HYPOTHESIS TESTING

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PARAMETRIC TESTS

- Powerful tests
- Used if basic assumptions met.
- Assumptions based on nature of the population distribution & type of scales used to quantify data observations

ASSUMPTIONS OF PARAMETRIC TESTS

- The observations are independent. The selection of one case is not dependent on the selection of any other case.
- The samples have equal or nearly equal variances. The condition is particularly important to determine in case of small samples.
- The variables expressed in interval or ratio scales. Nominal & ordinal measures not qualify for parametric tests

TESTING STATISTICAL SIGNIFICANCE

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}}$$

where $\bar{X}_1$ = mean of experimental sample

$\bar{X}_2$ = mean of control sample

N_1 = number of cases in experimental sample

N_2 = number of cases in control sample

S_1^2 = variance of experimental sample

S_2^2 = variance of control sample

THE NULL HYPOTHESIS

- No significant difference or relationship between two or more parameters.
- Concerned with a judgment that apparent differences between parameters are true or result of sampling error
- In an experimental study it is hypothesized that there is difference between means of control and experimental groups due to sampling error.
- For statistical purposes null hypothesis/ no difference hypothesis is formed. There is no difference between mean achievements of experimental and control group.
- If differences found, the alternative hypothesis takes place of null hypothesis.

- Testing null hypothesis provides stronger test of logic.
- For a positive hypothesis, there may be equally plausible and competing hypothesis. e.g. Mean achievement of control group is higher than mean achievement of Experimental group or vice versa.
- Explain taking an example

LEVEL OF SIGNIFICANCE

- The rejection or acceptance of null hypothesis is based on some level of significance as criterion
- 5% (.05) or α level of significance used as criterion to accept or reject hypothesis.
- Explain meaning of 5% level of significance
- More rigorous level is 1% (.01) level.
- Explain 0.01 level

Experimental Group	Control Group
$N_1 = 32$	$N_2 = 34$
$\bar{X}_1 = 87.43$	$\bar{X}_2 = 82.58$
$S_1^2 = 39.40$	$S_2^2 = 40.80$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_1^2}{N_2}}} = \frac{87.43 - 82.58}{\sqrt{\frac{39.40}{32} + \frac{40.80}{34}}}$$

$$= \frac{4.85}{\sqrt{1.23 + 1.20}} = \frac{4.85}{\sqrt{2.43}} = \frac{4.85}{1.56} \quad t = 3.11$$

- In a large sample (more than 30) t critical value approaches z score. If z value equals or exceeds 1.96, difference between means significant at 0.05 level. If z value exceeds 2.58, difference significant at 0.01 level
- Explain significance in the above t= 3.11

DECISION MAKING

- To take decision for accepting or rejecting hypothesis, there are 4 possible outcomes:
- 1. Reject null hypothesis when it is false- correct decision (Method A ≠ Method B) correct decision
- 2. Not reject null hypothesis when it is true (Method A = Method B) correct decision
- 3. Reject null hypothesis when it is true (Method A = Method B) wrong decision
- 4. Not reject null hypothesis when it is false (Method A ≠ Method B) wrong decision

HYPOTHESIS TESTING CONTD……
FOLLOWINGS TO BE DISCUSSED IN THE NEXT PERIOD OF METHODOLOGY

- Type I & Type II Errors
- One tailed test & two tailed test of significance
- Degrees of freedom

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