing the content of a text.**

The *content* refers to words, meanings, pictures, symbols, ideas, themes, or any message that can be communicated. The *text* is anything written, visual, or spoken that serves as a medium of communication.

Possible artifacts for study could be books, newspaper or magazine articles, advertisements, poems, letters, laws, constitutions, dramas, speeches, official documents, films or videotapes, musical lyrics, photographs, articles of clothing, or works of arts. All these works may be called as documents. **The documents can be:**

- **Personal** – letters, diary, autobiography.
- **Non-personal** – interoffice memos, official documents, proceedings of a meeting.
- **Mass media** – newspapers, magazines, fiction, films, songs, poems, works of arts.

Content analysis goes back nearly a century and is used in many fields – literature, history, journalism, political science, education, psychology, sociology, and so on. **It is also called a study of communication**, which means who says what, to whom, why, how, and with what effect. In content analysis, the researcher uses objective and systematic counting and recording procedures to produce a quantitative description of the symbolic content in a text. It may also be called “**textual coding**.” There are qualitative versions of content analysis. The emphasis here is quantitative data about a text’s content.

Content Analysis is Non-Reactive: It is non-reactive because the placing of words, messages, or symbols in a text to communicate to the reader or receiver occurs without influence from the researcher who analyzes its contents. There is no interaction between the researcher and the creator of the text under analysis.

Measurement and Coding: Careful measurement is crucial in content analysis because a researcher takes different and murky symbolic communication and turns it into precise, objective, quantitative data. He or she carefully designs and documents the procedures for coding to make replication possible.

Constructs in content analysis are operationalizing with a *coding system*, a set of instructions or rules on how to systematically observe and record content from text.

Observations can be structured: Measurement in content analysis uses *structured observation* i.e. systematic, careful observation based on written rules. **The rules explain how to categorize and classify observations in terms of frequency, direction, intensity and space.**

- **Frequency:** Frequency simply means counting whether or not something occurs and how often (how many times).
- **Direction:** Direction is noting the direction of messages in the content along some continuum (e.g., positive or negative, supporting or opposed).
- **Intensity:** Intensity is the strength or power of a message in a direction.
- **Space:** A researcher can record the size of the text message or the amount of space or volume allocated to it. Space in written text is measured by counting words, sentences, paragraphs or space on a page (e.g. square inches) for video or audio text, space can be measured by the amount of time allocated. For example, a TV character may be present for a few seconds or continuously in every seen of a two hour program.

The unit analysis can vary a great deal in content analysis. It can be a word, a phrase, a theme, a plot,, a news paper article, a character, and so forth.

Coding: The process of identifying and classifying each item and giving labels to each category. Later on each category may be assigned a numerical value for its entry into the computer. In content analysis one can look at the manifest coding and latent coding.

- i. **Manifest Coding:** Coding the visible, surface content in a text is called manifest coding. For example, a researcher counts the number of times a phrase or word (e.g. red) appears in the written text, or whether a specific action (e.g. shaking hands) appears in a photograph or video scene. The coding system lists terms or actions or characters that are then located in text. A researcher can use a computer program to search for words or phrases in the text and have a computer do the counting work.
Manifest coding is highly reliable because the phrase or the word either is or is not present.
- ii. **Latent Coding:** A researcher using *latent coding* (also called *semantic analysis*) looks for the underlying meaning in the content of a text. For example, the researcher reads the entire paragraph and decides whether it contains vulgar themes or a romantic mood. His or her coding system has general rules to guide his or her interpretation of the text and for determining whether particular themes or mood are present.
Latent coding tends to be less reliable than the manifest coding. It depends on a coder's knowledge of language and its social meaning. Training, practice, and written rules improve reliability, but still it is difficult to consistently identify themes, moods, and the like.

How to Conduct Content Analysis Research

1. **Question Formulation**
2. **Unit of Analysis**
3. **Sampling**
4. **Variables and Constructing Coding Categories**
5. **Inferences**

1. **Question Formulation:** As in most research, content analysis researchers begin with a research question. When the question involves variables that are messages or symbols, content analysis may be appropriate.
2. **Unit of Analysis:** A researcher decides on the unit of analysis (i.e. the amount of text that is assigned a code). In the previous example each advertisement may be a unit of analysis.
3. **Sampling:** Researchers often use random sampling in content analysis. First, they define the population and the sampling element. For example, the population might be all words, all sentences, all paragraphs or all articles in certain type of documents over a period of specified period.
4. **Variables and Constructing Coding Categories:** Say a researcher is interested in women's portrayal in significant leadership roles. Define "significant leadership role" in operational terms and put it as written rules for classifying people named in the articles. Say the researcher is further interested in positive leadership roles, so the measure will indicate whether the role was positive or negative. In addition to written rules for coding decisions, a content analysis researcher creates a recording sheet (also called a *coding form* or *tally sheet*) on which to record the information. Each unit should have a separate recording sheet.
5. **Inferences:** The inference a researcher can or cannot make on the basis of results is critical in content analysis. Content analysis describes what is in the text. It cannot reveal the intentions of those who created the text or the effects that messages in the text have on those who receive them.

