RESEARCH METHODOLOGY

Presented By

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RESEARCH - MEANING:

- The word research is derived from the middle of French 'recherche' which means to go about seeking.
- Research is a systematic and an organized method to finding answers to questions.
- A research is a frame work or blueprint for conducting the a research project. It details the procedures necessary for obtaining the information needed to structure or solve research problem.
- Research consist of the prefix Re which means to search, examine or try.
- Research can be explained as the process of collecting data and information for the purpose of making decisions.

DEFINTION - RESEARCH

- According to Neuman " A collection of methods and methodologies that researchers apply systematically to produce scientifically based knowledge about the social world."
- According to Mouly, "actually research is simply the process of arriving at dependable solutions to problems through the planned and systematic collections , analysis and interpretation of data."

OBJECTIVES OF RESEARCH:

- To explore a phenomena in order to achieve insights.
- To produce some new knowledge. Research remains the most efficient and reliable source of knowledge.
- To discover new inventions/design.
- To discover some solutions to solve a particular problem.
- To produce some new policies.
- To test certain hypothesis.
- Research enables predictions to be made. Predictions in research fulfills one of the basic desire of humanity, to discern the future and know what fate holds.

TYPES OF RESEARCH

Descriptive & Analytical Research

Descriptive Research is a fact finding investigation which is aimed at describing the characteristics of individual, situation or a group (or) describing the state of affairs as it exists at present.

Researcher has no control over the variables.

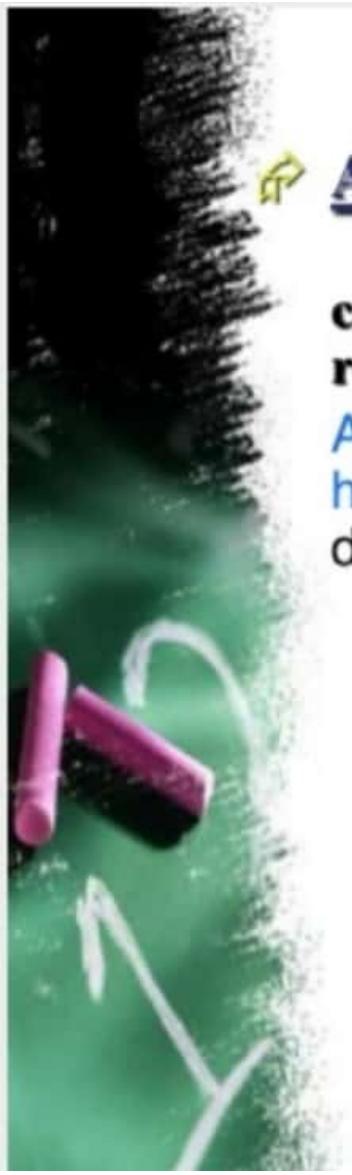
Report what has happened or what is happening.

To discover causes.

Example:-A student of Management pursue ea research on customer preference about a product or service.

Frequency of shopping.

- **Analytical Research** is primarily concerned with testing hypothesis and specifying and interpreting relationships, by analyzing the facts or information already available.
- Example- Research on a company's financial performance over long times.



Applied & Fundamental Research

Applied Research or Action Research is carried out to find solution to a real life problem requiring an action or policy decision.

Applied or practical projects impact directly on health, wealth, or culture (art, recreation…), or on development of a method.

Fundamental Research which is also known as basic or pure research is undertaken for the sake of knowledge without any intention to apply it in practice.

It is undertaken out of intellectual curiosity and is not necessarily problem-oriented.

- Example- relating to natural phenomenon or relating to pure mathematics.

Quantitative & Qualitative Research

Quantitative Research is employed for measuring the quantity or amount of a particular phenomena by the use of statistical analysis.

Qualitative Research is a non-quantitative type of analysis which is aimed at finding out the quality of a particular phenomenon.

Conceptual & Empirical Research

Conceptual Research is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones.

Empirical Research is a data based research which depends on experience or observation alone. It is aimed at coming up with conclusions without due regard for system and theory.

Some other types of research..

- **One-time Research** – Research confined to a single time period.
- **Longitudinal Research** – Research carried on over several time periods.

It's a correlation research study that involves repeated observations of the same item over long period of time – often many decades.

Longitudinal research studies are often used in psychology to study developmental trends across the life span.

E.g. : In medicine the design is used to uncover predictors of certain diseases.

- **Diagnostic Research** – It is also called clinical research which aims at identifying the causes of a problem, frequency with which it occurs and the possible solutions for it.

  E.g. Researches done by doctors on a crucial disease.

Experimental Research – It is designed to assess the effect of one particular variable on a phenomenon by keeping the other variables constant or controlled.

Experimental research is commonly used in sciences such as sociology and psychology, physics, chemistry, biology and medicine etc.

- **Historical Research – It is the study of past records and other information sources, with a view to find the origin and development of a phenomenon and to discover the trends in the past, in order to understand the present and to anticipate the future.**
- The historical method of research applies to all fields of study because it encompasses their: origins, growth, theories, personalities, crisis, etc. Both quantitative and qualitative variables can be used in the collection of historical information.

  For example, a researcher may chose to answer questions about the development of school.

Exploratory Research

- **It is the preliminary study of an unfamiliar problem, about which the researcher has little or no knowledge.**
- **It is aimed to gain familiarity with the problem, to generate new ideas or to make a precise formulation of the problem. Hence it is also known as formulative research.**

Any research starts with a exploratory research that's a basic step. Descriptive Research as the name suggest, is done in detail and is based on the exploratory research.

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7 STEPS OF RESEARCH PROCESS

- Step One: Define research problem
- Step Two: Review of literature
- Step Three: Formulate hypotheses
- Step Four: Preparing the research design
- Step Five: Data collection
- Step Six: Data analysis
- Step Seven: Interpretation and report writing

