Introduction to Research

Beginning the Research Work

Why ? (Statement of Problem)

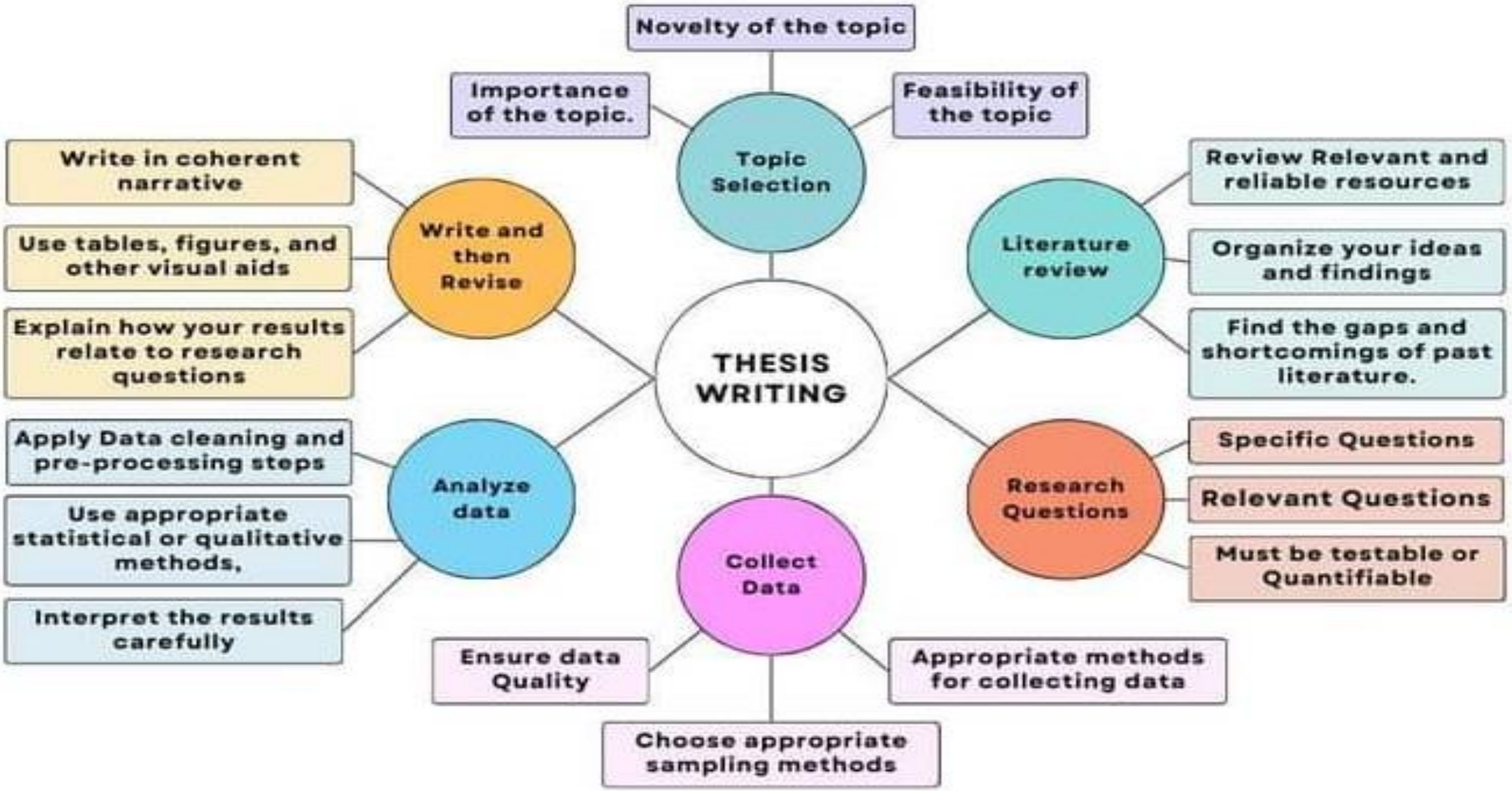
What ? (Objective of the Study)

