

**Institute of Science and techniques
of Physical Activities and Sports
Basic Education Department**

SCIENTIFIC RESEARCH METHODOLOGY

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Lecture: 05

RESEARCH Methodology

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Research Methodology

Research methodology is the specific procedures or techniques used to identify, select, process, and analyze information about a topic.

Research

According to John W. Creswell who states that “Research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue”.

It consists of three steps: pose a question, collect data to answer the question, and present an answer to the question.

Difference Between Research Methods and Research Methodology

Research Methods

- **The various ways and means of conducting a research that involve the conduct of experiments, tests, surveys and the like.**
- Aims at finding solutions to research problems

Research Methodology

- **The science of systematically solving a research problem**
- The learning of the various techniques we can use in the conduct of research.

Types of Research



Criteria	Types		
On the basis of Objectives	Fundamental Research	Applied Research	Action Research
On the Basis of Nature of Data	Qualitative Research	Quantitative research	
On the basis of Nature of Findings	Explanatory Research	Exploratory Research	Descriptive Research
On the basis Experimental manipulations	Experimental Research	Non-Experimental Research	
On the basis of approach involved	Longitudinal Research	Cross Sectional Research	

Main Steps in conducting research

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

Variable and its types

The first variable is called the **independent variable**. This is the part of the experiment that can be changed and tested.

The independent variable happens first and can be considered the cause of any changes in the outcome.

The outcome is called the **dependent variable**. The independent variable in our previous example is not studying for a test. The dependent variable that you are using to measure outcome is your test score.

Hypothesis

A **hypothesis** is a specific, testable prediction. It describes in concrete terms what you expect will happen in a certain circumstance.

The **null hypothesis**, symbolized by H_0 , is a statistical hypothesis that states that there is no difference between a parameter and a specific value, or that there is no difference between two parameters.

The **alternative hypothesis**, symbolized by H_1 , is a statistical hypothesis that states the existence of a difference between a parameter and a specific value, or states that there is a difference between two parameters.

Research Design

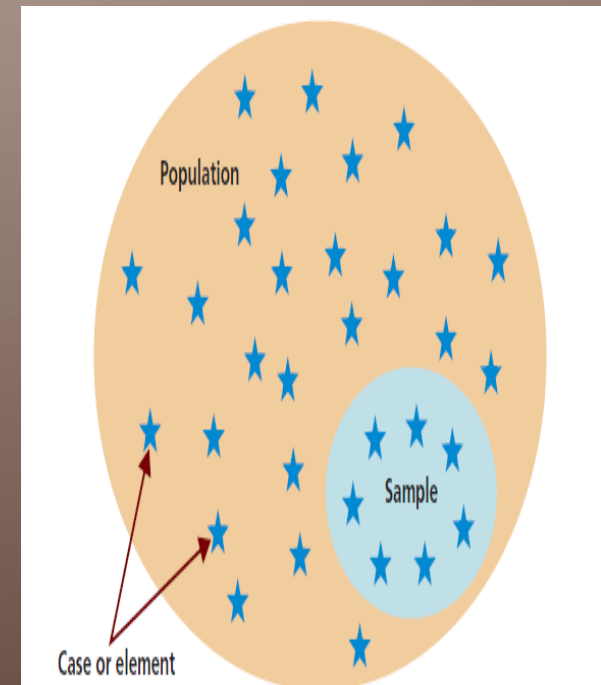
The **research design** refers to the overall strategy that **you** choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring **you will** effectively address the **research** problem; it constitutes the blueprint for the collection, measurement, and analysis of data.

