Introduction

In this project we are studying the Stroop's effect with the Stroop's Test. This is a psychological test which ends with the following 2 possible explanations as mentioned at washington.edu.

1. Speed of Processing Theory: the interference occurs because words are read faster than colors are named.
2. Selective Attention Theory: the interference occurs because naming colors requires more attention than reading words.

In the test we are measuring the time a person takes to read all the colors in which a list of words are written in. In this test the **dependent variable** is the ***time it takes for reading the color of the words,*** and the **independent variable** is the ***condition of words*** the person is reading *(Congruent or Incongruent)*.

Since we are measuring the time taken by the same person to read the words in both conditions we are conducting a within subject design of experiment with two conditions to test for. Given that we only have a small sample size of 25 and we do not know the statistics for the complete population of humans, we need to do a t-test. Particularly we need to do a ***dependent t-test for paired samples.*** We are assuming that the data distribution is a t-distribution which looks similar to a Gaussian distribution but are more spread out, since our data set it small.

We will be working with the following hypotheses, assuming:

μ_c is the population mean of the time taken for the Congruent Test.

μ_i is the population mean of the time taken for the Incongruent Test.

Hypothesis:

H_o: $\mu_c = \mu_i$ *the null hypothesis states that the average time taken is the same for Congruent and Incongruent Test*

H_a: $\mu_c \neq \mu_i$ *the alternate hypothesis states that the average time taken will be different for Congruent and Incongruent Test*

Descriptive Statistics from the Dataset

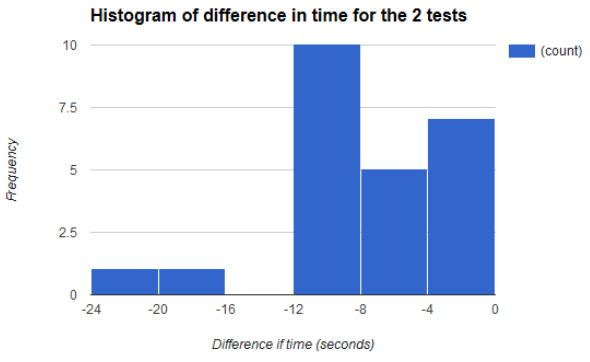
From the given dataset we get the following descriptive statistics for the time taken for the tests.

	Congruent Test	Incongruent Test
Mean	14.05	22.02
Standard Deviation	3.56	4.80

Note: The above descriptive stats are approximated to 2 decimal places.

Visualizing the Data

Histogram of the difference in time taken for the two tests is shown below. The histogram is interesting as the time taken for the incongruent test is more than the congruent test, for all the participants.



We use the following formula for the finding the t-statistic for this problem.

$$t = \frac{\mu_i - \mu_c}{S/\sqrt{n}} = \frac{22.02 - 14.05}{4.87/\sqrt{24}} = \frac{7.97}{0.994} = 8.017$$

We get the t-statistic as 8.017. This is a very high t statistic. From the t-table we find that this measure is significant even at the p-level of 0.0005 for degrees of freedom of 23 which has a critical value of 3.768. Hence we find that the results are statistically significant even at the alpha level of .001.

p-level < .0005

This means that the probability of this sample happening on random is less than 0.05%. We have a confidence level of 99.9% based on the p-level.

Thus we reject the Null hypothesis. The results prove that there is some hidden effects in the time taken to read the incongruent test which make the participants take longer on the test.