Business Research Method

Unit 5

By

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Data Analysis: Editing, Coding,

- **Data Analysis** is a process of inspecting, cleaning, transforming, and modeling data with the goal of discovering useful information, informing conclusions, and supporting decision-making. Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, while being used in different business, science, and social science domains. In today's business, data analysis is playing a role in making decisions more scientific and helping the business achieve effective operation.

- EDITING is the process of checking and adjusting responses in the completed questionnaires for omissions, legibility, and consistency and readying them for coding and storage.

- The process of identifying and classifying each answer with a numerical score or other character symbol. The numerical score or symbol is called a code, and serves as a rule for interpreting, classifying, and recording data. Identifying responses with codes is necessary if data is to be processed by computer.

Tabular representation of data, frequency tables,

- A table facilitates representation of even large amounts of data in an attractive, easy to read and organized manner. The data is organized in rows and columns. This is one of the most widely used forms of presentation of data since data tables are easy to construct and read.

- Frequency Distribution Table is a way to organize data. A frequency distribution table is an organized tabulation of the number of individual events located in each category. It contains at least two columns, one for the score categories (X) and another for the frequencies (f).

# Construction of frequency distributions,

- To make such a frequency distribution table, **first, write the class intervals in one column. Next, tally the numbers in each category based on the number of times it appears. Finally, write the frequency in the final column**. A frequency distribution table drawn above is called a grouped frequency distribution table.
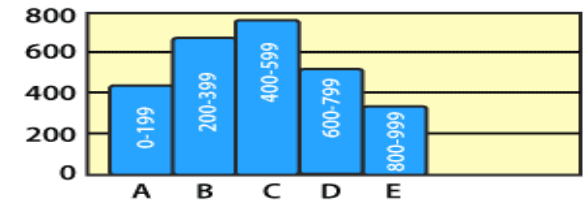
Graphical Representation of Data:

Graphic representation is another way of analyzing numerical data. A graph is a sort of chart through which statistical data are represented in the form of lines or curves drawn across the coordinated points plotted on its surface.
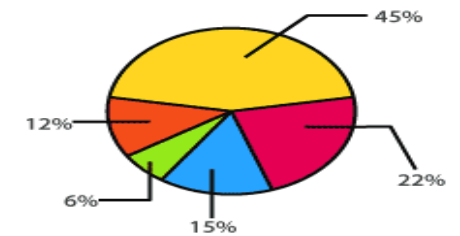

TYPES OF GRAPHICAL REPRESENTATION

Bar Graphs
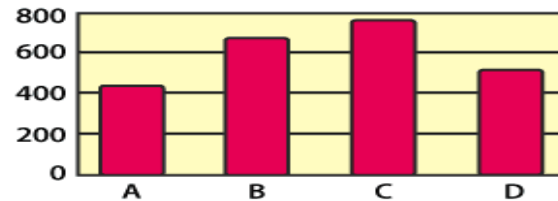
Histograms

Frequency Table

Rulers of France		
Reign (Years)	Tally	Frequency
1-15		18
16-30		11
31-45		6
46-60		4
61-75		1

Circle Graph

Line Graphs

Stem and Leaf Plot

Stem	Leaf
0	1, 1, 2, 2, 3, 4, 4, 4, 4, 5, 8
1	0, 0, 0, 1, 1, 3, 7, 9
2	5, 5, 7, 7, 8, 8, 9, 9
3	0, 1, 1, 1, 2, 2, 2, 4, 5
4	0, 4, 8, 9
5	2, 6, 7, 7, 8
6	3, 6