Lesson 37:

USE OF SECONDARY DATA

ADVANTAGES AND DISADVANTAGES OF THE USE OF CONTENT ANALYSIS:

Prior to the discussion of secondary data, let us look at the advantages and disadvantages of the use of content analysis that was covered in the last lecture. In a way content analysis is also the study of

documents through which the writers try to communicate, though some of the documents (like population census) may simply contain figures.

Advantages of Content Analysis:

1. ***Access to inaccessible subjects:*** One of the basic advantages of content analysis is that it allows research on subjects to which the researcher does not have physical access.
2. ***Non-reactivity:*** Document study shares with certain types of observations (e.g., indirect observation or non participant observation through one-way mirror) the advantage of little or no reactivity.
3. ***Can do longitudinal analysis:*** Like observation and unlike experiments and survey, document study is especially well suited to study over a long period of time. Many times the objective of the research could be to determine a trend.
4. ***Use Sampling:*** The researcher can use random sampling. One could decide on the population, develop sampling frame and draw sample random sample by following the appropriate procedure.
5. ***Can use large sample size:*** Larger the sample closer the results to the population. In experimentation as well as in survey research there could be limitations due to the availability of the subjects or of the resources but in document analysis the researcher could increase the sample and can have more confidence in generalization.
6. ***Spontaneity:*** The spontaneous actions or feelings can be recorded when they occurred rather than at a time specified by the researcher. If the respondent was keeping a diary, he or she may have been recording spontaneous feelings about a subject whenever he or she was inspired to do so. The contents of such personal recording could be analyzed later on.
7. ***Confessions:*** A person may be more likely to confess in a document, particularly one to be read only after his or her death, than in an interview or mailed questionnaire study
8. ***Relatively low cost:*** Although the cost of documentary analysis can vary widely depending on the type of document analyzed, how widely documents are dispersed, and how far one must travel to gain access to them, documentary analysis can be inexpensive compared to large-scale surveys.
9. ***High quality:*** Although documents vary tremendously in quality, many documents, such as news paper columns, are written by skilled commentators and may be more valuable than, for example, poorly written responses to mailed questionnaires.

Disadvantages of Content Analysis:

1. ***Bias:*** Many documents used in research were not originally intended for research purposes. The various goals and purposes for which documents are written can bias them in various ways.
2. ***Selective survival:*** Since documents are usually written on paper, they do not withstand the elements well unless care is taken to preserve them. Thus while documents written by famous people are likely to be preserved, day-to-day documents such as letters and diaries written by common people tend either to be destroyed or to be placed in storage and thus become inaccessible.
3. ***Incompleteness:*** Many documents provide incomplete account to the researcher who has had no prior experience with or knowledge of the events or behavior discussed.
4. ***Lack of availability of documents:*** In addition to the bias, incompleteness, and selective survival of documents, there are many areas of study for which no documents are available. In many cases information simply was never recorded. In other cases it was recorded, but the documents remain secret or classified, or have been destroyed.
5. ***Sampling bias:*** One of the problems of bias occurs because persons of lower educational or income levels are less likely to be represented in the sampling frames
6. ***Limited to verbal behavior:*** By definition, documents provide information only about respondent's verbal behavior, and provide no direct information on the respondent's nonverbal behavior, either that of the document's author or other characters in the document.

7. **Lack of standardized format:** Documents differ quite widely in regard to their standardization of format.
8. **Coding difficulties:** For a number of reasons, including differences in purpose for which the documents were written, differences in content or subject matter, lack of standardization, and differences in length and format, coding is one of the most difficult tasks facing the content analyst.
9. **Data must be adjusted for comparability over time:** Although one of the advantages of document study is that comparisons may be made over a long period of time, since external events cause changes so drastic that even if a common unit of measure is used for the entire period, the value of this unit may have changed so much over time that comparisons are misleading unless corrections are made. Look at the change in measuring distance, temperature, currency, and even literacy in Pakistan.