How ? (Methodology of the study)

Definition of Research

- Research is defined as addition to the stock of existing knowledge
- **“Research is to see what everybody else has seen, and to think what nobody else has thought”:-Albert Szent-Gyorgyi**

Guide to Thesis Writing



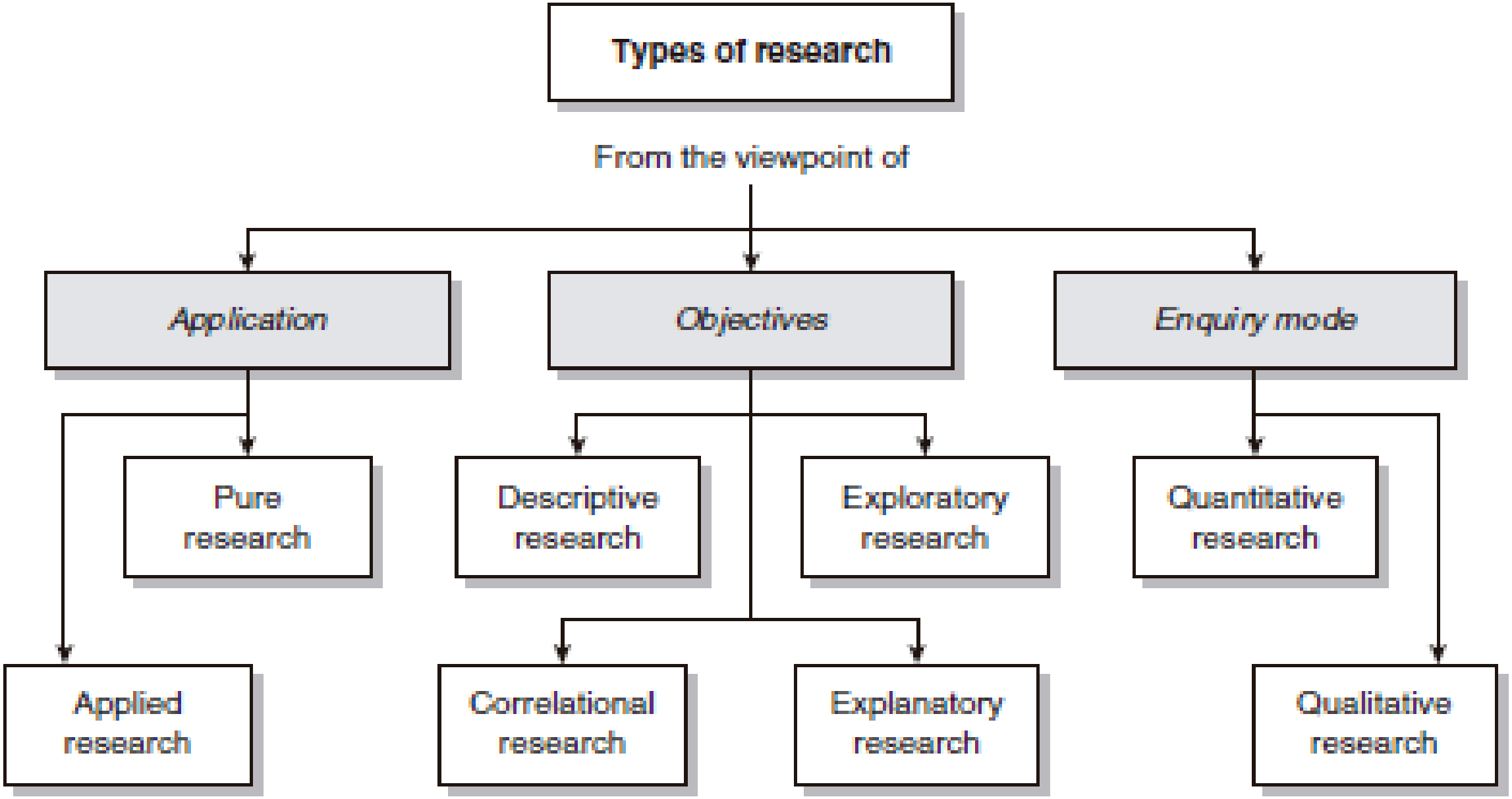


FIGURE 1.2 *Types of research*

Definition of Research

- "Research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue": John W. Creswell
- Research is the systematic process of collecting and analyzing information (data) in order to increase our understanding of the phenomenon under study:-
- **"Research is to see what everybody else has seen, and to think what nobody else has thought":-Albert Szent-Gyorgyi**
- According to Clifford Woody "research comprises defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organizing and evaluating data; making deductions and reaching conclusions; and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis"

What are the characteristics of research?

- The purpose of the research should be clearly defined and common concepts be used.
- The research procedure used should be described in sufficient detail to permit another researcher to repeat the researcher for further advancement, keeping the continuity of what has already been attained.
- The procedural design of the research should carefully planned to yield results that are as objective as possible
- The researcher should report with complete frankness, flaws in procedural design and estimate their effects upon the findings.
- The analysis of data should be sufficiently adequate to reveal its significance and the methods of analysis used should be appropriate. The validity and reliability of the data should be checked carefully
- Conclusions should be confined to those justified by the data of the research and limited to those for which the data provide an adequate basis.
- Greater confidence in research is warranted if the researcher is experienced, has a good reputation in research and is a person of integrity.

Pure Research/Basic Research/Fundamental Research

- Pure Research, also known as Basic Research or Fundamental Research, is a type of research that is conducted to increase our understanding of fundamental principles and theories.
- The primary goal of pure research is to generate new knowledge or expand existing knowledge without a direct or immediate practical application in mind
