Stroop Effect Analysis:

1. Identify variables in the experiment

The dependent variable is the 'response time' to name the ink-colors of words (both from congruent and incongruent tasks) and 'color of the ink' is the dependent variable.

2(a). Hypotheses:

Null hypothesis: The color of the ink in which a word is written has no effect on the response time to name the ink-color of words.

Alternative hypothesis: The color of the ink in which a word is written increases the effect of the response time to name the ink-color of words. Mathematically,

$$\text{AverageResponseTime}_{\text{congruent}} - \text{AveragResponseTime}_{\text{incongruent}} < 0$$

2(b). Establish a test:

Statistical test: Since the same set of participants took both the tasts, dependent sample t-test can be performed to test the hypothesis and establish whether the color of the ink effects response time. The following assumptions are made for the t-test:

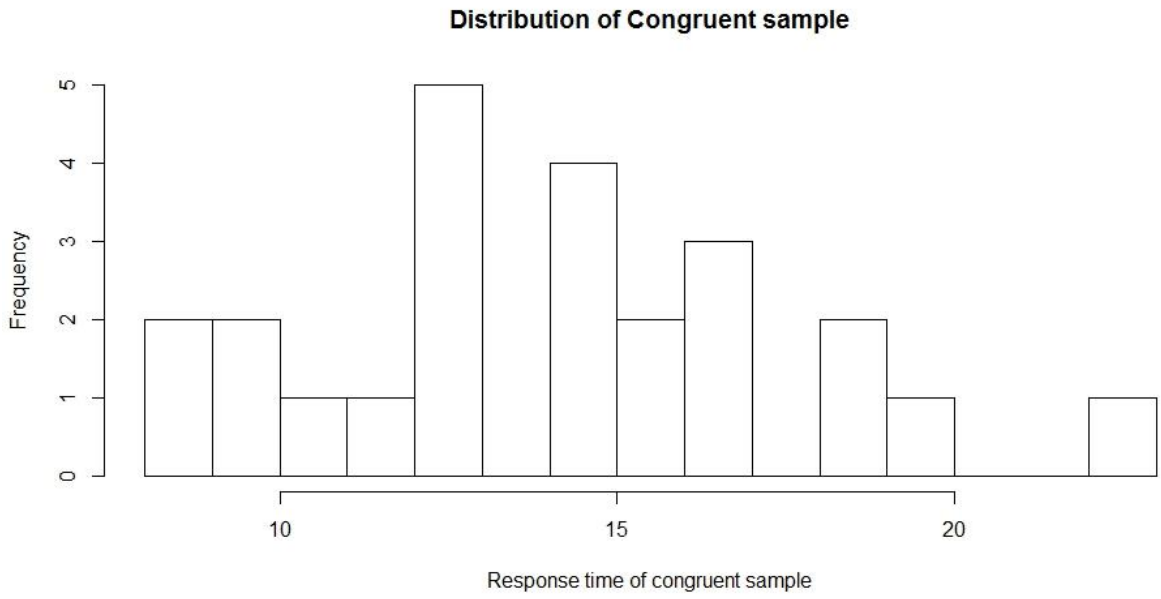
i. The sample drawn is a randomly drawn from the population
ii. The population from which the sample is drawn is approximately normal
iii. The sample data can estimate the population variance

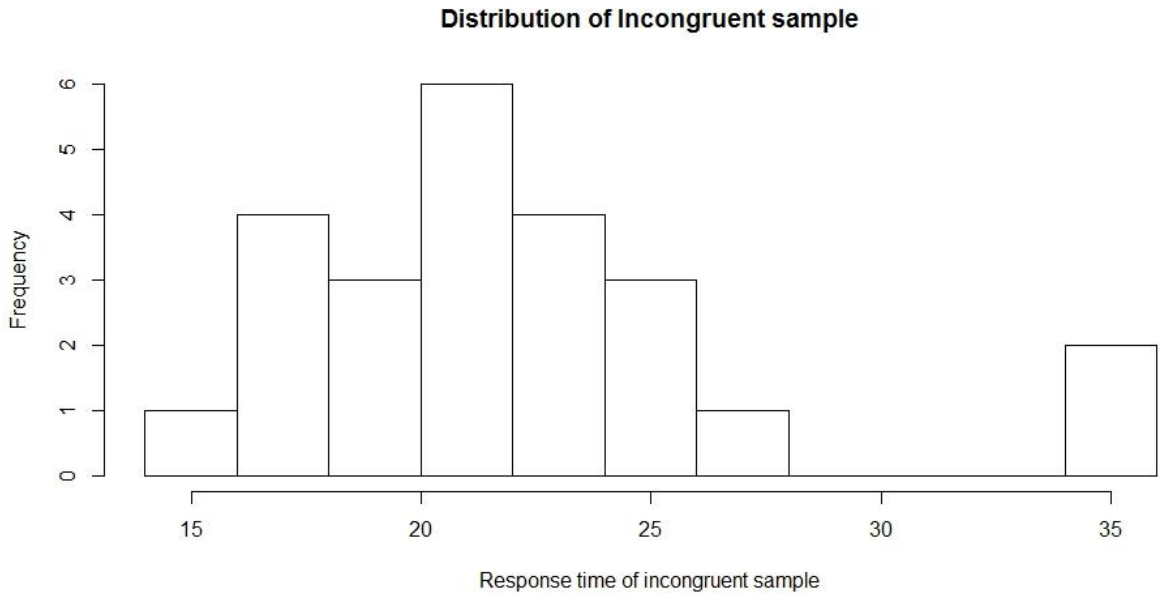
3. Descriptive statistics

	Congruent Sample	**Incongruent Sample**
Mean	14.05	22.02
Median	14.36	21.02
Standard Dev	3.55	4.79

4. Visualize the data:

Plotting the histogram for both the samples, the difference in range is evident. The response time for the incongruent sample is ranges from 15-35 seconds while the response time for congruent sample ranges from 8-20 seconds. The spread or the variance of the incongruent tasks is lesser than that of the congruent sample.





5. Dependent sample t-test:

The t-test is being performed at a significance level: 95%. The calculations are in stroopdata_workbook.xlsx as well as stroopdata.r

$t_{statistic}$ = -8.02.

Degrees of freedom = 23

$t_{criticalvalue}$ = -1.714

Inference: Since the $t_{statistic}$ is less than the $t_{criticalvalue}$, we may reject the null hypothesis. Since the $t_{statistic}$ is much greater than the critical value, the p-value of the statistic is almost 0. And a 95% confidence interval of the mean for an incongruent sample is: (-9.66, -6.26).

Interpretation: Failing to reject the null hypothesis means that the response time for incongruent words is more than the response time of congruent words.

References:

Udacity Lessons: *Intro to Descriptive Statistics* and *Intro to Inferential Statistics*