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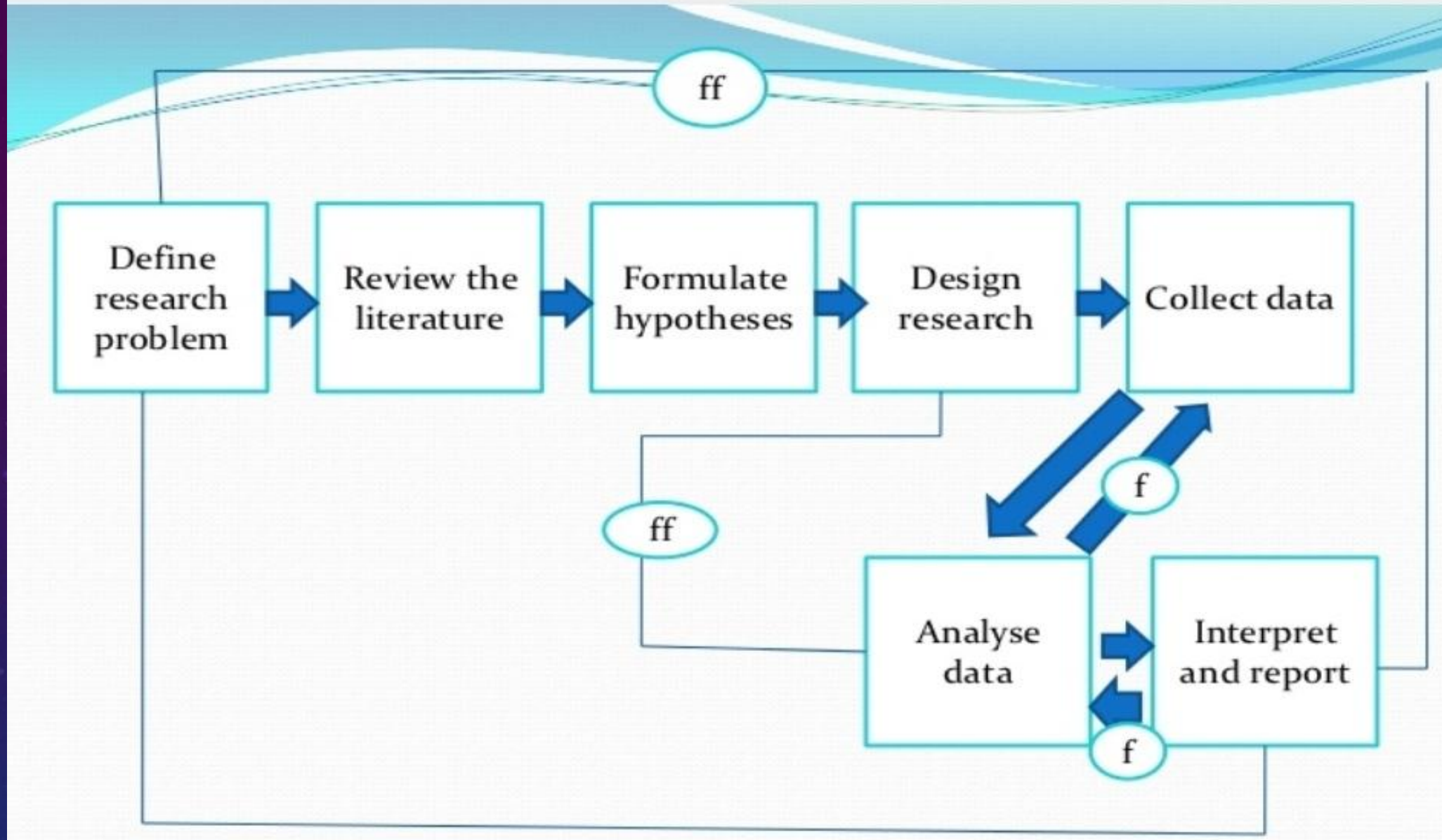

Where f = feed back(helps in controlling the sub system
ff= feed forward(serves the vital function of providing criteria for evaluation

Step One: Define Research Problem

There are two types of research problem, viz., those

- relate to states of nature
- relationship between variables.

Essentially two steps are involved in define research problem, viz.,

- understanding the problem thoroughly and
- rephrasing the same into meaningful terms from an point of view.

Step Two: Review of Literature

- Once the problem is define, a brief summary of it should be written down. It is compulsory for a research worker writing a thesis for a Ph.D. degree to write a synopsis of topic and submit it to necessary committee or the research board for approval.

Step Three: Formulate Hypothesis

- Formulate hypothesis is tentative assumption made in order to draw out and test its logical or empirical consequences. Hypothesis should be very specific and limited to the piece of research in hand because it has to be tested.

The role of the hypothesis is to guide the researcher by delimiting the area of research and to keep him on the right track.

Step Four: Preparing the Research Design

- The function of research design is to provide for the collection of relevant evidence with minimal expenditure of effort, time and money.

- Research purpose may be grouped into four categories, viz., (1) Exploration, (2) Description,(3) Diagnosis, and (4) Experimentation.

Step Five: Data Collection

- Primary data can be collected through:
  - By Observation
  - Through personal interview
  - Through telephone interview
  - By mailing of questionnaries
  - Through Schedules

Step Six: Data Analysis

The analysis of data requires a number of closely related operations such as establishment of categories.

This stage mainly include :

1. Coding
2. Editing
3. Tabulation

Step Seven: Interpretation and Report Writing

Researcher has to prepare the report of what has been done by him.

Writing of report includes:

1. the preliminary pages;
2. the main text, and
3. the end matter.


Thank You!

Experimental Research

- Experimental research is the objective, systematic, controlled investigation for the purpose of predicting and controlling phenomena and examining probability and causality among selected variables. (Creswell, 2007)

Features of Experimental Research

- random assignment—the subjects (or other entities) are randomly assigned to treatment groups
- experimental control—all features of the treatments are identical except for the independent variable
- appropriate measures—the dependent measures are appropriate for testing the research hypothesis

Steps of Experimental Research

- Identify and define the problem
- Select sample of subjects
- Group or pair subjects
- Identify and control non experimental factors

Steps of Experimental Research

- Select or construct, and validate instruments to measure outcomes
- Conduct pilot study
- Determine place, time, and duration of the experiment.
- Analysis & Conclusion

Factors Affecting Experimental Research

- History
- Pre-testing
- Measuring Instruments
- Interaction of Factor
- Experimental Mortality
- Experimental Procedures
- Multiple Treatment Interference

Benefits of Experimental Research

- Experimental research is generally recognized as the most appropriate method
- Ideal for establishing whether one or more factors caused change in an outcome
- The gold standard for educational psychology since the field evolved in the early 1900s

Limitations of Experimental Research

- Can impose artificiality on the situation
- Perfectly controlled conditions are generally not possible in authentic educational environment
- Experimental research may be able to tell that one method of instruction is better than conventional practice, but may not be able to specify why
- May not be able to pinpoint the mechanism

CASE STUDY METHODS

REFERENCE-

WIKIPEDIA

MEANING

- A detailed intensive study of a unit, such as a corporation or a corporate division, that stresses factors contributing to its success or failure.
- A detailed analysis of a person or group, especially as a model of medical, psychiatric, psychological, or social phenomena.

DEFINITION

"Case studies are analyses of persons, events, decisions, periods, projects, policies, institutions, or other systems that are studied holistically by one or more methods. The case that is the subject of the inquiry will be an instance of a class of phenomena that provides an analytical frame — an object — within which the study is conducted and which the case illuminates and explicates".

-G. Thomas, 2011

"The case study is a research approach, situated between concrete data taking techniques and methodological paradigms."

ADVANTAGES

1. make decision making easier
2. improve the analytical quality of decisions
3. reduce the time required to make decisions
4. increase the frequency of correct decisions.
5. Deeper understanding
6. Fact-driven

DISADVANTAGES

1. Lack of generalization
2. Lack of clearly defined methods
3. Time-consuming
4. Costs
5. Bias in data collection and analysis

PROCESS

- **Preliminary theory & blueprint of the study**
  - ⇋ Initial theory & understanding of what is being studied is necessary before any field contacts; the complete research design embodies a "theory" of what is being studied.
- **Deciding between explanatory, exploratory and descriptive designs**
  - Search for theoretical propositions that can be elaborated to cover study questions, propositions, units of analysis, data-proposition links & criteria of interpretation
  - Reviewing literature, discussing with investigators, asking challenging questions, thinking what is to be learned from the study
  - -Being aware of the range of theories & selecting the required level (individual, organization, societal)
  - Construction of the design / conceptual framework takes time & can be difficult, but is a crucial step for the success of the study

- **Selection of the cases**
  - ☞ Cases should be selected in the same way as the topic of an experiment is selected
  - ☞ Developed preliminary theory is used as a template with which to compare the characteristics & empirical findings from the case(s)
  - ☞ Selected cases should reflect characteristics & problems identified in the underlying theoretical propositions / conceptual framework

- **The level of generalization of the study results**
  - » Appropriately developed preliminary theory / study design
  - » Mode of generalization = theory-related **analytic generalization**, not statistical
  - » Analytic generalization possible from one or more cases.

