P1 Project

Q.1. In this experiment, the dependent variable is the Time recorded for each individual participant, in the experiment. This is because this is a variable that changes for each participant.

And the independent variable is the Congruency Condition, because we are hypothesizing that this condition will affect our dependent variable i.e. the individual time taken by each participant.

Q.2.(a). The appropriate hypothesis for this task is –

Null hypothesis (H_0) – The average time taken for congruent condition is not different from the time taken for the incongruent condition.

$$\mu_c = \mu_i$$

where μ_c = Mean for the congruent condition,

μ_i = Mean for the incongruent condition

Alternative Hypothesis (H_A) – The average time taken for congruent condition is in fact different from the time taken for the incongruent condition.

$$\mu_c \neq \mu_i$$

(b). The most appropriate hypothesis test for this seems to be a Dependent Samples t-test, as both the samples that we have in the dataset are dependent. 2 separate conditions have been performed and their results noted down. The dependent samples t-test would be best likely to verify our hypothesis.

Some assumptions to take into account for performing the Dependent Samples t-test can be the following -

1. Our dependent variable i.e. the time taken in both the cases, is measured on a continuous scale; here time is measured in seconds.
2. Our independent variable consists of two categorical related groups, i.e. the same subjects are compared in both the groups. The same people's times are measured in both the conditions of congruency.
3. There are no significant outliers in our sample set, which might alter the results of our t-test.

Q.3. ***Please refer the stroopdata.xlsx file for all the values hereon***

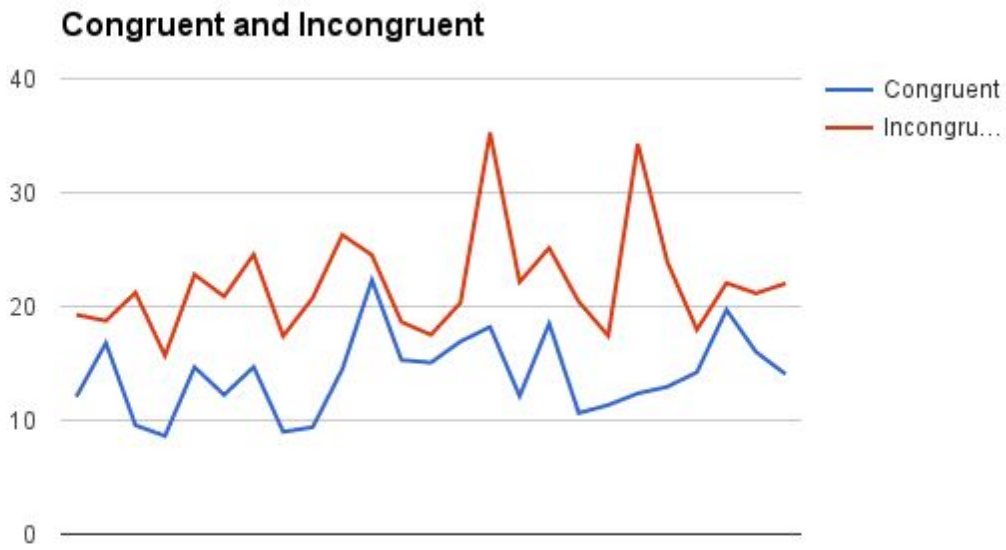
The Mean for the 1st Sample (Congruent) is 14.051125

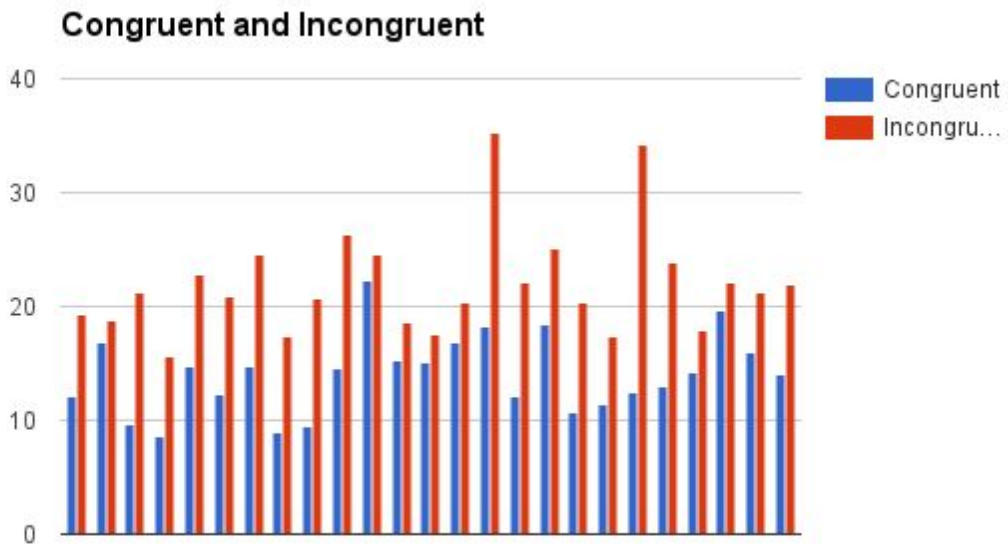
The Mean for the 2nd Sample(Incongruent) is 22.01591667

The Variance for the dataset is 23.66654087

The Standard Deviation for the dataset is 4.86482691

Q.4. ***Please refer the stroopdata.xlsx file for the charts***





Both the charts essentially signify the same thing, i.e. the time taken by the participants for the set of incongruent words is higher than that for the set of congruent words, the difference being quite significant in some cases as denoted by the red peaks over the blue ones.

Q.5. ***Please refer the stroopdata.xlsx file for all the values hereon***

The following values are calculated by applying the appropriate formulae –

Standard Error -> 0.9930286348

For a Confidence Level of 95%, an α level of 0.05 is chosen. Because this is a two-tailed test, the α level to calculate the t values becomes 0.025

The t-statistic for the given dataset comes out to be -> 8.020706944

The t-crtitical value is -> ±2.069

The degrees of freedom (DF) are -> n-1 = 23

So the p-value is calculated out to be -> <0.0001 i.e. less than 0.0001

The Confidence Interval (CI) is -> 5.910215421, 10.01936791

Taking the above findings into account, we reject the null hypothesis, i.e. there is a very significant difference in the average time for the conditions, as shown by our extremely low p-value.

So we conclude that the time taken by the participants was significantly higher when they were reading the set of Incongruent words, which might show that they had difficulty in reading the colour of those set of words because of the visual experience of the test.

Q.6. As mentioned above, one of the reasons for the observed results might be the human psychological tendency to respond according to its stimulus. This can explain why it is easier to read the word that happens to also be the name of the colour of the word, but is relatively hard to read the word if the two properties are interchanged, i.e. the colour of the word is different from what the word actually reads.

One experiment that I can think of randomly, is presenting people with photos of different animals along with their names in the subtitles. People generally get in the habit of slowly scrolling through the photos and simultaneously reading their names at the bottom. Then interchange the names with the photos. I hypothesize that it might take people a little more time, this time, to actually scroll through the photos because they might get confused by the different names. And consequently they might take a little more time in guessing the actual names of the animals in the photos, if they are given that task to perform.