Key : 6 | 3 = 63 Year
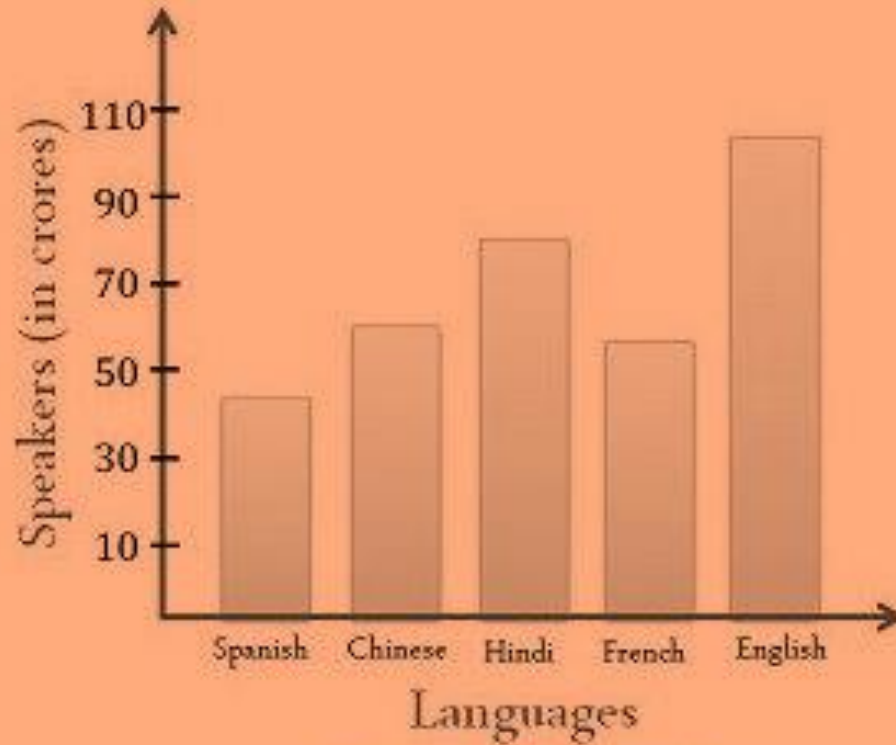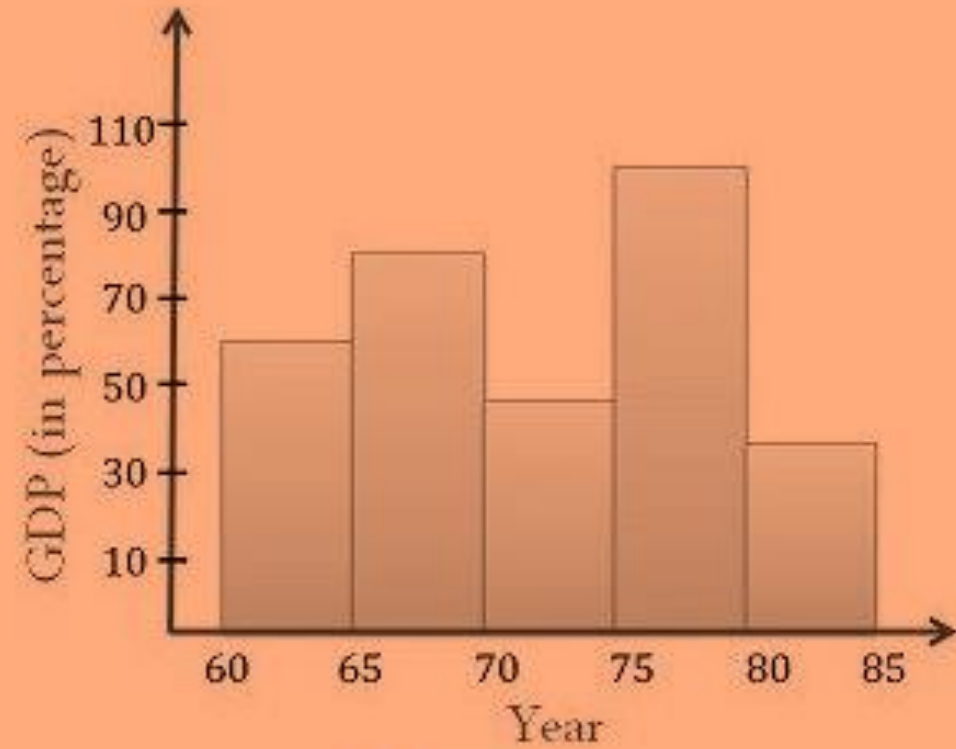
Line Plot
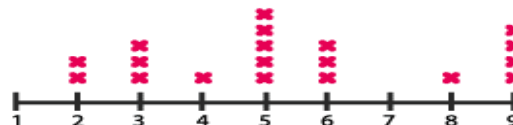
Box and Whisker Plot
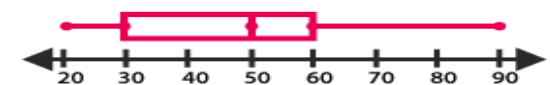
Bar Graph VS Histrogram

Hypothesis: Qualities of a good Hypothesis

- A hypothesis (plural: hypotheses), in a scientific context, is a testable statement about the relationship between two or more variables or a proposed explanation for some observed phenomenon. In a scientific experiment or study, the hypothesis is a brief summation of the researcher's prediction of the study's findings, which may be supported or not by the outcome. Hypothesis testing is the core of the scientific method.

