Stroop effect data analysis
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Project specification: Test a Perceptual Phenomenon.

Responses to the project questions.

Q1. Identify variables in the experiment. Correctly identify the Independent and Dependent variables in the experiment.

What is the Independent variable?

The Independent variable is words condition. Which are a congruent words where the printed words of color match with color background and an incongruent words where the printed words of color don't match with color background. Another words, experiment variables are words condition that have the same or different color.

What is the Dependent variable?

The Dependent variable is the record measurement of reaction time from each words condition.

Q2. Establish hypotheses.

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

Null hypotheses is mean ($\mu 1$) of the reaction time for the congruent test will be greater than the mean ($\mu 2$) of the reaction time for the incongruent test.

H_0: $\mu 1 > \mu 2$

Alternative hypotheses is mean of the reaction time for the congruent test will be less than the mean of the reaction time for the incongruent test.

H_a: $\mu 1 < \mu 2$

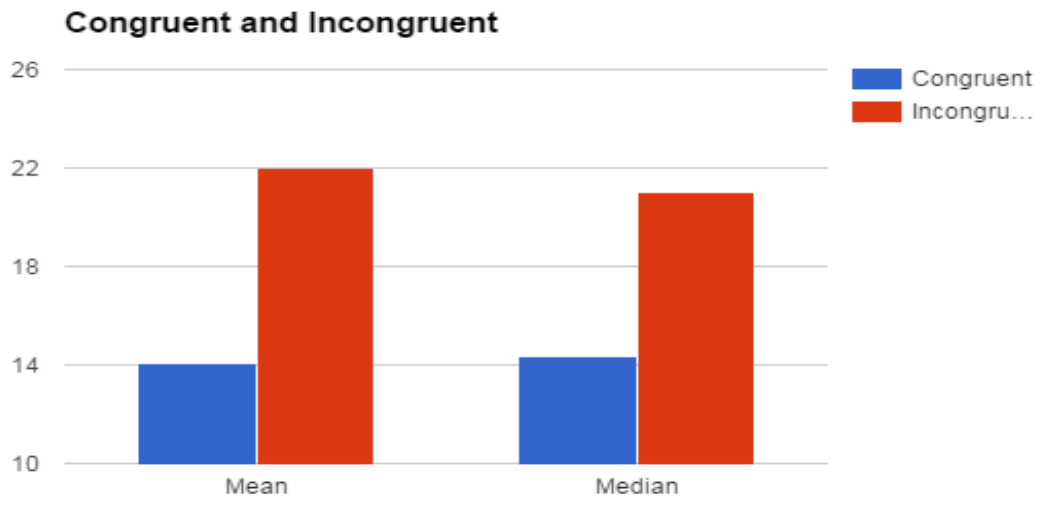
I will perform a Dependent paired T – statistical test, due to the fact I am going to compare and to find difference record measurement of reaction time of participants at two time points (congruent and incongruent).

T statistical test because we don't know the population's standard deviation and we have less than 30 samples.

Dependent sample test is because same experiment took the test twice

Q3. Report descriptive statistics. Descriptive statistics, including at least one measure of centrality and one measure of variability, have been computed for data set's groups.

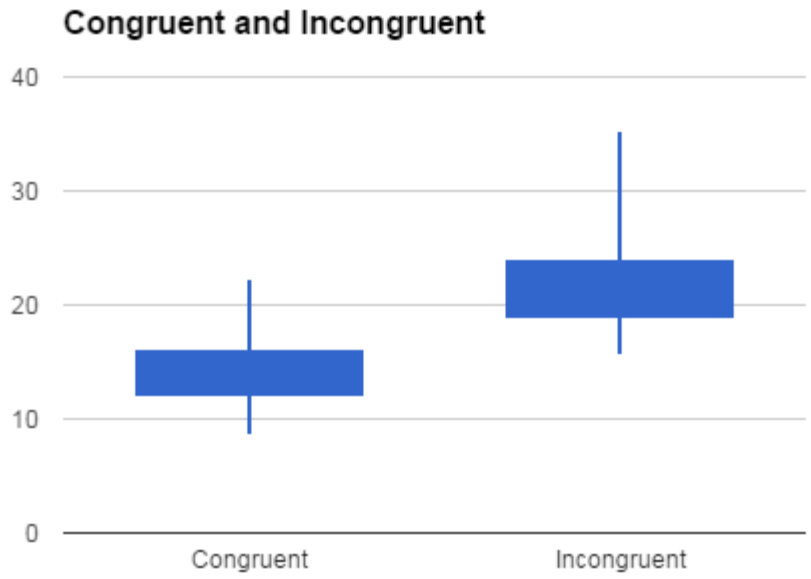
Measure of central tendency.