The Seven Steps of Problem Analysis

1. Read the case thoroughly.

To understand fully what is happening in a case, it is necessary to read the case carefully and thoroughly. You may want to read the case rather quickly the first time to get an overview of the industry, the company, the people, and the situation. Read the case again more slowly, making notes as you go.

2. Define the central issue.

Many cases will involve several issues or problems. Identify the most important problems and separate them from the more trivial issues. After identifying what appears to be a major underlying issue, examine related problems in the functional areas (for example, marketing, finance, personnel, and so on). Functional area problems may help you identify deep-rooted problems that are the responsibility of top management.

3. Define the firm's goals

Inconsistencies between a firm's goals and its performance may further highlight the problems discovered .At the very least, identifying the firm's goals will provide a guide for the remaining analysis.

4. Identify the constraints to the problem

The constraints may limit the solutions available to the firm. Typical constraints include limited finances, lack of additional production capacity, personnel limitations, strong competitors, relationships with suppliers and customers, and so on. Constraints have to be considered when suggesting a solution.

5. Identify all the relevant alternatives

The list should all the relevant alternatives that could solve the problem(s). Use your creativity in coming up with alternative solutions. Even when solutions are suggested in the case, you may be able to suggest better solutions.

6. Select the best alternative.

Evaluate each alternative in light of the available information. If you have carefully taken the proceeding five steps, a good solution to the case should be apparent. Resist the temptation to jump to this step early in the case analysis. You will probably miss important facts, misunderstand the problem, or skip what may be the best alternative solution. You will also need to explain the logic you used to choose one alternative and reject the others.

7. Develop an implementation plan

The final step in the analysis is to develop a plan for effective implementation of your decision. Lack of an implementation plan even for a very good decision can lead to disaster for a firm and for you. Don't overlook this step. Your teacher will surely ask you or someone in the class to explain how to implement the decision.

SURVEY RESEARCH

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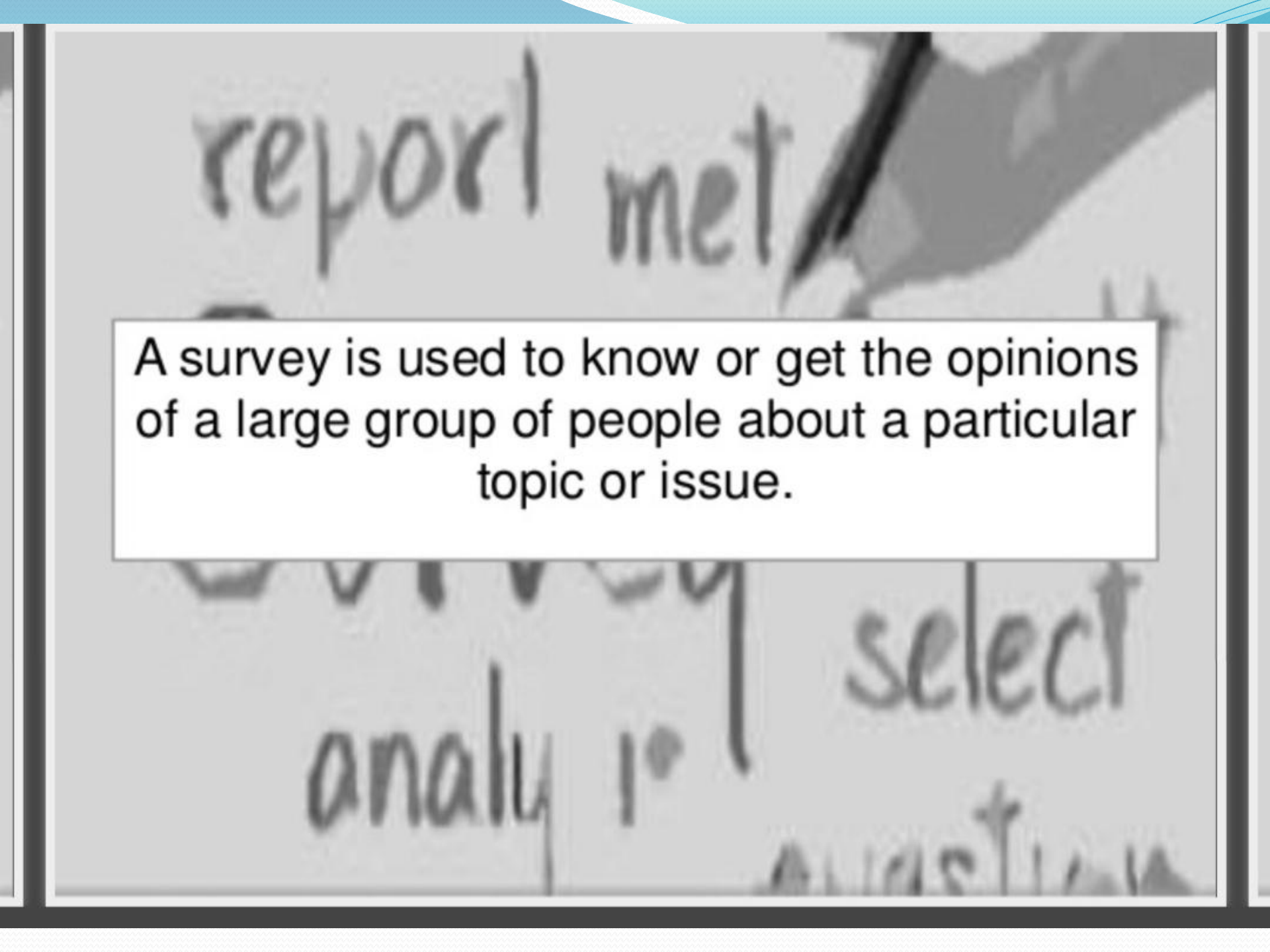
SURVEY

- to ask (many people) a question or a series of questions in order to gather information about what most people do or think about something.