Types of Research Design

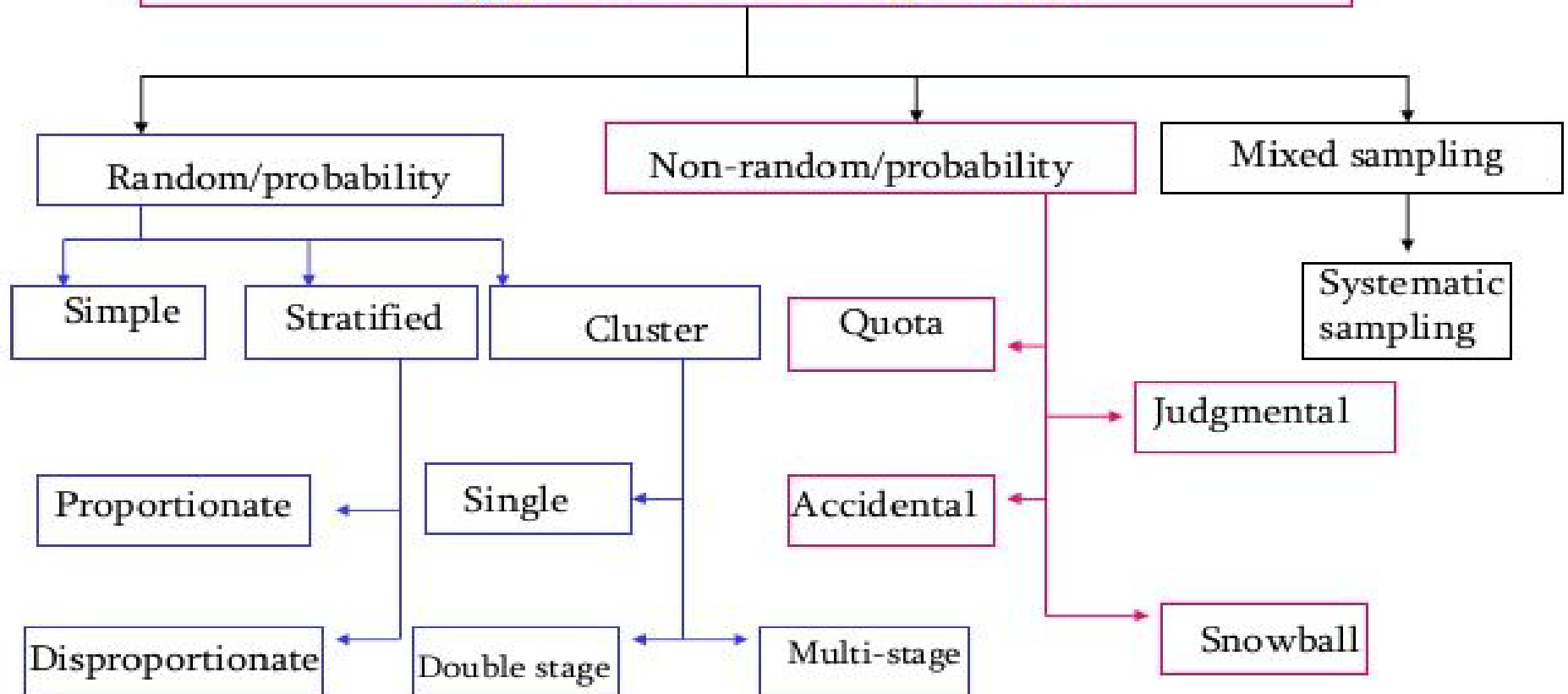
1. **Explanatory**
2. **Descriptive**
3. **Diagnostic**
4. **Experimental**