Summary of results measure of central tendency for congruent and incongruent in stroopdata set's group.

Type	Mean	Median
Congruent	14.05	14.36
Incongruent	22.016	21.02

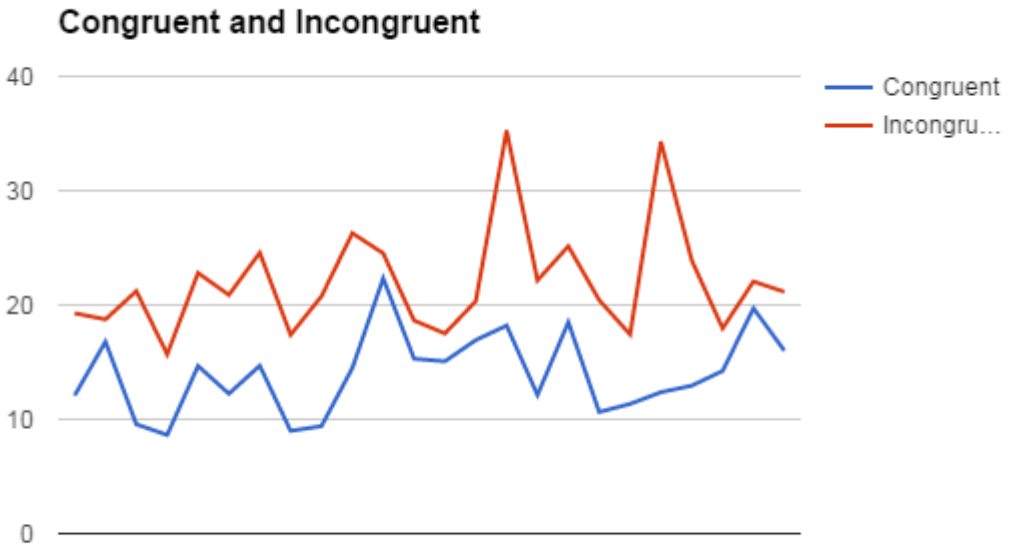
Measure of variability.