- Merriam- Webster Dictionary



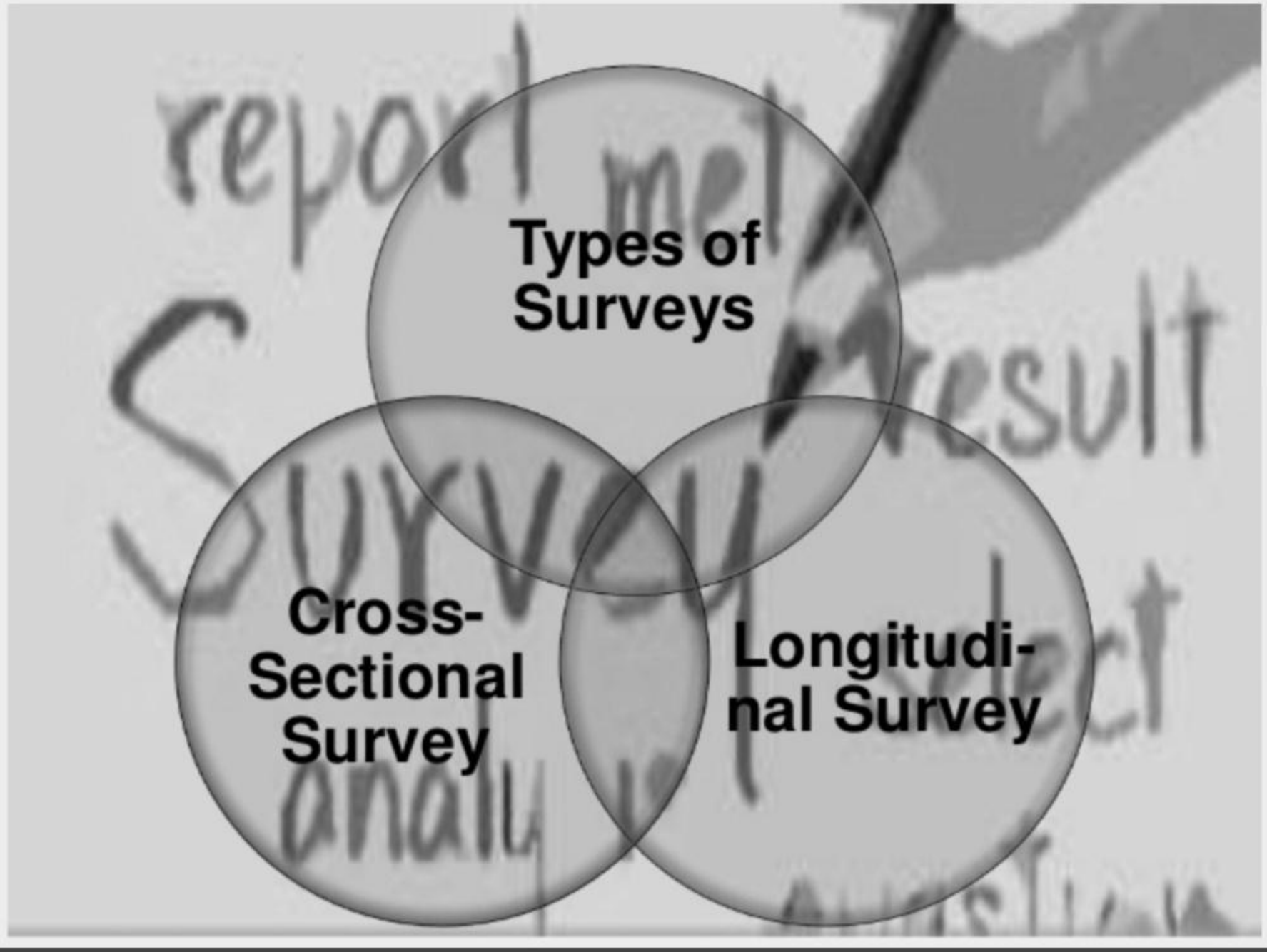
A survey is used to know or get the opinions of a large group of people about a particular topic or issue.

STEPS IN CONDUCTING A SURVEY

- ask a number of questions, all related to the issue, to find answers.
- select a sample
- administer the questions to each samples
- analyze the responses of the samples
- draw conclusions about the opinions of the sample
- generalize to the population from which the sample was selected.

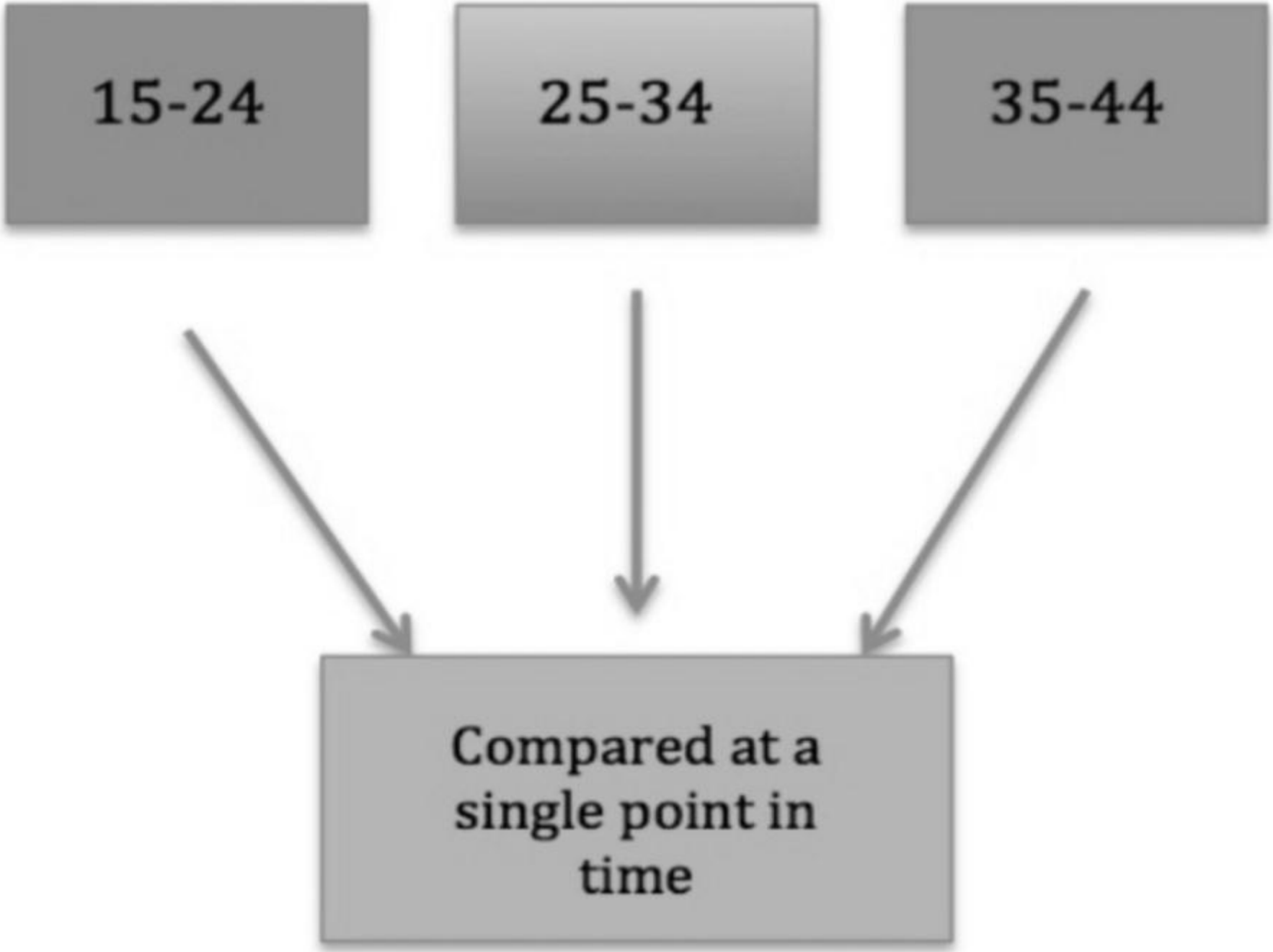
CHARACTERISTICS OF A SURVEY

1. Information is collected from a group of people
2. The main way in which the information is collected is through asking questions
3. Information is collected from a sample rather than from every member of the population.