Sample

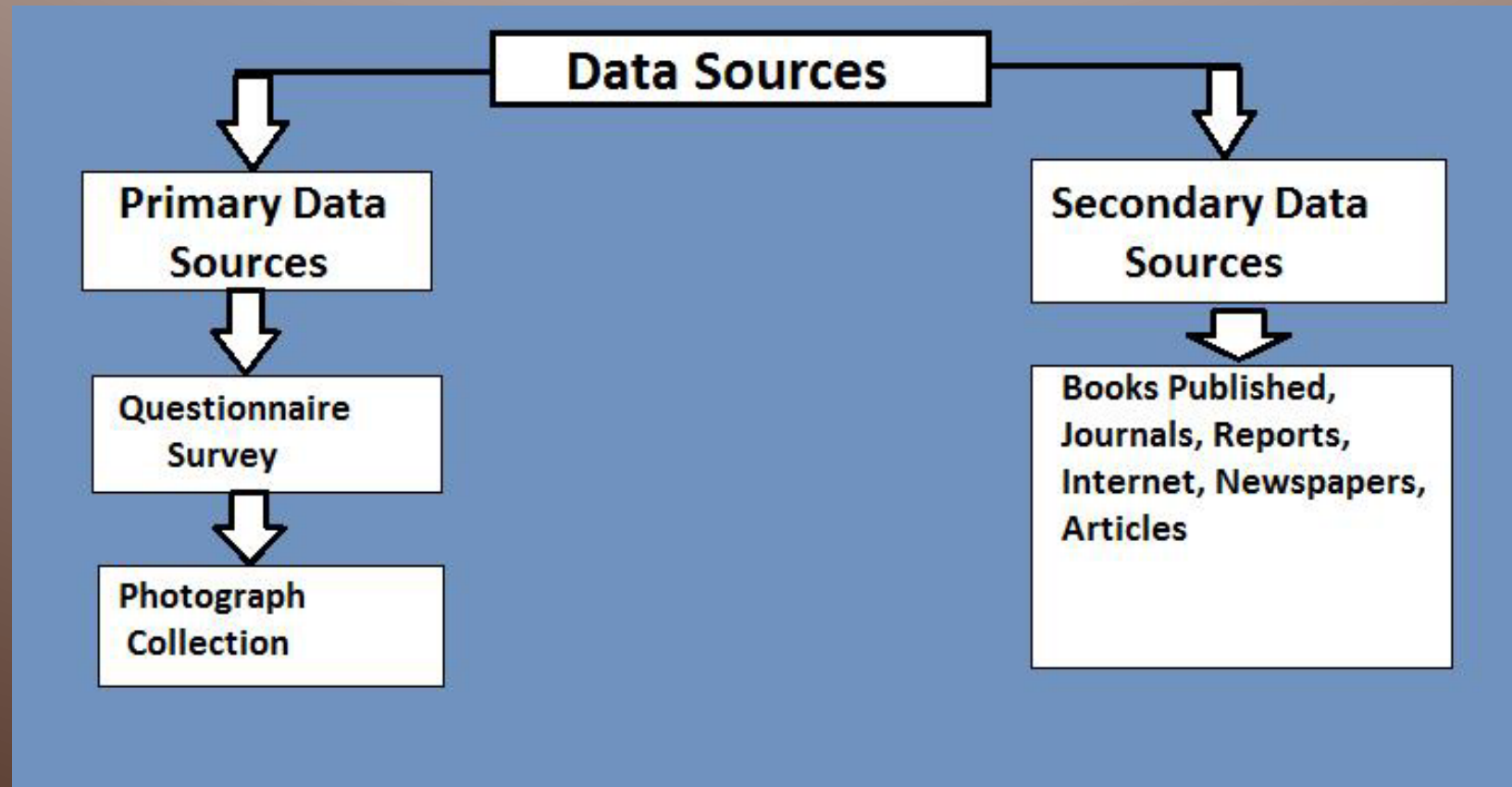
A **sample** refers to a smaller, manageable version of a larger group. It is a subset containing the characteristics of a larger population.



Types of sampling



Source of Data collection



Difference b/w primary and secondary data

Primary data

- ▶ Real time data
- ▶ Sure about sources of data
- ▶ Help to give results/ finding
- ▶ Costly and time consuming process
- ▶ Avoid biasness of response data
- ▶ More flexible

Secondary data

- ▶ Past data
- ▶ Not sure about of sources of data
- ▶ Refining the problem
- ▶ Cheap and no time consuming process
- ▶ Can not know in data biasness or not
- ▶ Less flexible

