**TERMS**

* Inductive reasoning
* Sample
* Sampling error
* Experimental treatments/ clinical trials, pilot studies, independent variables
* Response variables/ dependent variables/ target variables
* Cause and effect analysis
* Paired t-test
* **Contingency table**; Contingency tables show the frequency of occurrence of the row and column categories.
* Level of significance of a test
* Z-statistics
* Critical value
* Level of significance
* Hypothesized mean difference
* **Experimental design**; explicitly controlling the collection of observed data, manipulation of factors.
* **Observational studies**; researcher has no control of the observed
* Observation v. experimental studies
* Datapoint
* Lack-of-fit
* **Contingency tables** show the frequency of occurrence of the row and column categories.

1. **CHI-SQUARE (TEST OF INDEPENDENCE OF CATEGORICAL DATA).**

Test if there is an association or relationship between two categorical data **(nominal variables)**.

, the test addresses the question of whether or not the two categorical variables are independent (not related).

we would like to know if the result can be extended to the entire population, or is due simply to chance.

**Criteria**

1. Between two variables
2. Categorical data
3. Count or frequency of observation

**HYPOTHESIS TESTING STEPS (CHI-SQUARE)**

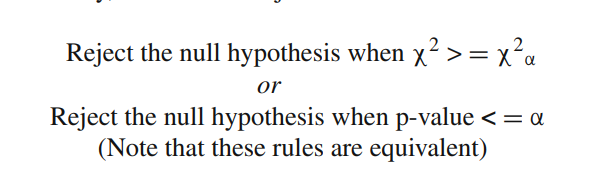
1) an assumption (null hypothesis) that the variables under consideration are independent, or that they are not related, is made

2) an alternative assumption (alternative hypothesis) relative to the null is made that there is dependence between variables

3) the chi-square test is performed on the data contained in a contingency table to test the null hypothesis

4) the results, a statistical calculation, will be used to attempt to reject the null hypothesis

5) if the null is rejected, then this implies that the alternative is accepted; if the null is not rejected, then the alternative hypothesis is rejected



1. **Z-TEST AND T-TEST CATEGORICAL AND INTERVAL DATA (CONTINUOUS DATA).**

**Criteria**

* Categorical variable should take only two levels (dichotomous)-binary
* Categorical data is called experimental treatment, interval variables are called response variables.
* It involves 2 categorical variables and interval or ratio variables.

**ONE TAIL VERSUS TWO-TAIL TEST**

For two-tail test since we are not speculating on whether one specific sample mean will be greater than the other mean. We are simply positing a difference in the alternative. This is important in the application of a critical z-value for possible rejection of the null hypothesis.

In cases where you have evidence that one mean is greater than another, then a one-tail test is appropriate.

Determining statistically the true effect on the mean score improvement is a complicated task that may require several tests and some personal judgment

1. **ANOVA (ANALYSIS OF VARIANCE)**

ANOVA will allow us to compare the effects of multiple factors, with each factor containing several levels of treatment on a variable of interest.

**Single factor ANOVA**

* Is similar to the t-Tests we previously performed, and it provides an extension of the t-Tests analysis to more than two samples mean.
* The ANOVA tests of hypothesis permit the testing of equality of three or more sample means.
* Unlike the t-Test, where we calculate a t-statistic for rejection or acceptance of the null, in ANOVA we calculate an F-Statistic and compare it to a critical F-value. Thus, the statistic is different, but the general procedure is similar.

**REPLICATION** is an important factor for testing the adequacy of models to explain behavior. It permits testing for lack-of-fit.

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| **Experimental Design** | **Explanation** |
| * Completely randomized design |  |
| * Randomized blocked design |  |
| * Factorial design |  |

* In addition, inferential statistics provides techniques for quantifying the inherent uncertainty associated with using samples to specify population characteristics.
* A hypothesis and its alternative are posited and then tested by examining data collected in observational or experimental studies. We then construct a test to determine if we can reject the null hypothesis based on the results of the analysis

