

Testing Perceptual Phenomenon on Congruent and Incongruent dataset using Stroop effect:

→ Dependent and Independent Variables:

The given dataset - **Congruent** and **Incongruent** refers to the **Independent variables**.

The performance of the user (i.e) the **Time** taken by the user to complete the tests is the **Dependent Variable**.

→ Null and Alternative Hypothesis:

Null Hypothesis is referred as H_0 and Alternative Hypothesis is H_A .

→ Null Hypothesis:

There is no difference between the variables (i.e) the Congruent and Incongruent words.

In Null Hypothesis, the Congruent word can be said to have values greater than or equal to the Incongruent word.

$$H_0 = \mu_c \geq \mu_I$$

→ Alternative Hypothesis:

The alternative hypothesis gives some significant difference between the variables (i.e) Congruent and Incongruent words.

The Congruent word is less than the Incongruent word.

$$H_A = \mu_c < \mu_I$$

Here,

μ_c is Population mean of Congruent word

μ_I is Population mean of Incongruent word

→ Statistical Test and Assumptions:

To test the perceptual phenomenon in this experiment, I prefer to use one tailed hypothesis. This is because the number of data sets given is very less and all the values lie in the positive scale of the distribution and this gives which one of these is more likely and unlikely to occur. I can even observe that the mean of Incongruent data is greater than the mean of Congruent data set.

By this we can assume that the null hypothesis can be rejected.

The various assumptions can be made here are:

1. The distributions are Gaussian.
2. T-score can be used since the sample size is less than 30.
3. The population standard deviation is not known.