Types of Surveys
Cross-Sectional Survey
Longitudi-nal Survey

CROSS-SECTIONAL SURVEYS

- Collects information from a sample that has been drawn from a predetermined population
- The information is collected at just one point in time.


15-24
25-34
35-44
Compared at a single point in time

LONGITUDINAL SURVEYS

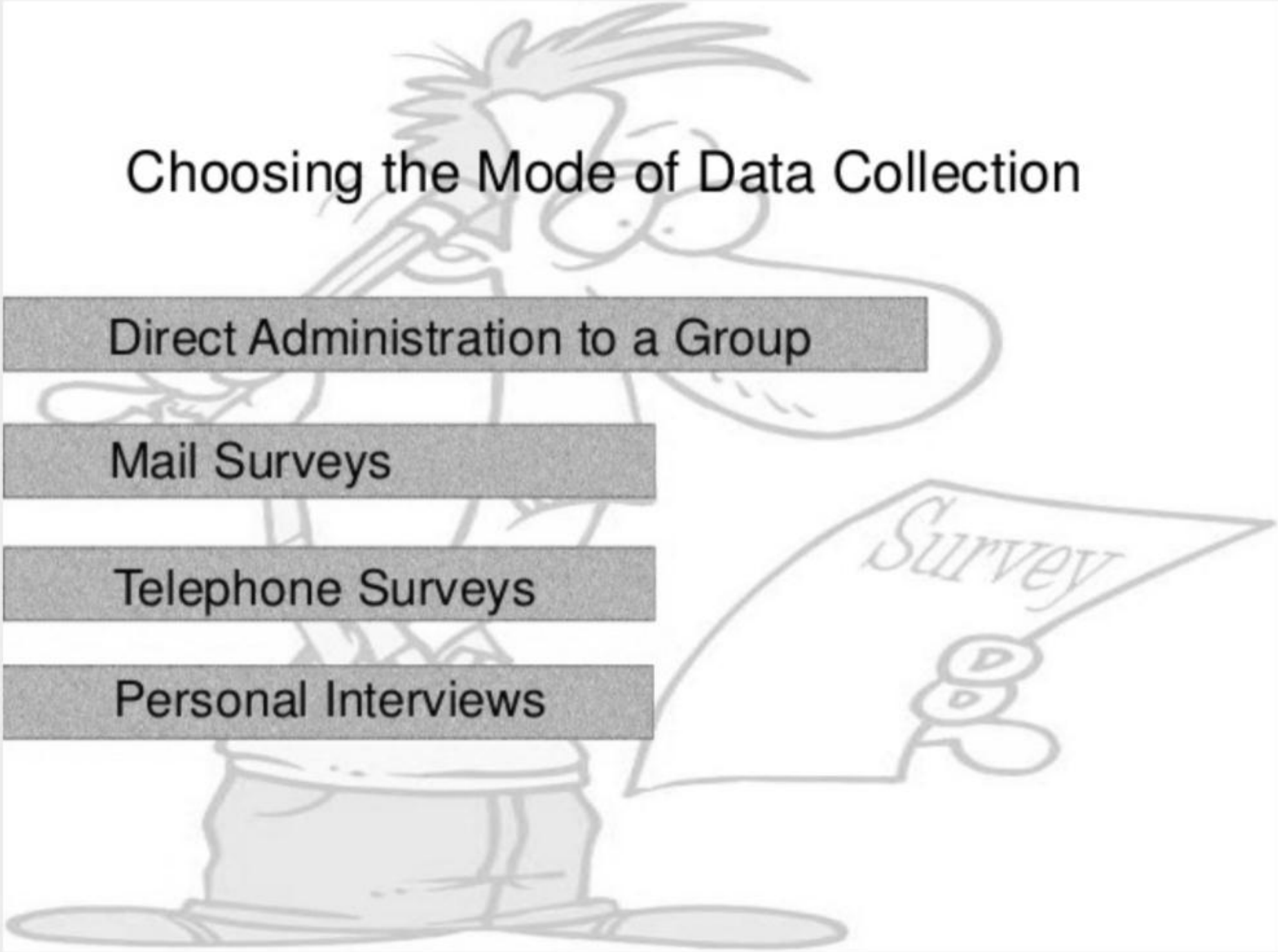
- Information is collected at different points in time in order to study changes over time

- Three longitudinal designs are commonly employed in survey research: trend studies, cohort studies and panel studies.


Don't you have enough information?

Choosing the Mode of Data Collection

- Direct Administration to a Group
- Mail Surveys
- Telephone Surveys
- Personal Interviews



DIRECT ADMINISTRATION TO A GROUP

This method is used whenever a researcher has access to all (or most) of the members of a particular group in one place.

- *Examples would include giving questionnaires to students to complete in their classrooms or workers complete at their job setting.*

MAIL SURVEYS

This method is used when data in a survey are collected by mail, the questionnaire is sent to each individual in the sample, with a request that it be completed and then returned by a given date.

TELEPHONE SURVEYS

This method is used when the researcher asks questions of the respondents over the telephone.

**Nowadays, given the fast-pace of technology, communication has been more accessible for all. Computers are being used more in telephone surveys.*

PERSONAL INTERVIEWS

This method is used when the researcher conducts face-to-face interview with the respondent. Rapport can be established, questioned can be clarified, unclear or incomplete answers can be followed-up, and so on.

**Face-to-face interviewing also places less of a burden on the reading and writing skills of the respondents and, when necessary, permits spending more time with respondents.*


Thank you

IDENTIFICATION & FORMULATION OF RESEARCH PROBLEM

Research Problem

- A research problem is a question that a researcher wants to answer, or a problem that a researcher wants to solve.
- A research problem is the situation that causes the researcher to feel apprehensive, confused and ill at ease.

- Identification & Formulation of research problem is a first step in the research process.
- It is believed that most of the good research studies needs lot of time for selection of a research problem.

RESEARCH PROBLEM- DEFINITION

A problem is an interrogative sentence or statement that asks what relation exists between two or more variables. – **Kerlinger**

COMPONENTS OF RESEARCH PROBLEM

- There must be an individual or a group which has some difficulty.
- There must be some objective(s) to be attained at.If one wants nothing,one cannot have a problem.
- There must be alternative means (or the courses of action) for attaining the objectives one wish to attain.This means that there must be at least two means available to a researcher for if he has no choice of means,he cannot have a problem.
- There must remain some doubt in the mind of a researcher with regard to the selection of alternatives.This means that research must answer the question concerning the relative efficency of the possible alternatives.
- There must be some environment to which the difficulty pertains.

