Stroop Test Data Analysis
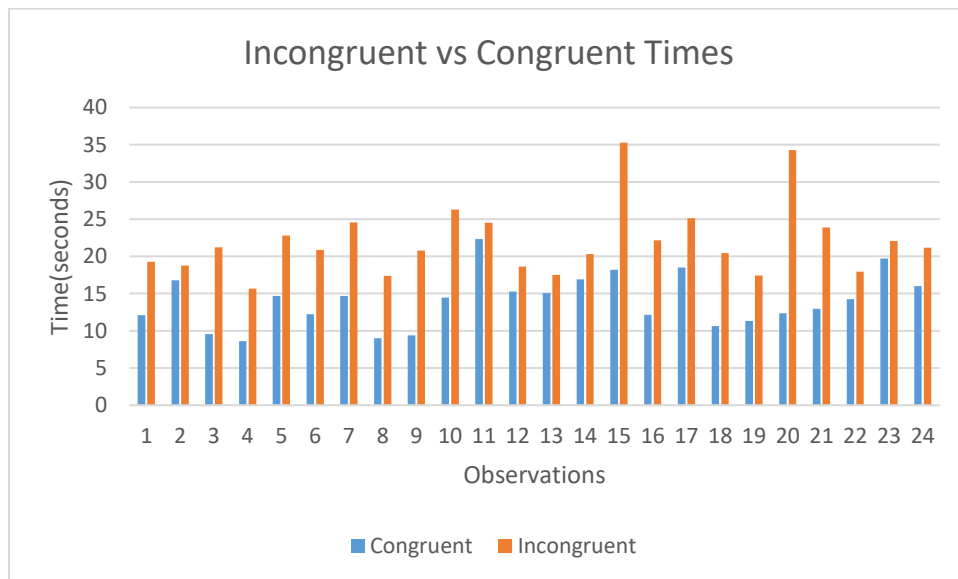
Congruent		Incongruent	
Standard Deviation	3.559357958	Standard Deviation	4.7970571
Variance	12.66902907	Variance	23.011757
Mean	14.051125	Mean	22.015917
Median	14.3565	Median	21.0175
Mode	NA	Mode	NA

The Dependent variable will be the time it takes in seconds to say the color of the words. The independent variable will be whether the words are congruent or not.


As you can see there is clearly a trend between the Congruent and Incongruent versions of the test. Every person took longer on the Incongruent test than they did on the congruent test.