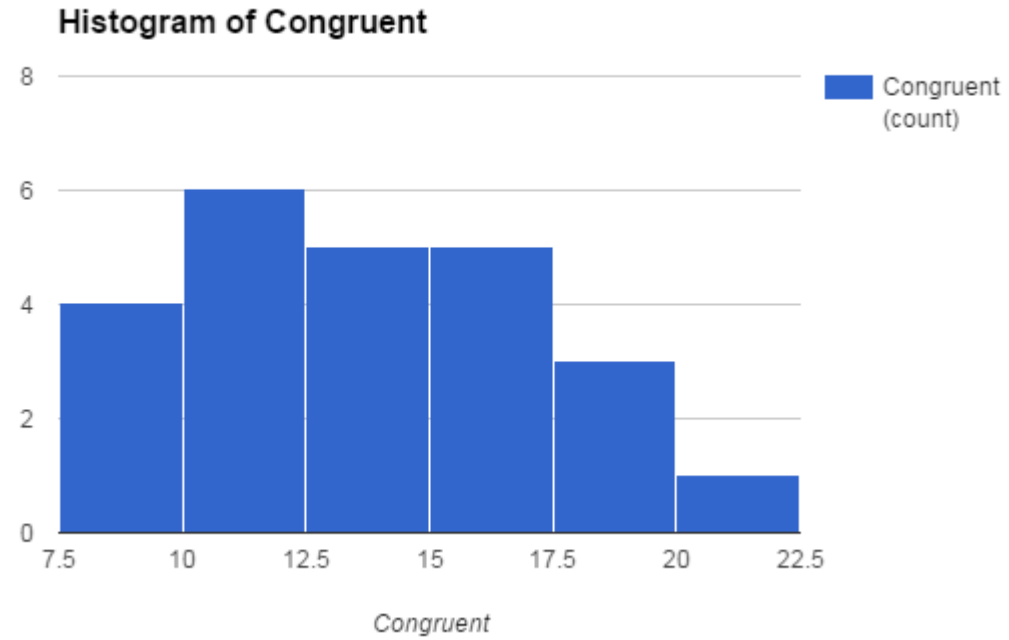


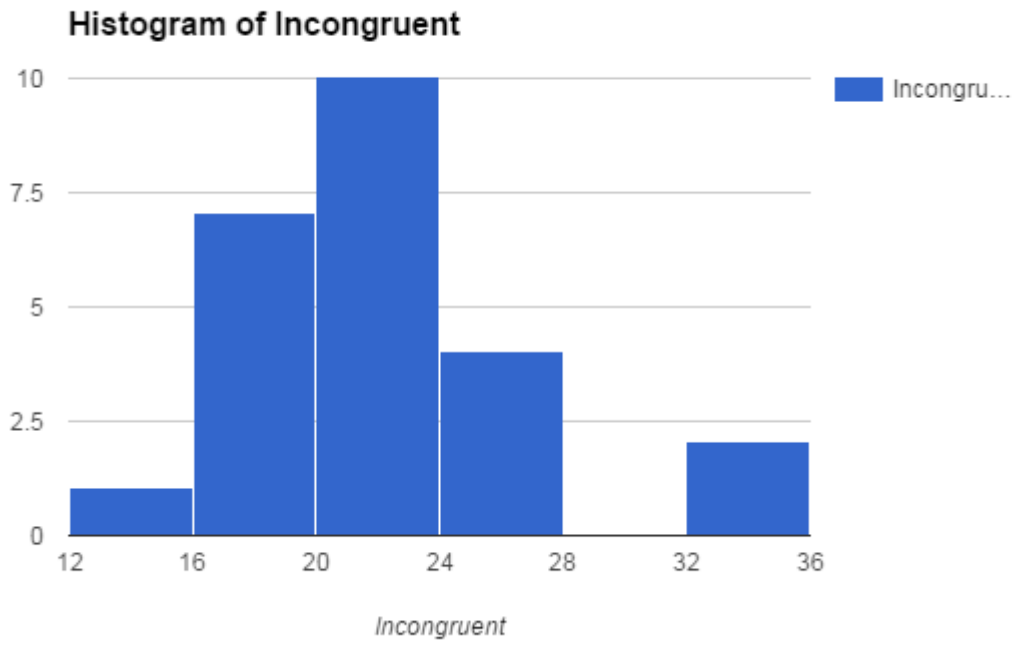
Summary of results measure of variability congruent and incongruent in stroopdata set's group.

Type	Min	Lower Quartile	Upper Quartile	Max
Congruent	8.63	11.90	16.20	22.328
Incongruent	15.69	18.72	24.05	35.255

Q4. Plot the data. 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.


Congruent and Incongruent
40
30
20
10
0
Congruent
Incongru...


Histogram of Congruent
8
6
4
2
0
7.5
10
12.5
15
17.5
20
22.5
Congruent
Congruent (count)



In these distribution histogram graphs I can analyze and visualize the data recording of the reaction time of participants in a congruent and an incongruent trials. As we can see in the incongruent histogram with bin size 4, participants on this trial took longer to read words condition.

Q5. Perform the statistical test and interpret your result. 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?

	Congruent	Incongruent
Mean	14.05	22.02
Varience	12.67	23.01
Standart Deviation	3.56	4.80
Median	14.36	21.02
Minimum	8.63	15.687
Maximum	22.328	35.255
Range	13.698	19.568
Standart Error	0.73	0.98

-7.965

Point estimate or mean of difference	4.86
Standard deviation of diffrence	
Squire of value (n)	4.90
T test	-8.021

According to my Alternative hypotheses H_a: $\mu 1 < \mu 2$

This will be one – tailed test in the negative direction. I would not do a two tail test because my alternative hypotheses says I am only looking for a negative difference.

Critical region of a distribution alpha levels (a): 0.05

Degree of freedom (df): 23

Critical statistic value in one-tailed type of test: -1.714

Based on my T statistic and T critical value my result statistically significant.
I reject the null hypotheses. Because p value for this t is p<0.5

Come to conclusion in term of experiment task the result did not match up with my expectations. When I tried out the Stroop task for myself I got following result: congruent time was 12.268 secong and incongruent time was 15.838second with difference time of second is 3.57 second.
On the incongruent test I felt a slowdown in my brain even if I tried to recognize difference words condition it took longer to read them. I suppose that It maybe depends from the length of color words. For example if I see the printed word Red on Yellow color or Blue on Green color.

Answering the question 6, I was interested in if the incongruent result would be similar on words condition with different languages. For example I tried to recognize word Yellow, RED, Green, Blue in Russian language (where I can speak more fluent than in English) with various background color. Result of my

experiment was the same but with less difference. I guess my experiment was with more less differences because as I said above maybe it depends from the length words condition as Russian color words have same of the length. (for ex. “красный” it means RED has the same the length with “зеленый” it means Green and etc.)

References to perform this project I used following materials:

- pdf. Lessons of statistics 1-11.
- T table
-google spreadsheet.
- Statistics videos on Youtube.