Steps in Problem Identification

- Statement of the problem in general way
- Understanding the nature of the problem
- Surveying the available literature
- Developing the ideas through discussions
- Rephrasing the research problem into a working proposition.

(a)Statement of the problem in a general way

- Define the problem in general way

  Ex: Does negative news interest people more than positive news?
- Narrow it down by rethinking over the problem. (Consider feasibility of problem)

  Ex: Does negative news such as robbery, corruption interest people more than positive news like country economic growth ?
- How to define in general way?

  Study the related subject thoroughly

  Do preliminary survey or pilot survey

(b) Understanding the nature of the problem

- Best way to understand the problem is through discussion.
- Discussion with the people who has good knowledge about that problem.

(c) Surveying the available literature

Survey all the research which are already undertaken in related problem.

It helps to :

- Narrow down the problem
- To identify research gaps
- Gives new ideas in related area
- Helps for research design

(D) DEVELOPING THE IDEAS THROUGH DISCUSSIONS

- Discussion always produces useful information.
- Various new ideas can be developed through such an exercise.
- Researcher must discuss his/her problem with his/her colleagues and others who have enough experience in the same area or in working on similar problems. This is known as experience survey.

(e) REPHRASING THE RESEARCH PROBLEM

- Rephrase the research problem in to operational term.
- Initial research question: Why is productivity in Japan so much higher than in India?
- After, the problem has understood, available literature has taken place and discussion over the problem has taken place, the question has rephrased.
- Rephrased Research question: What factors were responsible for the higher labour productivity of Japan's manufacturing industries during the decade 1971 to 1980 relative to India's manufacturing industries?

Formulation of a Problem

Formulation means translating and transforming the selected research problem/topic into a scientifically researchable question.

It is the demarcation of a problem area within a certain context involving the:

- WHO
- WHAT
- WHERE
- WHEN and the WHY of the problem situation

A problem well defined is a problem half solved

ill defined problem may create hurdles like:

- What data are to be collected?
- What characteristics of data are relevant and need to be studied?
- What relations are to be explored.
- What techniques are to be used for the purpose?

LITERATURE REVIEW

INTRODUCTION

- Review of literature is one of the most important steps in the research process.
- It is an account of what is already known about a particular phenomenon.
- The main purpose of literature review is to convey to the readers about the work already done & the knowledge & ideas that have been already established on a particular topic of research.
- Literature review is a laborious task, but it is essential if the research process is to be successful.

- A literature review is an evaluative report of information found in the literature related to selected area of study. The review describes, summarizes, evaluates & clarifies this literature. It gives a theoretical base for the research & helps to determine the nature of research.

…(Queensland University, 1999)

- A literature review is a body of text that aims to review the critical points of knowledge on a particular topic of research.

…(ANM, 2000)

- A literature review is an account of what has been already established or published on a particular research topic by accredited scholars & researchers.

…(University of Toronto, 2001)

IMPORTANCE OF LITERATURE REVIEW

- Identification of a research problem & development or refinement of research questions.
- Generation of useful research questions or projects/activities for the discipline.
- Orientation to what is known & not known about an area of inquiry to ascertain what research can best contribute to knowledge.
- Determination of any gaps or inconsistencies in a body of knowledge.
- Discovery of unanswered questions about subjects, concepts or problems.
- Determination of a need to replicate a prior study in different study settings or different samples or size or different study populations.

Count...

- Identification of relevant theoretical or conceptual framework for research problems.
- Identification or development of new or refined clinical interventions to test through empirical research.
- Description of the strengths & weaknesses of design/methods of inquiry & instruments used in earlier research work.
- Development of hypothesis to be tested in a research study.
- Helps in planning the methodology of the present research study.
- It also helps in development of research instruments.
- Identification of suitable design & data collection methods for a research study.

PURPOSES OF LITERATURE REVIEW

- The purpose of a literature review is to convey to the reader previous knowledge & facts established on a topic, & their strength & weakness.
- The literature review allows the reader to be updated with the state of research in a field & any contradictions that may exist with challenges findings of other research studies.
- It helps to develop research investigative tools & to improve research methodologies.
- It also provide the knowledge about the problems faced by the previous researchers' while studying same topic.
- Besides enhancing researchers' knowledge about the topic, writing a literature review helps to:

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Count…

- Place each in the context of its contribution to the understanding of subject under review.
- Describe the relationship of each study to other research studies under consideration.
- Identify new ways to interpret & shed light on any gaps in previous research.
- Resolve conflicts amongst seemingly contradictory previous studies.
- Identify areas of prior scholarship to prevent duplication of effort.
- Point a way forward for further research.
- See what has & has not been investigated.

Count…

- Develop general explanation for observed variations in a behavior or phenomenon.
- Identify potential relationship between concepts & to identify researchable hypothesis.
- Learn how others have defined & measured key concepts.
- Identify data sources that other researchers have used.
- Develop alternative research projects.
- Discover how a research project is related to the work of others.
- Place one's original work (in case of thesis or dissertation) context of the existing literature.

SOURCES OF LITERATURE REVIEW

Literature can be reviewed from two sources:

1. Primary sources
2. Secondary sources

1. Primary Sources

- Literature review mostly relies on primary sources, i.e. research reports, which are description of studies written by researchers who conducted them.
- A primary sources is written by a person who developed the theory or conducted the research, or is the description of an investigation written by the person who conducted it.
- Most primary sources are found in published literature.

2. Secondary Sources

- Secondary source research documents are description of studies prepared by someone other than the original researcher.
- They are written by people other than the individuals who developed the theory or conducted the research.
- The secondary sources may be used when primary sources are not available or if researchers want external opinions on an issue or problem or

Example of a Secondary Source: A literature review on patient experiences in the ICU: Stein-Parbury, J. & Mckinley, S. (2000) patient experiences of being in an intensive care unit: a select literature review. *American Journal of critical care*, 9:20-27.

Research Hypothesis

- Hypothesis is considered as an intelligent guess or prediction, that gives directional to the researcher to answer the research question.

- Hypothesis or Hypotheses are defined as the formal statement of the tentative or expected prediction or explanation of the relationship between two or more variables in a specified population.

- A hypothesis is a formal tentative statement of the expected relationship between two or more variables under study.

- A hypothesis helps to translate the research problem and objective into a clear explanation or prediction of the expected results or outcomes of the study.

- Hypothesis is derived from the research problems, literature review and conceptual framework.

- Hypothesis in a research project logically follow literature review and conceptual framework.