- This type of research is driven by curiosity, the desire to explore the unknown, and the quest for knowledge for its own sake
- Key Characteristics of Pure Research
  - Knowledge-Driven
  - Theoretical in Nature
  - No Immediate Practical Application
  - Curiosity-Driven
- Examples of Pure Research
  - Albert Einstein's Theory of Relativity
  - Adam Smith's Inquiry into the Nature and Causes of the Wealth of Nations (1776)
  - John Maynard Keynes' General Theory of Employment, Interest, and Money

Applied Research

- It aims at finding a solution for an immediate problem facing a society or an industrial/business organisation.
- Research aimed at a certain conclusions facing concrete social or business problem
- It is often driven by the need to find answers to specific challenges, improve processes, or create new technologies, policies, or strategies.
- Key Characteristics of Applied Research
    - Problem-Oriented
    - Utilization of Existing Knowledge
    - Immediate Relevance
    - Interdisciplinary
- Examples of Applied Research in Social Issues
    - Enhancing Job Training Programs
    - Improving Access to Healthcare
    - Improving Educational Outcomes
    - Reducing Homelessness
    - Combating Domestic Violence
- Importance of Applied Research
    - Direct Societal Impact
    - Policy Development
    - Improvement of Quality of Life
    - Economic Development:

Descriptive Research

- The major purpose of descriptive research is description of the state of affairs as it exists at present
- Descriptive Research is a type of research that aims to describe the characteristics, behaviors, functions, and attributes of a particular group, situation, phenomenon, or population in a systematic and accurate manner
- Researcher has no control over the variables; he can only report what has happened or what is happening.
- It focuses on providing a detailed, factual account of the subject being studied.
- Descriptive research seeks to determine the answers to who, what, when, where, and how questions
- It plays a crucial role in gathering information that can inform decisions, policies, and further research efforts
- Examples of Descriptive Research
  - Demographic Surveys, Health Studies, Labor Force Surveys, Educational Census
- Importance of Descriptive Research
  - Foundation for Further Research, Informing Decision-Making, Understanding Trends and Patterns
- Types of Descriptive Research
  - Survey Research, Case Studies, Observational Research, Correlational Research, Content Analysis