→ **Central Tendency:**

Congruent words -

For $n = 24$

Mean = 14.051125

Median = 14.3565

Mode = No Mode

Variance = 12.67

Standard Deviation = 3.56

Incongruent words-

For $n = 24$

Mean = 22.01591667

Median = 21.0175

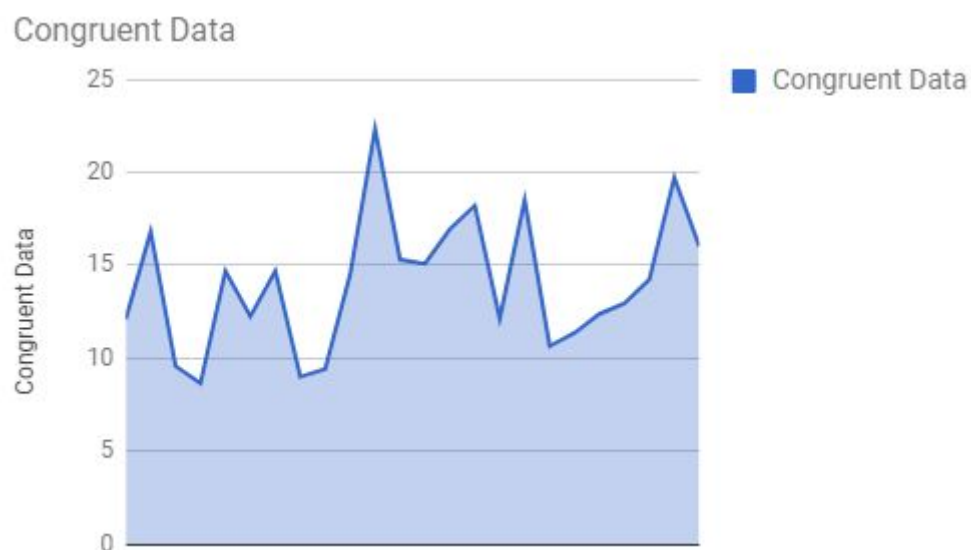
Mode = No Mode

Variance = 23.011

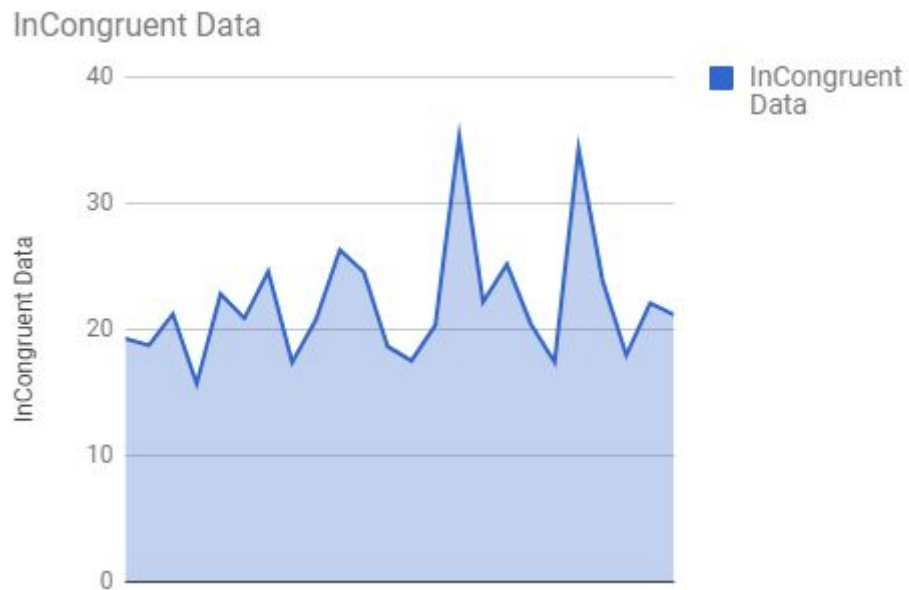
Standard Deviation = 4.80

→ **Visualization of dataset:**

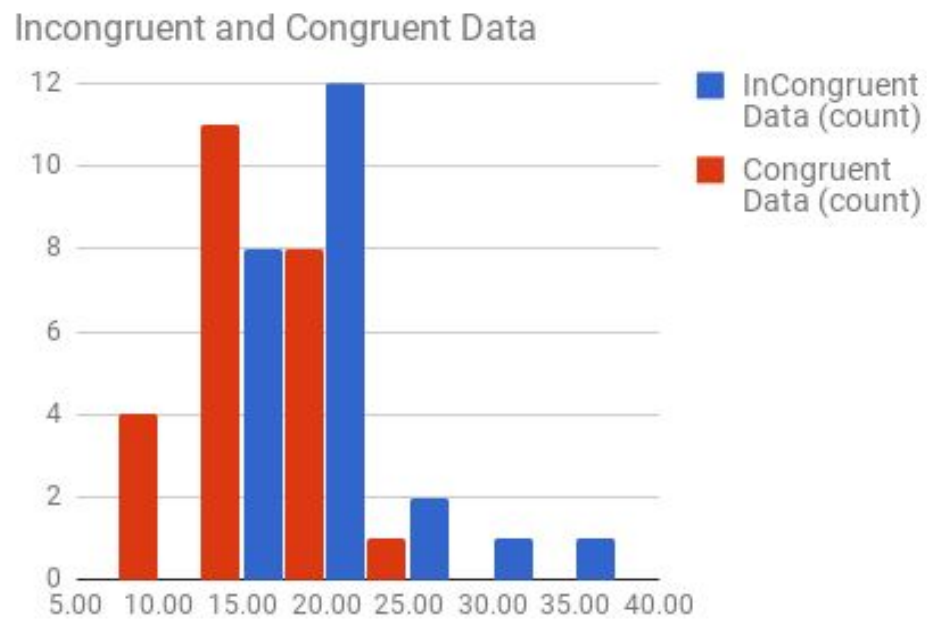
Congruent dataset:



Incongruent dataset:



Both Congruent and Incongruent dataset:



→ Statistical Result:

Degrees of Freedom = 23

One tailed T- test for 1% = 0.01

Critical Statistics = -2.5

T- Statistics = -8.02

P- value < 0.0001

➔ **Result:**

Hence, from the following dataset, we can **reject** the **Null Hypothesis** and the **Alternative Hypothesis** is **Selected**.

This is because the value of T-statistics lies in the critical region which makes the Alternative hypothesis acceptable.

➔ **Related Experiment for Stroop Effect:**

Instead of using color and color name, the number name with its occurrences can be used.

The link to that Stroop effect is given below:

<https://faculty.washington.edu/chudler/java/readyn.html>

➔ **References:**

From statistics course (Udacity):

<https://classroom.udacity.com/nanodegrees/nd009-in-basic/parts/2d574aac-201b-4501-96b6-03107ef64d89>

From Stattrek.com:

<http://stattrek.com/hypothesis-test/mean.aspx?Tutorial=AP>

From Statisticshowto.com:

<http://www.statisticshowto.com/when-to-use-a-t-score-vs-z-score/>