Project On Testing a perceptual phenomenon between congruent and incongruent Dataset

Dataset link (https://drive.google.com/file/d/0B9Yf01UaIbUgQXpYb2NhZ29yX1U/view)

- **Dependent and Independent variable**

The condition - a **congruent** words condition and an **incongruent** words condition - is our **independent variable**. The **performance of the participant** is our **dependent variable**. The operational definition of the performance is the time it takes to name the ink colors in equally-sized lists

- **Set of Hypotheses and Statistical test**

The set of hypotheses that, I prefer for the given dataset is **Null Hypotheses and Alternative Hypotheses**

Where,

Null Hypothesis is $H_0 : \mu_C$ (greater than or equal to) μ_I

Mathematical Expression is $H_0: \mu_C \geq \mu_I$

Alternative Hypothesis is Ha : μ_C (lesser than) μ_I

Mathematical Expression is $H_A: \mu_C < \mu_I$

(where μ is a population mean, the subscript "C" represents the congruent words condition, and the subscript "I" represents the incongruent words condition.)

The Statistical test that, I prefer to use is **One Tailed Dependent Sample t-test**.

A one-tailed, dependent samples t-test comparing the difference in means (the time to name the ink colors for congruent words and incongruent words) should be performed. With this test, we seek to determine whether there is enough evidence in the provided sample of data to infer that the congruent words mean colour recognition time is less than the incongruent words mean colour recognition time for the entire population and not just the sample data.

A t-test is appropriate because the population variance is unknown and the sample size is less than 30. When the sample size is less than 30, the sample data no longer approximate a normal distribution, which makes the use of a Z-value inappropriate. The following assumptions are required for t-tests for dependent means:

- **Characteristics:**
- Interval or ratio scale of measurement (approximately interval)
- Random sampling from a defined population
- Samples or sets of data used to produce the difference scores are linked in the population through repeated measurement, natural association, or matching
- Scores are normally distributed in the population; difference scores are normally distributed

- ## Measure of Central tendency

  For congruent values,

  Mode = 22.328,

  Mean = 14.051125

  Median = 14.3565

  N = 24

  Sample Standard Deviation (**σ) = 3.56**

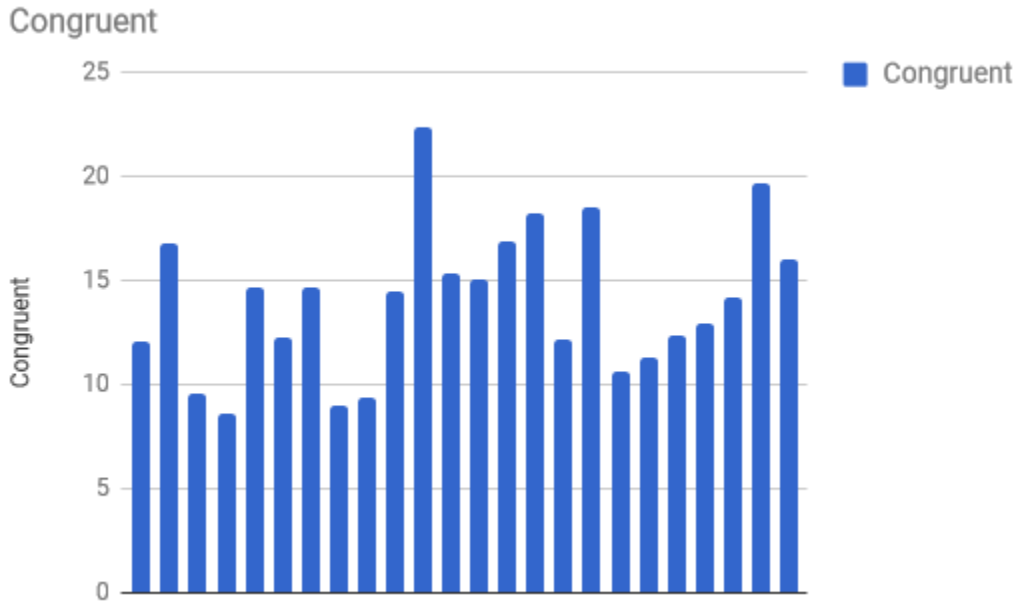
  For incongruent values,

  Mode = 35.255,

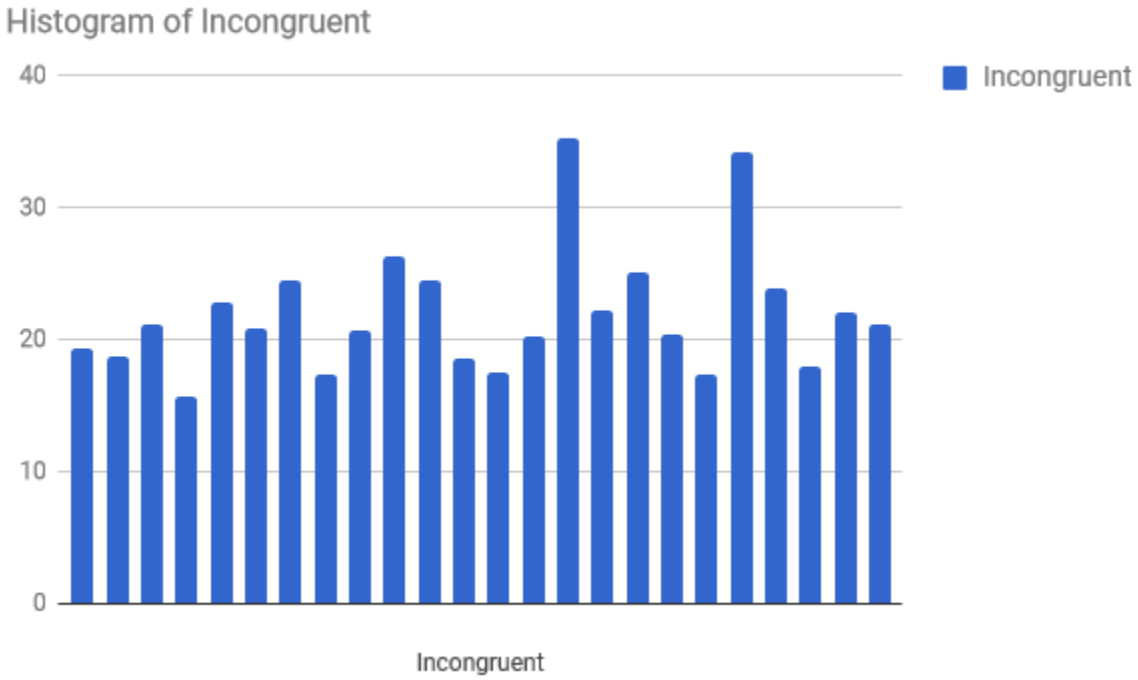
  Mean =22.01591667

  Median = 21.0175 N = 24

  Sample Standard Deviation (**σ) = 4.80**



The above Two visualization is The Data analysis of Congruent and Incongruent data,with



data in x-axis and frequency in y-axis shows that the Coressponding values of stroop effect data

- ## Statistical Test

One Tailed t-test for 99% (α)= 0.01

Degree Of Freedom = 23

Critical statistics(t_{crit})= -2.50

T - statistics (t) = -8.02

P-value = < .0001

- ## Conclusion and Decision

Thus from the above **Statistical test** we can conclude that **Null Hypotheses (Ho)** should be **rejected**, Since the **T-Statistics lies in the Critical region** and **Alternate Hypotheses(Ha)** is **Accepted**