

# STROOP TEST

## 1. What is our independent variable? What is our dependent variable?

Independent variable: We can choose between congruent words or incongruent words for the subject to read.

Dependent variable: Response time and errors made by the subject while reading words cannot be controlled and it is our dependent variable.

## 2. What is an appropriate set of hypotheses for this task? What kind of statistical test do you expect to perform? Justify your choices.

The directional hypothesis is appropriate for Stroop effect. Directional hypothesis expresses the effect of independent variable on dependent variables. Stroop effect states that independent variable incongruent words will increase the reaction time of the subject.

The **null hypothesis**: "Mean response time of a population while reading incongruent words is same as the mean response time of population while reading congruent words.."

The **alternate hypothesis**: "Mean response time of a population while reading incongruent words is greater than mean response time while reading congruent words..".

Null Hypothesis :  $H_0 : \text{mean}_{\text{diff}} = 0$

Alternate Hypothesis :  $H_1 : \text{mean}_{\text{diff}} > 0$  (one-tail)

$H_0$ : Null hypothesis

Mean<sub>diff</sub> -- Mean difference between the response time of population while reading incongruent and congruent words.

$H_1$  -- Alternative Hypothesis.

### Statistical choice:

- Given two tests are independent samples.
- T-test works well when the sample size is less than 30. Our sample size is 24
- We have to compare the difference between two samples i.e pairwise, the difference between incongruent and congruent response time of each subject.
- From the graphs below we can say that both the sample follow approximately normal distribution.

With all the above characteristics of samples and problem requirement, paired t-test will be an appropriate measure to test the Stroop effect. With t-test, we can compare results of two independent test outcomes more reliably for the given degree of freedom.

By comparing t-value with confidence level we can test the hypothesis of Stroop effect experiment.

**3. Report some descriptive statistics regarding this dataset. Include at least one measure of central tendency and at least one measure of variability.**