Data collection tools & techniques

TOOLS

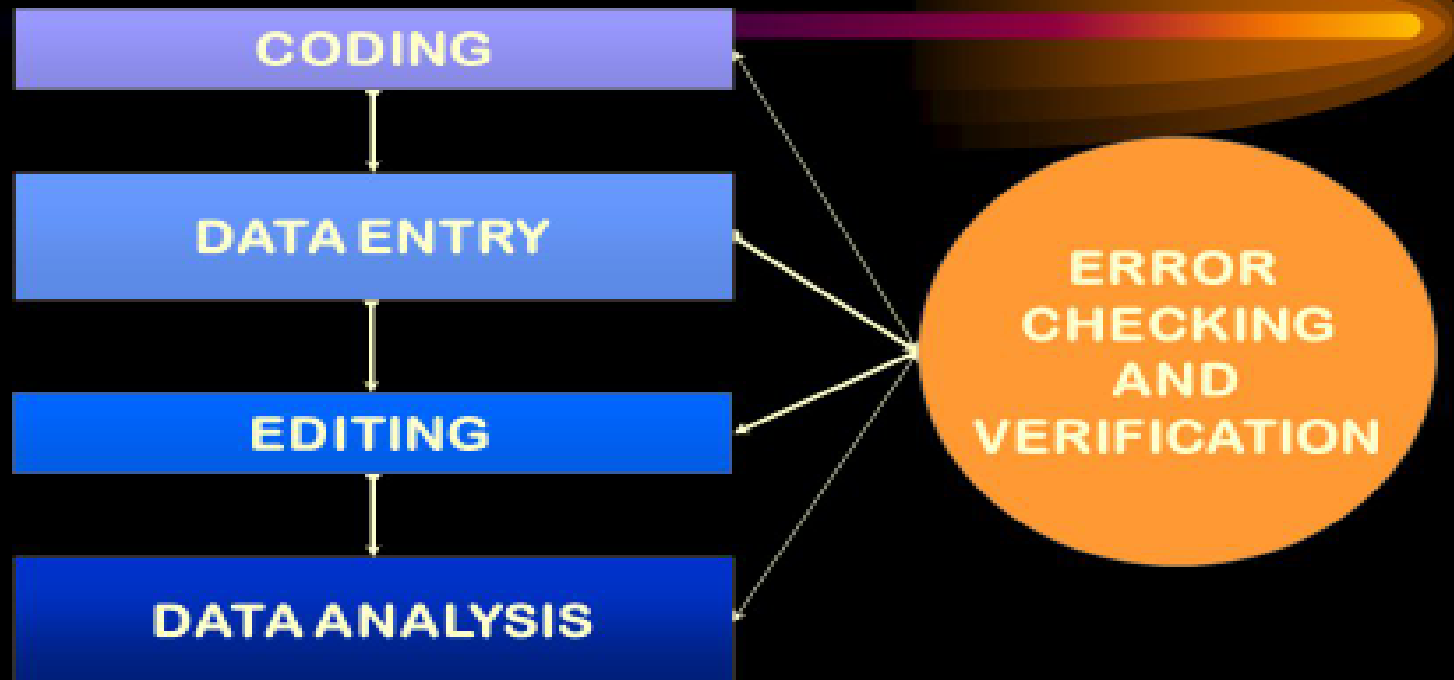
- Questionnaire
- Interview schedule
- Observation schedule
- Scales
- Tests
- Inventory, Checklist, Opinionnaire
- Sociogram/Sociometry