Exploratory Research(Formulative Research)

- **Exploratory Research** is a type of research that is conducted to investigate a problem or situation that is not well defined or understood.
- It aims to explore and gain insights into the nature of a problem, the underlying factors, and potential solutions, without having a clear hypothesis or predefined outcome
- The main goal of exploratory research is to identify patterns, ideas, or hypotheses that can be further investigated in more structured research studies
- Key Characteristics of Exploratory Research
  - Unstructured and Flexible, Preliminary and Informal, Qualitative Methods, Iterative Process, Broad Scope
- Examples of Exploratory Research
  - **Understanding a New Market, Understanding Tribal Culture, Exploring New Educational Approaches**
- Importance of Exploratory Research
  - **Generates New Ideas, Clarifies Research Problems, Reduces Research Risks, Supports Decision-Making, Lays the Groundwork for Future Research**

Explanatory Research

- Explanatory Research is a type of research that seeks to understand the cause-and-effect relationships between variables
- It goes beyond merely describing or exploring phenomena by aiming to explain why and how certain events occur
- This type of research is often used to test hypotheses and build theories that clarify the underlying mechanisms of a particular issue or phenomenon.
- Key Characteristics of Explanatory Research
  - Cause-and-Effect Focus, Hypothesis Testing, Structured and Systematic, Quantitative Methods, Theoretical Frameworks
- Examples of Explanatory Research
  - Impact of Education on Income Levels
  - Effectiveness of a Health Intervention
  - Relationship Between Social Media Use and Mental Health
  - Impact of Work Environment on Employee Productivity
  - Influence of Parental Involvement on Student Achievement
- Importance of Explanatory Research
  - Identifies Causal Relationships
  - Supports Decision-Making
  - Advances Scientific Knowledge
  - Guides Intervention and Policy
  - Informs Future Research

Correlational Research

- **Correlational Research** is a type of non-experimental research method used to examine the relationship between two or more variables
- The primary purpose of correlational research is to identify whether there is an association between variables and the strength and direction of this relationship
- Examining the Relationship Between Stress and Academic Performance
- Studying the Relationship Between Smoking and Lung Cancer
- Exploring the Relationship Between Income and Happiness

Experimental Research

- **Experimental research** is a systematic and scientific method of investigation that involves manipulating one or more independent variables to observe the effect on one or more dependent variables.
- This type of research is characterized by controlled conditions and random assignment, allowing researchers to establish cause-and-effect relationships.
- Experimental research is a powerful tool for investigating causal relationships and testing hypotheses in various fields, including medicine, psychology, education, and marketing.
- A clinical trial is conducted to test the effectiveness of a new drug for reducing blood pressure. Participants are randomly assigned to receive either the new medication (experimental group) or a placebo (control group). Blood pressure levels are measured before and after treatment to determine the drug's effectiveness
- An educator tests a new teaching method on student learning outcomes. One class (experimental group) uses the new method, while another class (control group) uses traditional teaching methods. Students' test scores are compared at the end of the semester.

Quantitative Research

- Quantitative Research is based on the quantitative measurements of some characteristics
- It is applicable to phenomena that can be expressed in terms of quantities
- Quantitative Research is a systematic investigation that primarily focuses on quantifying relationships, behaviors, phenomena, and patterns
- It involves the collection and analysis of numerical data, which is used to uncover patterns, test hypotheses, and make predictions.
- The goal of quantitative research is to develop and employ mathematical models, theories, and hypotheses pertaining to a particular phenomenon.
- Key Characteristics of Quantitative Research
  - Numerical Data, Structured Research Instruments, Objective Measurement, Large Sample Sizes, Hypothesis Testing, Deductive Approach, Statistical Analysis
- Importance of Quantitative Research
  - Generalizability, Hypothesis Testing, Trend Analysis, Data-Driven Decision-Making

