Statistics Project

Stroop Effect

Q1. Set of Independent and Dependent Variable.

Independent Variable: The displayed word has the same color as the text or not. (test is congruent or incongruent) .

Dependent variable: Reaction time to the test.

Q2.

Null Hypothesis: Ho: $\mu = \mu c = \mu l$ **:** There is no significant difference between population mean μc , μl

Alternative Hypothesis: Ha: $\mu = \mu I$ Population mean is significantly less than that of incongruent mean.

I am using a Paired Dependent t test because population standard deviation or mean is not known, the sample size is less than 30 (we cannot use z test).The results cannot be described as normal but they are not heavily skewed. Dependent because the same subjects are involved in both the sample. The results are moving in only one direction so it is one-tailed test.

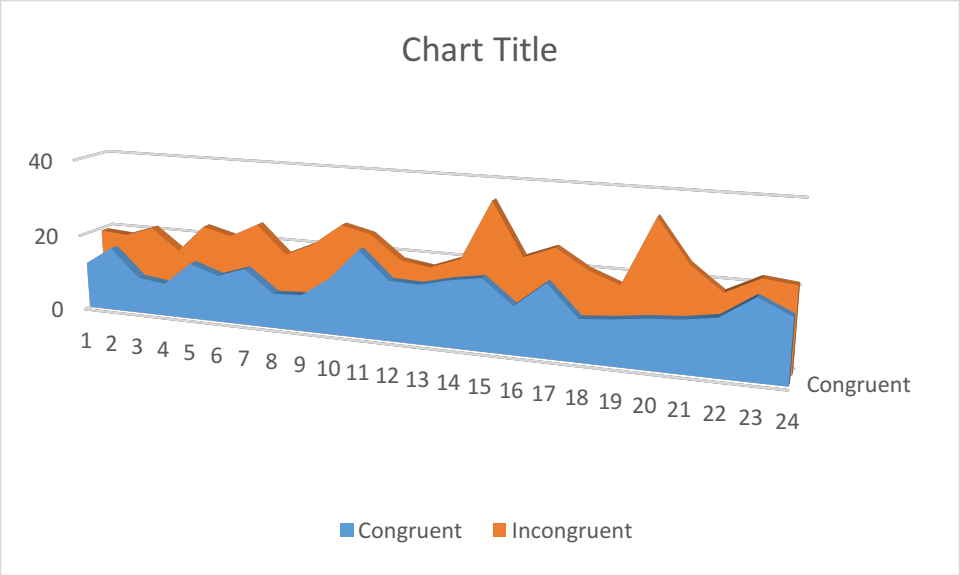
Q3. Descriptive Statistics:

Congruent Mean: 14.0415
Congruent Standard Deviation: 3.559357958

Incongruent Mean: 22.01591667

Incongruent Standard Deviation: 4.797057122

Q4. Visualization



As seen in the above plot the reaction time on Incongruent test is more than the reaction congruent test.

Q5. Statistical Analysis

Difference in mean = Mean(Incongruent) – Mean (congruent)
= 22.01591667 - 14.0415
= 7.9744
Difference in Standard Deviation = STD(DIFFERENCE OF RESPONSE TIME)
=4.86482691

Standard error = Difference in Standard Deviation / sqrt(n)

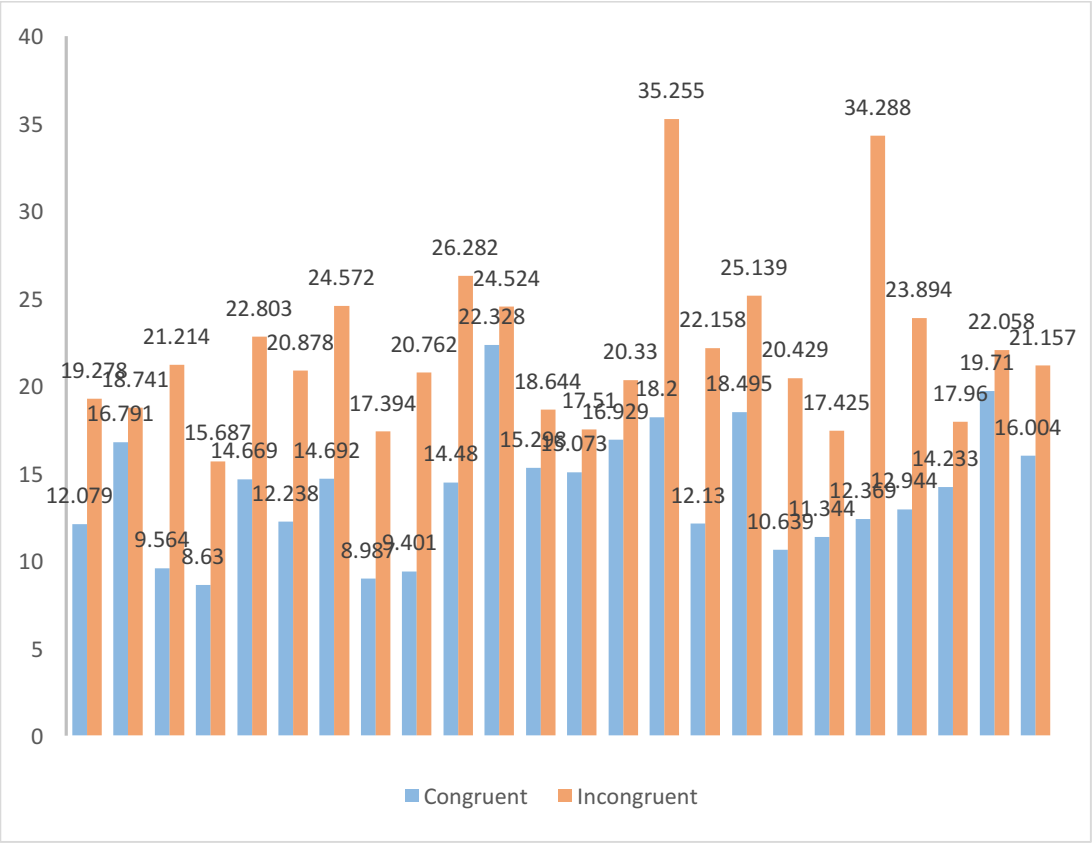
T stats = Difference in Mean / Standard Error
= 7.9744 / (4.8648 / SQRT(24))
= 8.030399515

P VALUE = 0.00001
Tcritical = 1.714 alpha <0.05 , one tailed ,23 degrees of freedom

As the sample size is small, I'll go for 95 % confidence interval
95% C I = (6.263, 9.667)

P value implies that I can reject the null hypothesis. The t stats in higher than tcritical. The difference in mean lies in the confidence interval .

Q.6 Additional Observation



There are 7 points (apprx 30 %) whose difference between the reaction time to congruent test to incongruent test is small . 2 points have significantly large difference and other points have incongruent time apprx 1.5-2 times that of congruent time . This implies that there can be other factors that must have influenced the reaction time such as age , whether the person is a native English speaker , gender etc.

Reference:

https://en.wikiversity.org/wiki/T-test

http://www.socscistatistics.com/pvalues/tdistribution.aspx