H_0: $U_{congruent} = U_{Incongruent}$

H_A: $U_{congruent} < U_{Incongruent}$

We will do a dependent one tailed t-test in the positive direction, because we want to know if the Incongruent times are larger than the Congruent times and because the Incongruent and congruent times are not independent. We are using a t-test because we have a small sample size and are trying to make inferences about the population means. Our degrees of freedom for this sample is 23 since df = n - 1. We will use an alpha of 0.05 which will give us a t-critical value of 1.714. Based on the graphs we can say our data is fairly normal.
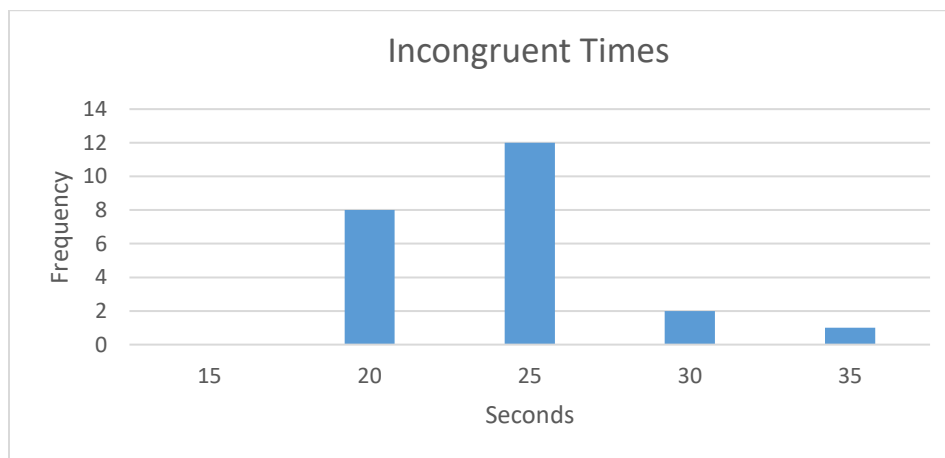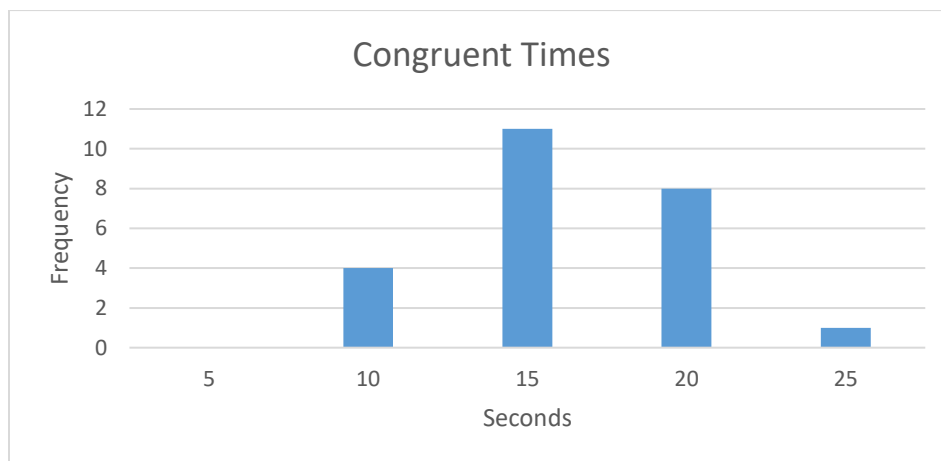
Here we have the table of values with the differences

Congruent	Incongruent	Differences
12.079	19.278	-7.199
16.791	18.741	-1.95
9.564	21.214	-11.65
8.63	15.687	-7.057
14.669	22.803	-8.134
12.238	20.878	-8.64
14.692	24.572	-9.88
8.987	17.394	-8.407
9.401	20.762	-11.361
14.48	26.282	-11.802
22.328	24.524	-2.196
15.298	18.644	-3.346
15.073	17.51	-2.437
16.929	20.33	-3.401
18.2	35.255	-17.055
12.13	22.158	-10.028
18.495	25.139	-6.644
10.639	20.429	-9.79
11.344	17.425	-6.081
12.369	34.288	-21.919
12.944	23.894	-10.95
14.233	17.96	-3.727
19.71	22.058	-2.348
16.004	21.157	-5.153

The mean of the differences is -7.96479

We found the standard error which is 1.951975891

If we divide -7.96479 by 1.951975891 we will get our t-statistic which is -4.080373995

This t-statistic gives us a p-value of 0.001 which means it is very statistically significant and not due to chance, so we can safely reject the null hypothesis.

Cohens D = -1.63722

For a 95 confidence interval we have a lower bound of -11.3105 and an upper bound of -4.62691. Which means that there is a 95% chance that a user will take between 11.3 seconds and 4.626 seconds longer on the Incongruent test than on the Congruent test.

Conclusion

The results were exactly as I expected, it was not due to luck or chance that the Incongruent test took more time than the Congruent test. I took the stroop test myself and got 11 seconds on the first Congruent test and 22 seconds on the Incongruent test. The Incongruent test is definitely harder. Maybe it will be easier without the first congruent test. I took the Incongruent test after a rest period after taking the Congruent test and got 15 seconds. This leads me to believe the first Congruent test might negatively prepare someone for the Incongruent test. I think this is because the brain is used to and primed to look at colors and words as the same, but then it has to "delete" that pattern and start again with a new pattern by dissociating words and colors. I believe that resting a significant amount after the first test might lead to different results as well. Unfortunately, I could not find anything about this online.

Resources

https://graphpad.com/quickcalcs/pValue1/

http://psychclassics.yorku.ca/Stroop/

https://discussions.udacity.com/t/what-exactly-are-we-testing-for-project-5/306468

https://discussions.udacity.com/t/mann-whitney-u-test-question-p3-3-spoilers/31550/4