Statistics

No of records : 24

**Congruent :**

Mean = 14.05

Mode = No Mode

Median = 14.3565

Q1 = 11.89

Q3 = 16.20

IQR = 4.30

Standard Deviation(sample) : 3.559

**Incongruent :**

Mean : 22.015

Mode : No Mode

Median : 22.015

Q1 = 18.71

Q3 = 24.05

IQR = 5.33

Standard Deviation(sample) : 4.797

**Difference : [' Difference between incongruent and congruent']**

Mean : 7.96

Mode : No Mode

Median : 4.762

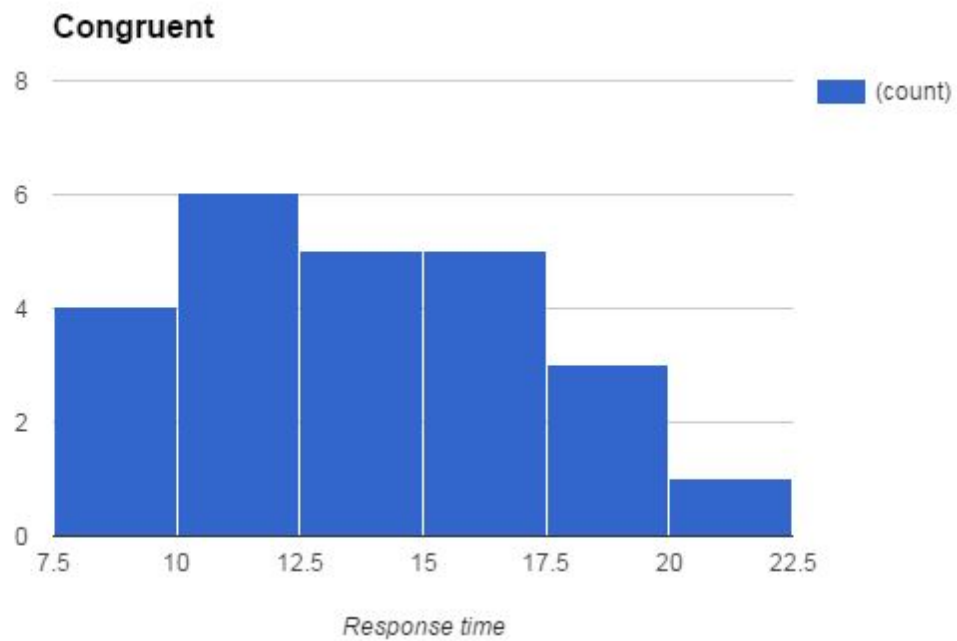
Q1 = 3.64

Q3 = 10.25

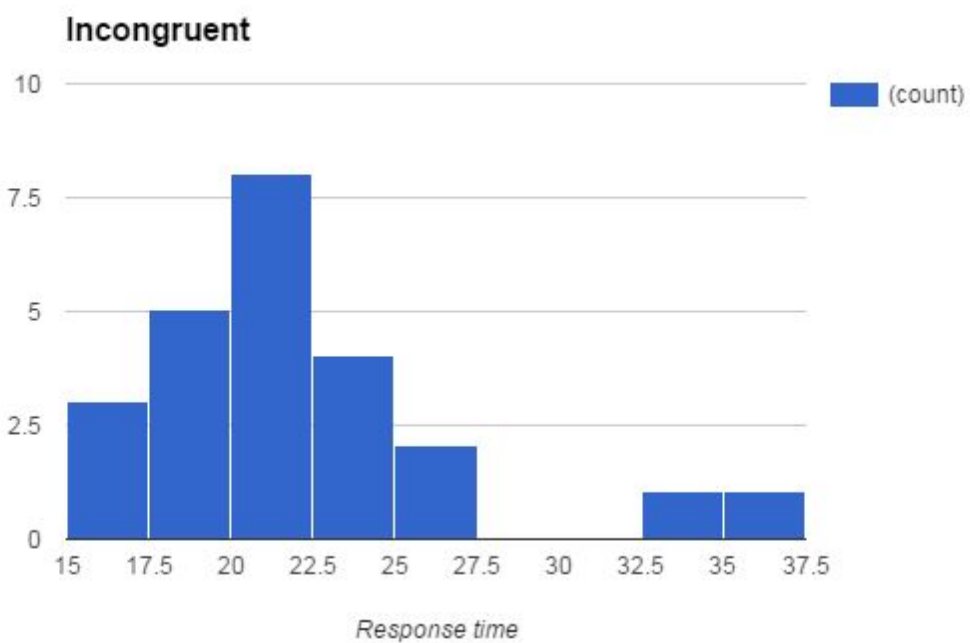
IQR = 6.61

Standard Deviation(sample) : 4.86

**4. Provide one or two visualizations that show the distribution of the sample data. Write one or two sentences noting what you observe about the plot or plots.**



Histogram plot of Congruent time graph. X-axis represents Response time take to read the congruent words. Range of the x-axis is 7.5 to 22.5. Bin size is 2.5. Bin 10-12.5 has the highest mode of 6. Distribution forms a right skewed normal distribution.



Histogram plot of incongruent time graph. X-axis represents Response time take to read the congruent words. Range of the x-axis is 15 to 37.5. Bin size is 2.5. Bin 20-22.5 has the

highest mode of 6. Distribution forms a right skewed normal distribution.(given little more records).

5. Now, perform the statistical test and report your results. What is your confidence level and your critical statistic value? Do you reject the null hypothesis or fail to reject it? Come to a conclusion in terms of the experiment task. Did the results match up with your expectations?

Null Hypothesis :  $H_0 : \text{mean}_{\text{diff}} = 0$

Alternate Hypothesis :  $H_1 : \text{mean}_{\text{diff}} > 0$  (one-tail)

Confidence level = 0.001

Diff mean = 7.96

Diff Std = 4.86

N = 24

$T = \text{diff mean} - 0 / (\text{diff std} / \sqrt{n})$

T-value = 8.0238

P-value < 0.0001

confidence-level(0.001) is greater than p-value. Null hypothesis is rejected. So, Two sample are significantly different. Even during my personal stroop effect there is significant difference between congruent and incongruent tests. Results are in accordance to my expectations.