- A good Hypothesis must possess the following characteristics –
- 1.**It is never formulated in the form of a question**.
- 2.It should be empirically testable, whether it is right or wrong.
- 3.It should be specific and precise.
- 4.It should specify variables between which the relationship is to be established.

- The null hypothesis is a general statement or default position that there is no relationship between two measured phenomena, or no association among groups. Testing (accepting, approving, rejecting, or disproving) the null hypothesis—and thus concluding that there are or are not grounds for believing that there is a relationship between two phenomena (e.g. that a potential treatment has a measurable effect)—is a central task in the modern practice of science; the field of statistics gives precise criteria for rejecting a null hypothesis.

- Often -but not always- the null hypothesis states there is no association or difference between variables or subpopulations. Like so, some typical null hypotheses are:

- The correlation between frustration and aggression is zero (correlation-analysis);

KEY DIFFERENCES BETWEEN NULL AND ALTERNATIVE HYPOTHESIS

1. A null hypothesis is a statement, in which there is no relationship between two variables. An alternative hypothesis is a statement; that is simply the inverse of the null hypothesis, i.e. there is some statistical significance between two measured phenomenon.

2. A null hypothesis is what, the researcher tries to disprove whereas an alternative hypothesis is what the researcher wants to prove.

3. A null hypothesis represents, no observed effect whereas an alternative hypothesis reflects, some observed effect.

4. If the null hypothesis is accepted, no changes will be made in the opinions or actions. Conversely, if the alternative hypothesis is accepted, it will result in the changes in the opinions or actions.

5. As null hypothesis refers to population parameter, the testing is indirect and implicit. On the other hand, the alternative hypothesis indicates sample statistic, wherein, the testing is direct and explicit.

6. A null hypothesis is labelled as H0 (H-zero) while an alternative hypothesis is represented by H1 (H-one).
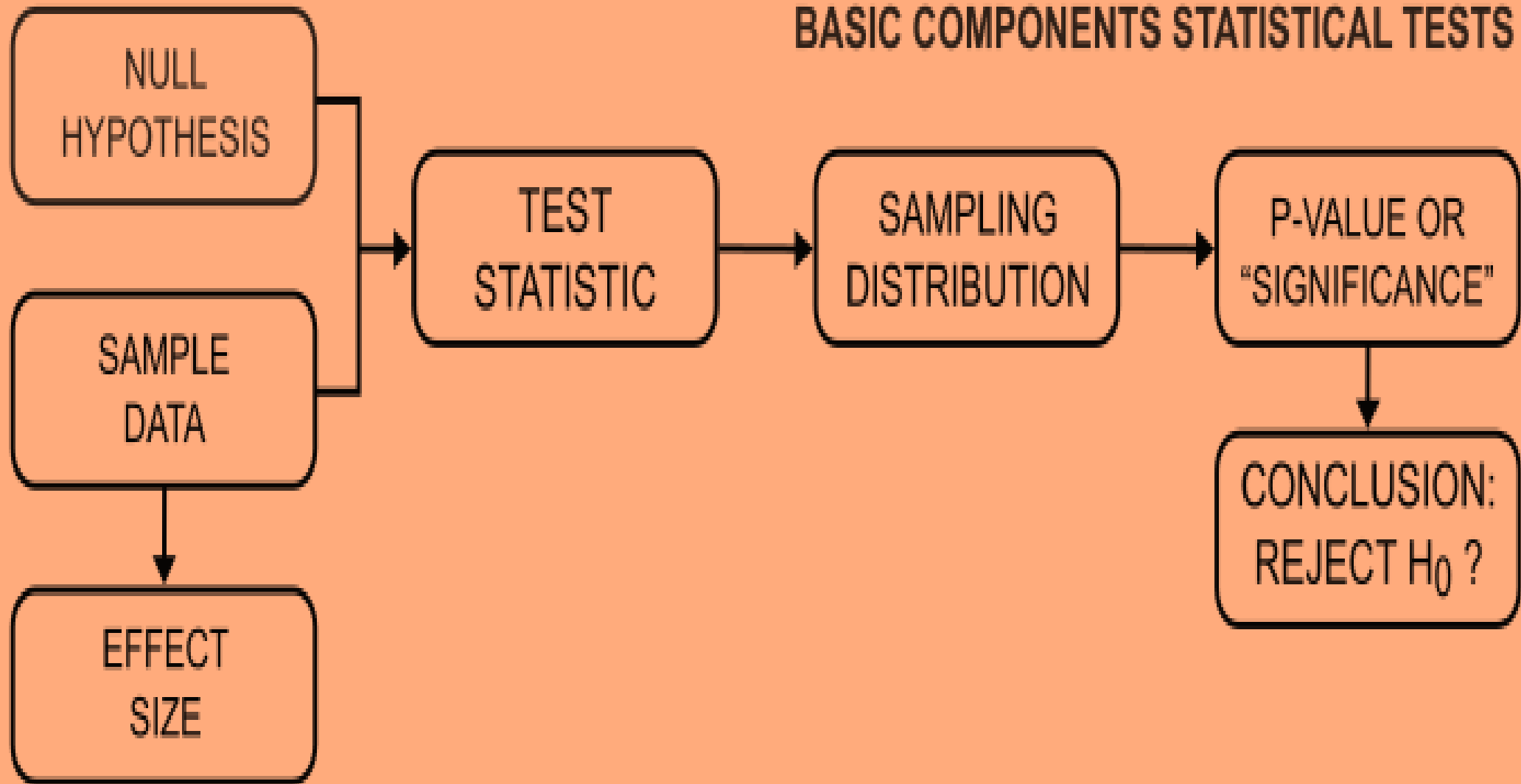
Framing Null Hypothesis & Alternative Hypothesis