Use of Secondary Data or Existing Statistics/Documents

Secondary Data: Secondary data refer to information gathered by someone other than the researcher conducting the present study. Secondary data are usually historical, already assembled and do not require access to respondents or subjects.

Secondary data may be collected by large bureaucratic organization like the Bureau of Statistics or other government or private agencies. These data may have been collected for policy decisions or as part of public service.

The data may be a time bound collection of information (population census) as well as spread over long periods of time (unemployment trends, crime rate). Secondary data are used for making comparisons over time in the country (population trends in the country) as well as across the countries (world population trends).

Selecting Topic for Secondary Analysis

- Search through the collections of information with research question and variables in mind, and then reassemble the information in new ways to address the research question.
- It is difficult to specify topics that are appropriate for existing statistics research because they are so varied.
- **Experiments** are best for topics where the researcher controls a situation and manipulates an independent variable.
- **Survey research** is best for topics where the researcher asks questions and learns about reported attitudes and behavior.
- **Content analysis** is best for topics that involve the content of messages in cultural communication.
- **Existing statistics research** is best for topics that involve information collected by large bureaucratic organizations. Thus existing statistics research is appropriate when a researcher wants to test hypotheses involving variables that are also in official reports of social, economic and political conditions. These include descriptions of organizations or people in them. Often, such information is collected over long periods. For example, existing statistics can be used by researcher who wants to see whether unemployment and crime rates are associated in 100 cities across a 20 year period.

There are so many sources of existing statistics like: UN publications, UNESCO Statistical Yearbook, UN Statistical Yearbook, Demographic Yearbook, Labor Force Survey of Pakistan, and Population Census Data.

Secondary Survey Data: Secondary analysis is a special case of existing statistics; it is reanalysis of previously collected survey or other data that was originally gathered by others. As opposed to primary research (e.g., experiments, surveys, and content analysis), the focus is on analyzing rather than collecting data.

Secondary analysis is increasingly used by researchers. It is relatively inexpensive; it permits comparisons across groups, nations, or time; it facilitates replication; and permits asking about issues not thought by the original researchers.

Large-scale data collection is expensive and difficult. The cost and time required for major national surveys that uses rigorous techniques are prohibitive for most researchers. Fortunately, the organization, preservation, and dissemination of major survey data sets have improved. Today, there are archives of past surveys open to researchers (e.g., data on Population Census of Pakistan, Demographic Survey of Pakistan).

Reliability and Validity: Existing statistics and secondary data are not trouble free just because a government agency or other source gathered the original data. Researchers must be concerned with validity and reliability, as well as with some problems unique to this research technique.

Validity: *Validity problems occur when the researcher's theoretical definition does not match that of the government agency or organization that collected the information.* Official policies and procedures specify definitions for official statistics. For example, a researcher defines a *work injury* as including minor cuts, bruises, and sprains that occur on the job, but the official definition in government reports only includes injuries that require a visit to a physician or hospital. Many work injuries as defined by the researcher will not be in the official statistics.

Another validity problem arises when official statistics are a proxy for a construct in which the researcher is really interested. This is necessary because the researcher cannot collect original data. For example, the researcher wants to know how many people have been robbed, so he or she uses police statistics on robbery arrests as a proxy. But the measure is not entirely valid because many robberies are not reported to the police, and reported robberies do not always result in an arrest.

Another validity problem arises because the researcher lacks control over how information is collected. All information, even that in official government reports, is originally gathered by people in bureaucracies as part of their job. A researcher depends on them for collecting organizing, reporting, and publishing data accurately. Systematic errors in collecting the initial information (e.g., census people who avoid poor neighborhoods and make-up information, or people who put a false age on their ID card); errors in organizing and reporting information (e.g., police department that is sloppy about filing crime reports and loses some); errors in publishing information (e.g., a typographical error in a table) all reduce measurement validity.

Reliability: *Stability reliability problems develop when official definition or the method of collecting information changes over time.* Official definitions of work injury, disability, unemployment, literacy, poverty, and the like change periodically. Even if the researcher learns of such changes, consistent measurement over time is impossible.

Equivalence reliability can also be a problem. For example, studies of police department suggest that political pressures to increase arrests are closely related to the number of arrests. It could be seen when political pressures in one city may increase arrests (e.g., a crackdown on crime), whereas pressures in another city may decrease arrests (e.g., to show drop in crime shortly before an election in order to make officials look better).

Researchers often use official statistics for international comparisons but national governments collect data differently and the quality of data collection varies.