Qualitative Research

- It is concerned with qualitative phenomenon, i.e., phenomena relating to or involving quality or kind
- For instance, when we are interested in investigating the reasons for human behaviour(i.e., why people think or do certain things)
- This type of research aims at discovering the underlying motives, desires, using in depth interviews of the purpose
- It explores the deeper meaning behind behaviors, decisions, and social processes, often seeking to answer "how" or "why" questions.
- Key Characteristics of Quantitative Research
  - Focus on Meaning and Interpretation, Flexible and Unstructured, interviews, focus groups, observations, Small Sample Sizes, Contextual Understanding
- Examples of Qualitative Research
  - Exploring Cultural Practices, Understanding Patient Experiences in Healthcare, Studying Social Movements

Research “Method” and Research “Methodology”

- The term **methodology** refers to the **overall approaches & perspectives** to the research process as a whole and is concerned with the following main issues:
  - **Why** you collected certain data
  - **What** data you collected
  - **Where** you collected it
  - **How** you collected it
  - **How** you analysed it
- A research method refers only to the various specific tools or ways data can be collected and analysed, e.g. a questionnaire; interview checklist; data analysis software etc.

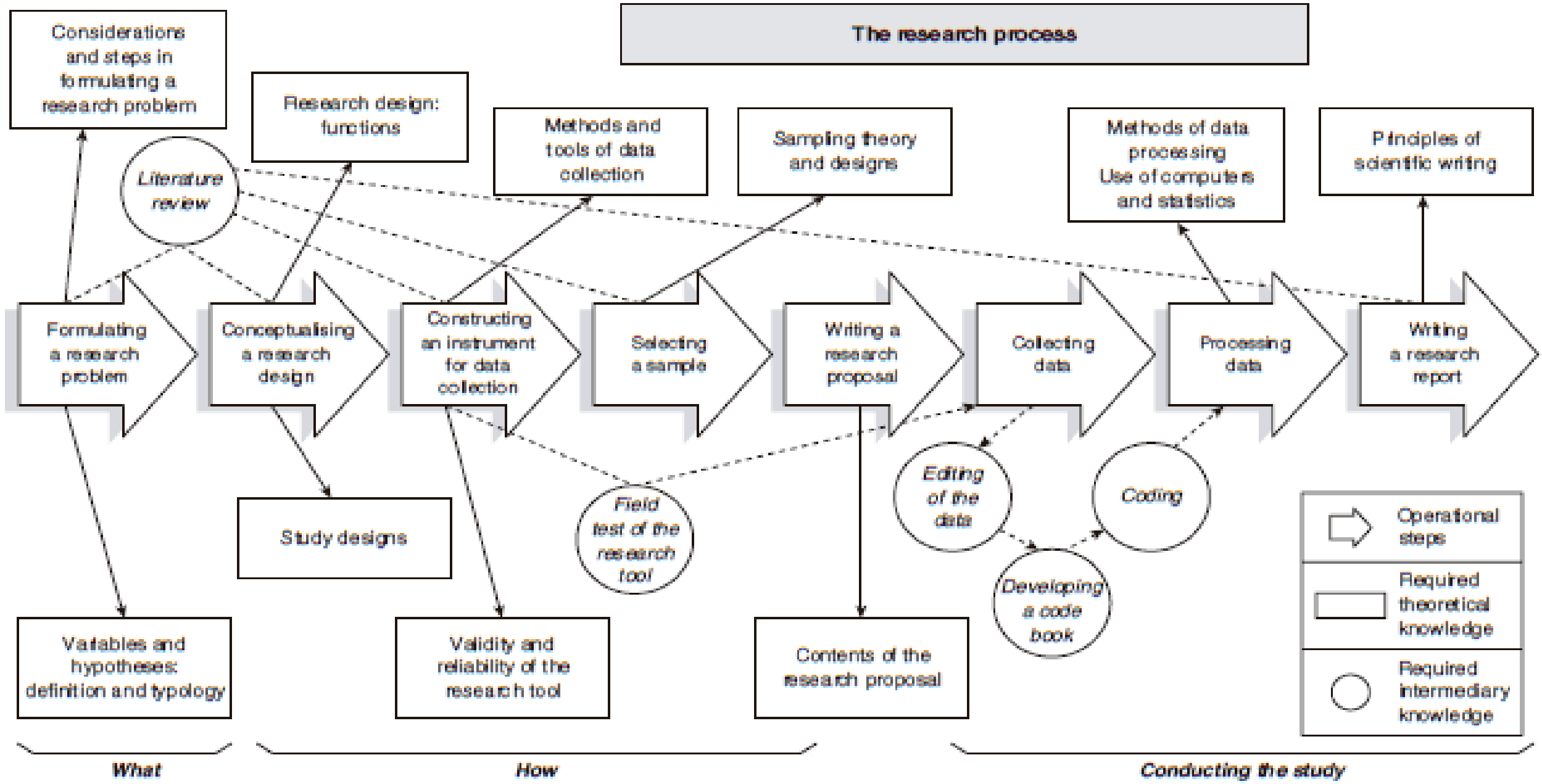
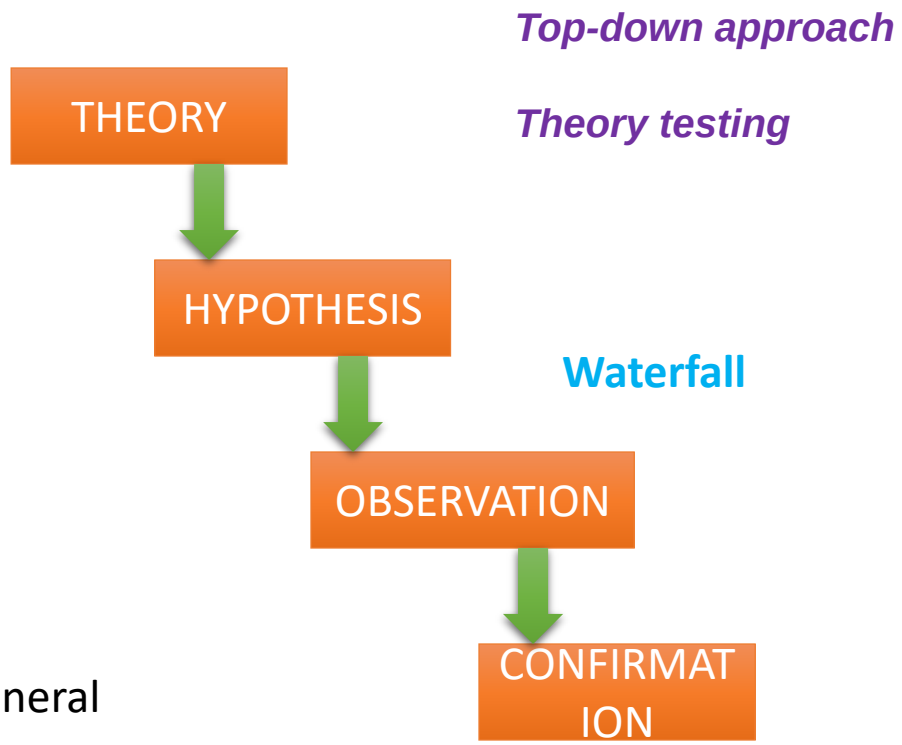