- **Framing Alternative Hypothesis**

- An alternative hypothesis is one in which a difference (or an effect) between two or more variables is anticipated by the researchers; that is, the observed pattern of the data is not due to a chance occurrence. This follows from the tenets of science, in which empirical evidence must be found to refute the null hypothesis before one can claim support for an alternative hypothesis (i.e. there is in fact a reliable difference or effect in whatever is being studied). The concept of the alternative hypothesis is a central part of formal hypothesis testing.

- The alternative hypothesis is generally denoted as H1. It makes a statement that suggests or advises a potential result or an outcome that an investigator or the researcher may expect

Concept of Hypothesis Testing – Logic & Importance.

Hypothesis testing is a statistical method that is used in making statistical decisions using experimental data. Hypothesis Testing is basically an assumption that we make about the population parameter.

Hypothesis Testing is done to help determine if the variation between or among groups of data is due to true variation or if it is the result of sample variation. With the help of sample data we form assumptions about the population, then we have to test our assumptions statistically. This is called Hypothesis testing

Level of significance: Refers to the degree of significance in which we accept or reject the null-hypothesis. 100% accuracy is not possible for accepting or rejecting a hypothesis, so we therefore select a level of significance that is usually 5%.

Hypothesis testing is one of the most important concepts in statistics because it is how you decide if something really happened, or if certain treatments have positive effects, or if groups differ from each other or if one variable predicts another. In short, you want to proof if your data is statistically significant and unlikely to have occurred by chance alone. In essence then, a hypothesis test is a test of significance.ss

Difference between Large and Small sample

| Sr. No.	Large sample	Small sample
1.	The sample size is greater than 30.	The sample size is 30 or less than 30
2.	The value of a statistic obtain from the sample can be taken as an estimate of the population parameter.	The value of a statistic obtain from the sample can not be taken as an estimate of the population parameter.
3.	Normal distribution is used for testing.	Sampling distribution like t, F etc. are used for testing.

Type I and Type II Error

Null hypothesis is ...	True	False
Rejected	**Type I error** False positive Probability = α	**Correct decision** True positive Probability = $1 - \beta$
Not rejected	**Correct decision** True negative Probability = $1 - \alpha$	**Type II error** False negative Probability = β

Analysis of Variance: One way and two way Classifications.

- Analysis of Variance (ANOVA) is a parametric statistical technique used to compare datasets. This technique was invented by R.A. Fisher, and is thus often referred to as Fisher's ANOVA, as well. It is similar in application to techniques such as t-test and z-test, in that it is used to compare means and the relative variance between them. However, analysis of variance (ANOVA) is best applied where more than 2 populations or samples are meant to be compared.

- Analysis of variance (ANOVA) is a collection of statistical models and their associated estimation procedures (such as the "variation" among and between groups) used to analyze the differences among group means in a sample. ANOVA was developed by statistician and evolutionary biologist Ronald Fisher.