Hypothesis makes the following contributions in research study

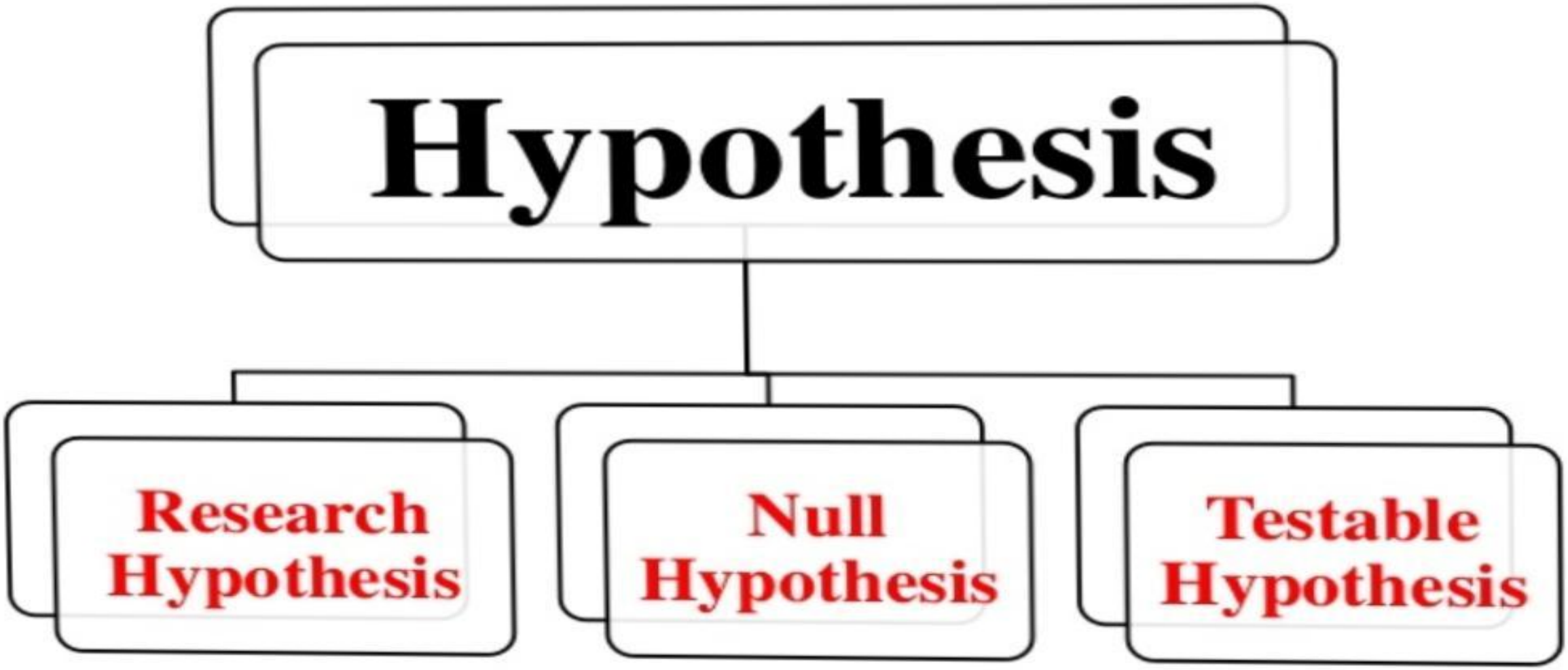
- It provides clarity to the research problem and research objectives
- It describes, explains or predicts the expected results or outcome of the research.
- It indicates the type of research design.
- It directs the research study process.

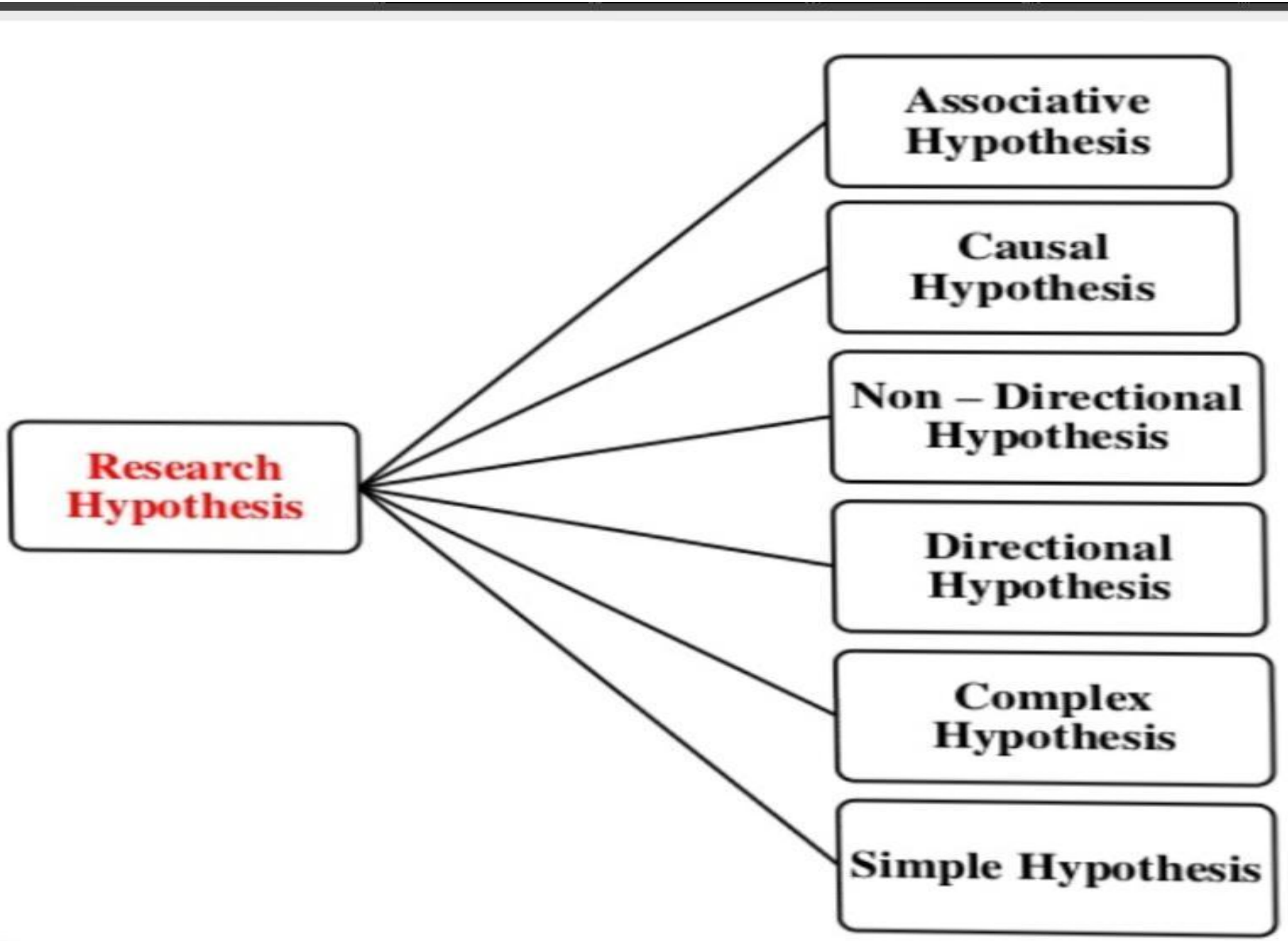
Cont...

