Test a Perceptual Phenomenon

Dependent Variable

In this case, our dependent variable is reaction time. The time is taken for a user or player to identify the color in both cases whether its congruent or incongruent

Duration(time) to recognise the colour.

Independent Variable

The independent variable is whether the word the word has the same name as to its color name or not.

Congruency of the colour and text is independant variable

Hypothesis

NULL HYPOTHESIS (H_0)

There is no significant difference in response time of congruent word and incongruent words, at α level .05.

$(\mu_{congruent} = \mu_{incongruent})$ or $(\mu_{congruent} - \mu_{incongruent} = 0)$

ALTERNATIVE HYPOTHESIS(H_A)

There is a significant difference between response time of congruent word and response time of incongruent words, at α level .05.

$(\mu_{congruent} \neq \mu_{incongruent})$ or $(\mu_{congruent} - \mu_{incongruent} \neq 0)$

where   :

$\mu_{congruent}$ is population mean for congruent word is displayed

$\mu_{incongruent}$ is population mean for incongruent word is displayed

Statistical Test

Assuming that the population data is approximately normally distribution.

We are going to perform **A dependant two sample T-test, two-tailed, with α=0.05**

Dependent because there is only one sample that has been tested twice. Paired because our participants were measured at two time points.

dependant sample t-test,since we are comparing reaction time from a sample from the same population, same subjects are assigned two different conditions and based on it we are concluding about a population

And mainly, In addition, we don't have any population parameters provided so a z-test would not tend to work here.
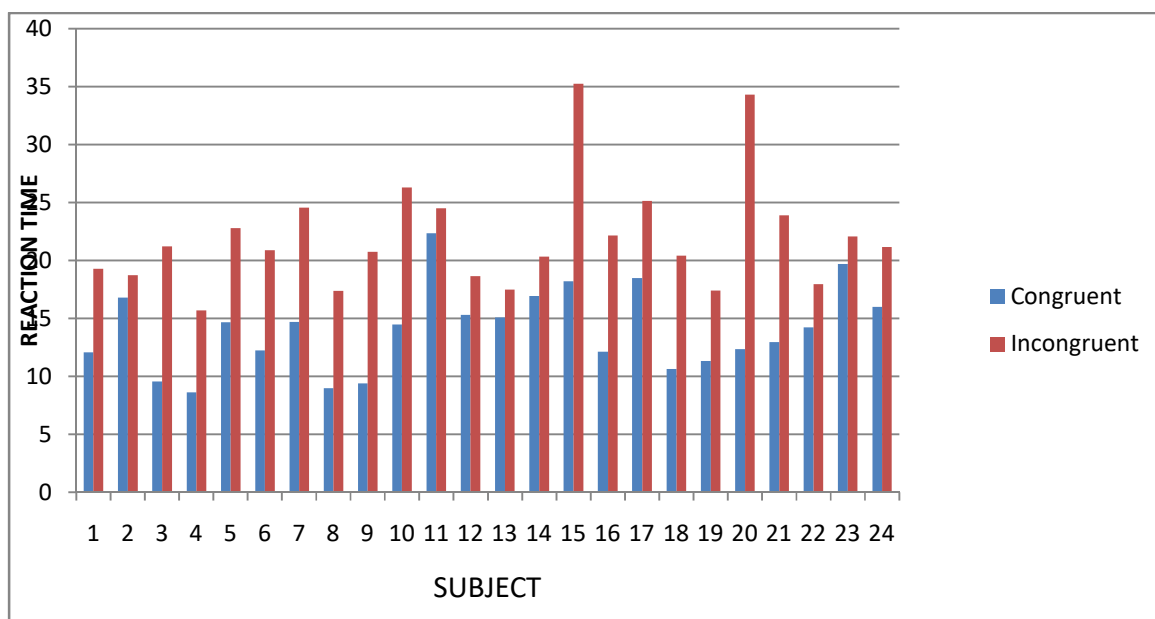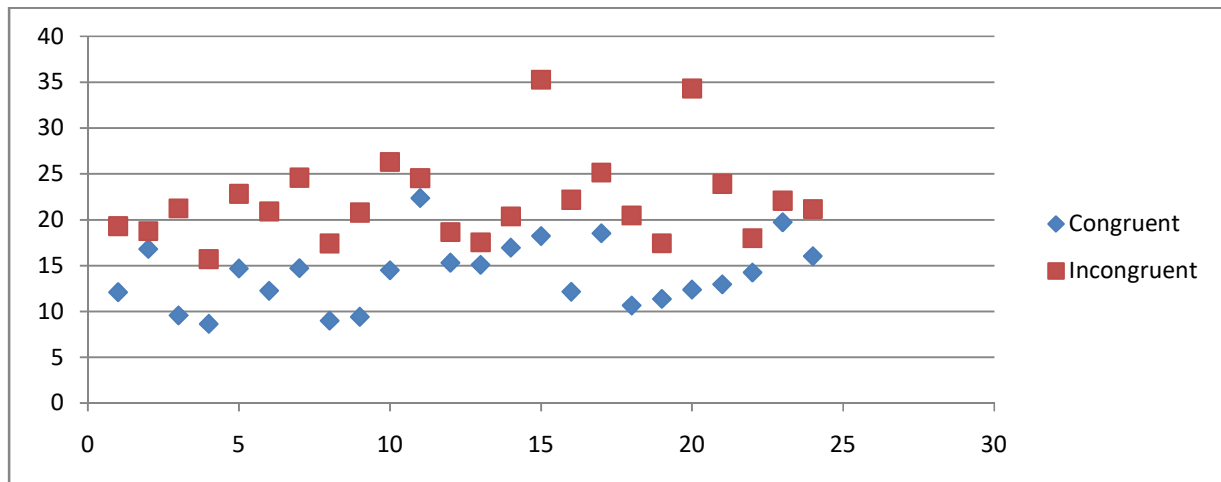
Descriptive Statistics

Congruency	Mean	Median	Standard Deviation
Congruent	14.051	14.357	3.559
Incongruent	22.016	21.017	4.797

Visualize

Conclusions from bar graph

By looking at the bar graph, we can see that for each subject in a sample the reaction time for congruent words is less than as compared to reaction time for the incongruent word.

The reaction time with congruent words ranges in between 8-22, for incongruent it ranges from 15-36, with outliers.

There are 2 outliers in incongruent sample data

Test Result

For α=0.05, two tailed t-test, Confidence Level = 95%

n=24

t-critical= ±2.069

difference in mean= 7.964791667

S= 4.79705712

t-static=(difference in mean)/(S/(n)^.5)= 8.134018417

From above calclulation

As,   t-statistic > t-critical

  8.1340 > 2.069

Therefore we reject the Null Hypothesis which states that there are no significant differences between the population average completion time between Congruent & Incongruent ($\mu_{congruent} = \mu_{incongruent}$).

Therefore, there is a significant difference in the in the reaction time in the two conditions.

Bibliography

https://en.wikipedia.org/wiki/Stroop_effect

https://s3.amazonaws.com/udacity-hosted-downloads/t-table.jpg