- ANOVA formula

- F= MST/MSE

- Where:

- F = ANOVA coefficient

- MST = Mean sum of squares due to treatment

- MSE = Mean sum of squares due to error.
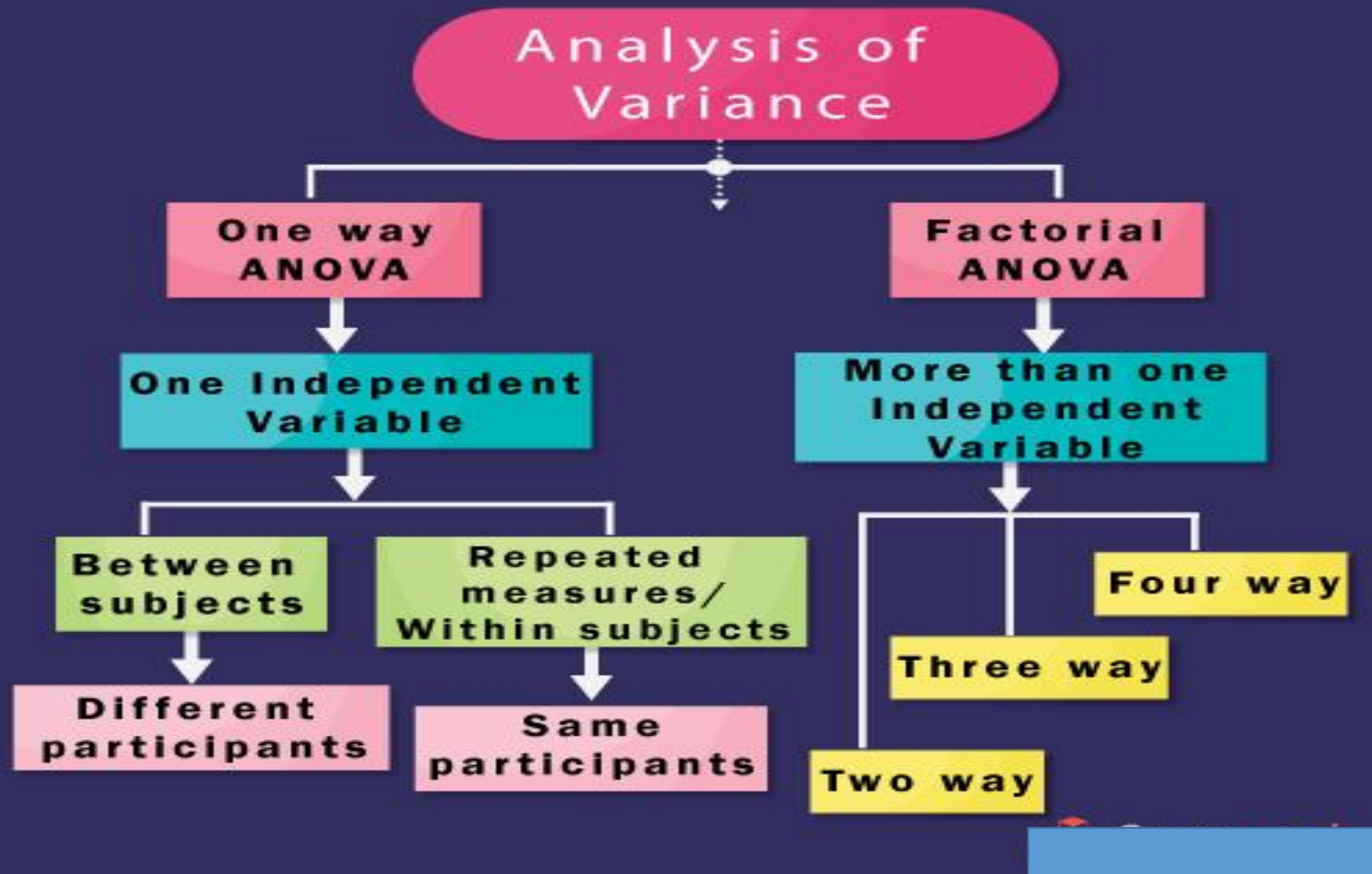
Mechanism of Report Writing-

- There are very definite and set rules which should be followed in the actual preparation of the research report or paper. Once the techniques are finally decided, they should be scrupulously adhered to, and no deviation permitted. The criteria of format should be decided as soon as the materials for the research paper have been assembled.

- Research report must be prepared by keeping the following precautions in view: Length of the report: While determining the length of the report (since research reports vary greatly in length), one should keep in view the fact that it should be long enough to cover the subject but short enough to maintain interest

Report Preparation: Types,

- Long Report and Short Reports: These kinds of reports are quite clear, as the name suggests.

- Internal and External Reports:

- Vertical and Lateral Reports:

- Periodic Reports:

- Formal and Informal Reports:

- Informational and Analytical Reports

Report Structure:

- Title
- Abstract
- Introduction
- Method
- Results
- Discussion
- Conclusions
- References
- Appendices