TEHNIQUES

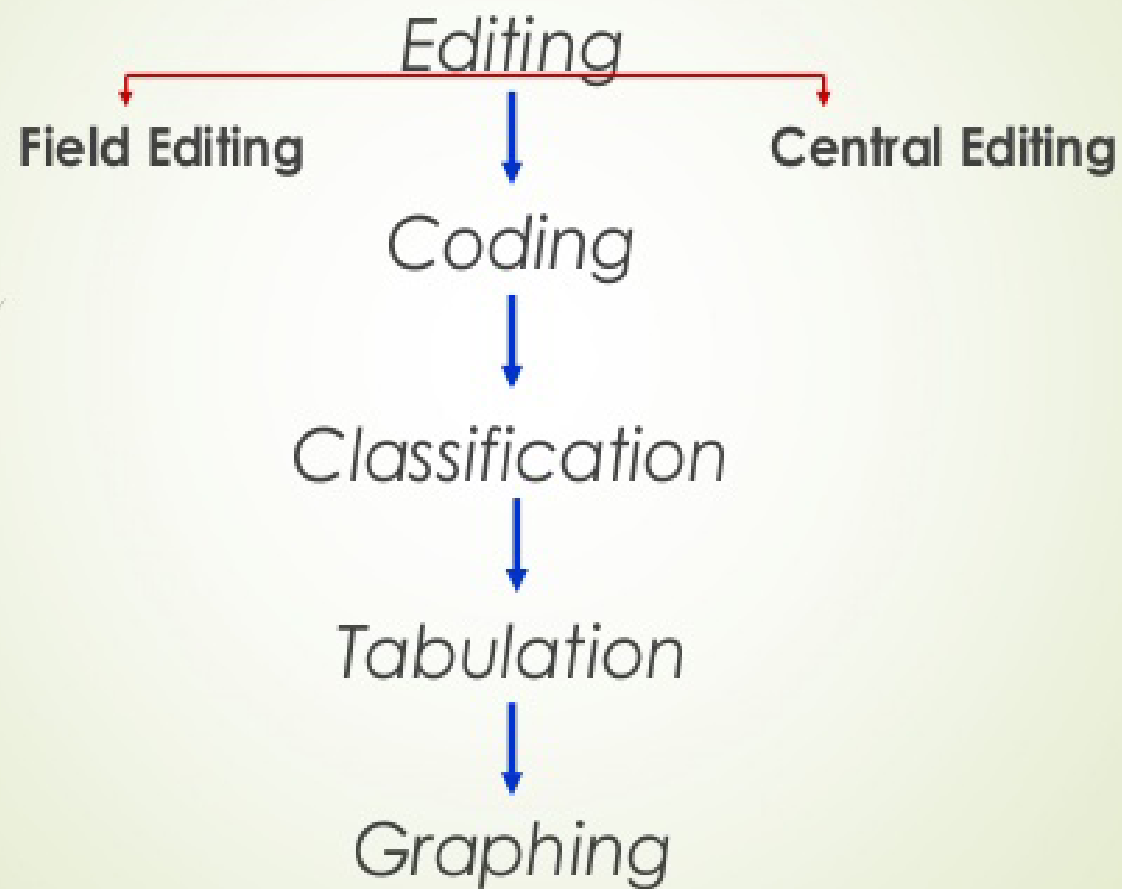
- Questioning: Written, Oral
- Interviewing: Face to face, Telephonic, Electronic/Net, Group, Video
- Observation
- Projective Techniques
- Panel Methods (Diary, Checklist, Logs etc.)

Data Analysis

Stages of Data Analysis



Processing the data

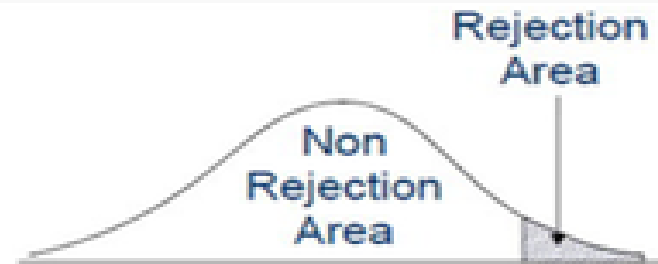


TEST OF HYPOTHESIS

❶ One-tailed (directional)

$$H_A: \rho > 0$$

$$H_A: \rho < 0$$



❷ Two-tailed (non directional)

$$H_A: \rho \neq 0$$



Type 1 Error: We may reject the null hypothesis when it is, in fact, true. This occurs when we think there is a difference between our groups, but there really isn't. We can minimise this possibility by selecting an appropriate alpha level .

Type 2 Error: Type 2 error occurs when we fail to reject a null hypothesis when it is, in fact, false (i.e. believing that the groups do not differ, when in fact they do).

		Hypothesis	
		H_0 True	H_0 False
Decision	Reject H_0	Type I Error	Correct Decision
	Fail to Reject H_0	Correct Decision	Type II Error

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THANK YOU