FIGURE 2.2 *The research process*

Deductive Research Method

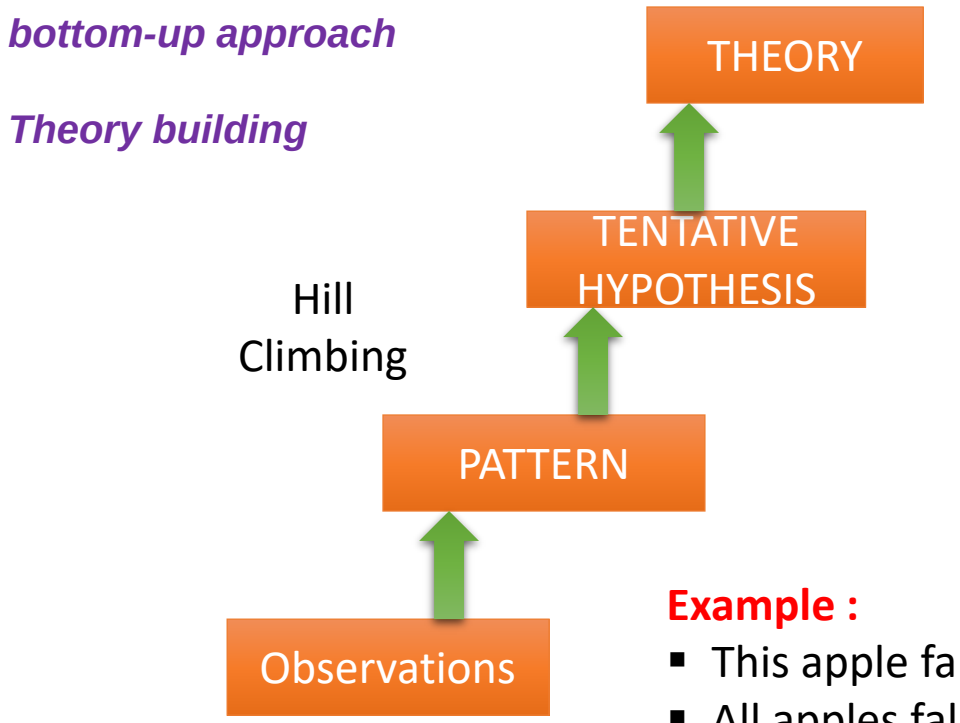
- Deductive Methods works from the more general to the more specific.
- Sometimes this is informally called a "top-down“ approach.
- Conclusion follows logically from premises (available facts)



Example :

- Let there be 360 degrees in circle – (A general assumption)
- There are four right angles in circle – (A logical argument)
- Therefore this right angle has 90 degrees – (A particular conclusion)

Inductive Research Approach



- Inductive reasoning works the other way, moving from specific observations to broader generalizations and theories.
- Informally,, we sometimes call this a "bottom up“ approach
- Conclusion is likely based on premises.
- Involves a degree off uncertainty

Example :

- This apple falls to the ground. (A particular observation)
- All apples fall to the ground. (More observations)
- All objects attract each other. (A general explanation)

Research Error

- Research error refers to random, unintentional mistakes or inaccuracies in the research process, data collection, analysis, or interpretation.
- Errors are often due to factors that are out of the researcher's control and occur despite good intentions and proper planning.
- These errors are typically random and do not systematically skew results in one direction.
- Types of Research Errors
- Sampling Error
- Measurement Error
- Data Entry Error
- Non-response Error

Research Bias

- Research bias occurs when a systematic error is introduced into the research process, often due to the researcher's subjective influence, **faulty design**, or **social or cultural factors**
- Research biases are systematic and intentional or unintentional, leading to consistent distortions of results in one direction. They can mislead conclusions and provide inaccurate representations of reality.
- **Selection Bias**
- **Measurement Bias (or Instrument Bias)**
- **Response Bias**
- **Confirmation Bias**
- **Publication Bias**

Research Error and Research Bias

Aspect	Research Error	Research Bias
Nature	Random, unintentional deviations	Systematic, intentional/unintentional distortions
Cause	Chance factors, human error, data collection issues	Subjective influences, faulty design, researcher influence
Impact	Leads to less precision but no directional shift	Skews results in a specific direction
Examples	Typographical errors, measurement inaccuracies	Selection bias, confirmation bias, response bias
Control	Can often be reduced with larger samples or better tools	Requires careful research design and awareness of biases

Thank You