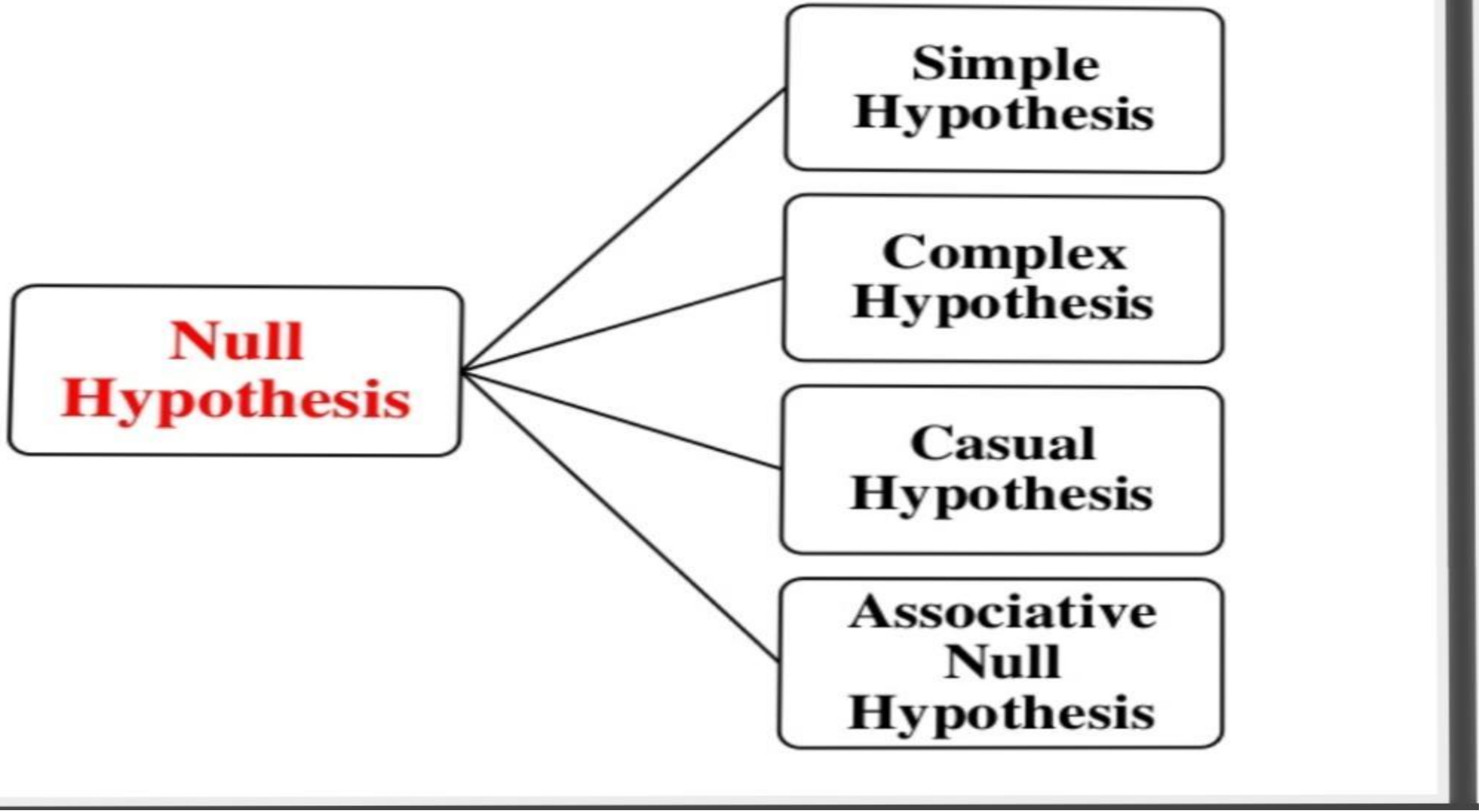
- It identifies the population of the research study that is to be investigated or examined.

- It facilitates data collection, data analysis and data interpretation

Type of Hypothes is


Hypothesis
Research Hypothesis
Null Hypothesis
Testable Hypothesis


Research Hypothesis
Associative Hypothesis
Causal Hypothesis
Non – Directional Hypothesis
Directional Hypothesis
Complex Hypothesis
Simple Hypothesis


Null Hypothesis
Simple Hypothesis
Complex Hypothesis
Casual Hypothesis
Associative Null Hypothesis

Testable Hypothesis

Simple Hypothesis

- simple hypothesis predicts that, there exist a relationship between the independent variable and dependent variable.

- **Example**- two hourly positions- changing of a fully bedridden patient will prevent bedsore.
  - In the **above example** 2 hourly position changing is independent variable and bedsore prevention is dependent variable. The statement shows that there exists a relationship between 2 hourly positioning and bedsore prevention.

Complex Hypothesis

- complex hypothesis predicts that there exists relationship between tw or more independent and dependen variable.

- **Example** – for a fully bed ridden patent 2 hourly position changing, 2 hourly back care and a high protein diet will build up body resistance, will promote blood circulation and will prevent bedsore.
  - In the above example, **three independent variable** are:- A) 2 hourly position changing, B) 2 hourly back care, C) high protein diet.
  - And **three dependent variable** are:- a) promotion of blood circulation, B) building up of body resistance, C) prevention of bed sore.

Directional Hypothesis

- Directional Hypothesis predicts the direction of the relationship between the independent and dependent variable.

- **Example**- High quality of nursing education will lead to high quality of nursing practice skills.

Non directional Hypothesis

- **Non -directional Hypothesis** predicts the relationship between the independent variable and the dependent variable but does not specific the **directional of the relationship**.
- **Example**- teacher student relationship influence student's learning.

Causal Hypothesis

- Causal Hypothesis predicts a **cause** and **effects** relationship or interaction between the independent variable and dependent variable. This hypothesis predicts the effect of the independent variable on the dependent variable.

- In this the independent variable is the experimental or treatment variable. The dependent variable is the outcome variable

- Example – early postoperative ambulation will lead to prompt recovery.

Associative hypothesis

- Associative Hypothesis predicts an associative relationship between the independent variable and the dependent variable.
- When there is a change in any one of the variables, changes also occurs in the other variable.

- The associative relationship between the independent and dependent variables may have either.
  - Positive association
  - Negative association

Null hypothesis

- **Null Hypothesis** is also called **statistical hypothesis** because this type of hypothesis is used for statistical testing and statically interpretation. The null hypothesis predicts that, there is no relationship between the independent variable and dependent variable.

- Example- Nasogastric tube feeding does not alter body temperature.

Simple null hypothesis

- **Example** – bed rest will not relives sever asthmatic dyspnea. In the above example, the independent variable that is, bed rest does not have any causal relationship with the dependent variable that is, severe asthmatic dyspnea.

Complex null Hypothesis

- Example- smoking, drug abuse, alcoholism, tobacco use etc. have no relationship in the occurrence of malaria, mumps or chicken pox.

Causal null Hypothesis

- **Example**- high intake of fluid does not cause tissue oedema. In the above example, the independent variable, that is, high fluid intake does not have any causal relationship with the dependent variable such as, tissue oedema.

Associative null Hypothesis

- Example- Increased does in antibiotics will not reduce body temperature

Testable Hypothesis

- The testable hypothesis predicts relationship between the independent variable and the dependent variable and theses variable are testable or measurable.

- **Example** – Increase in patient's body temperature causes increase in patient's pulse rate.

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