Udacity Data Analyst Nanodegree

Test a Perceptual Phenomenon

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

INDEPENDENT – whether the words are Congruent or Incongruent
DEPENDENT - Time in seconds it takes the responder to give answers

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

μ1 = the mean in time of congruent test
Ho - **Null Hypothesis**: There is no significant difference in the average time it takes to state the colors of the words in congruent or incongruent conditions.
Ho -μ1 - μ2 = 0

μ2 = the mean in time of incongruent test
Ha - **Alternative Hypothesis**: There is a significant difference in the average time it takes to state the colors of the words in congruent or incongruent conditions.
Ha -μ1 - μ2 ≠ 0

We are testing dependent variables in this dataset., we use a t-test because the sample size is less than 30, and the standard deviation is not known and we assume that the distribution is normal. We want to test if the average time duration difference of the congruent and incongruent tests would equal zero or be greater than zero. Based on the likelihood of the presence of the Stroop effect and thus reject or retain the null hypothesis

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

Congruent

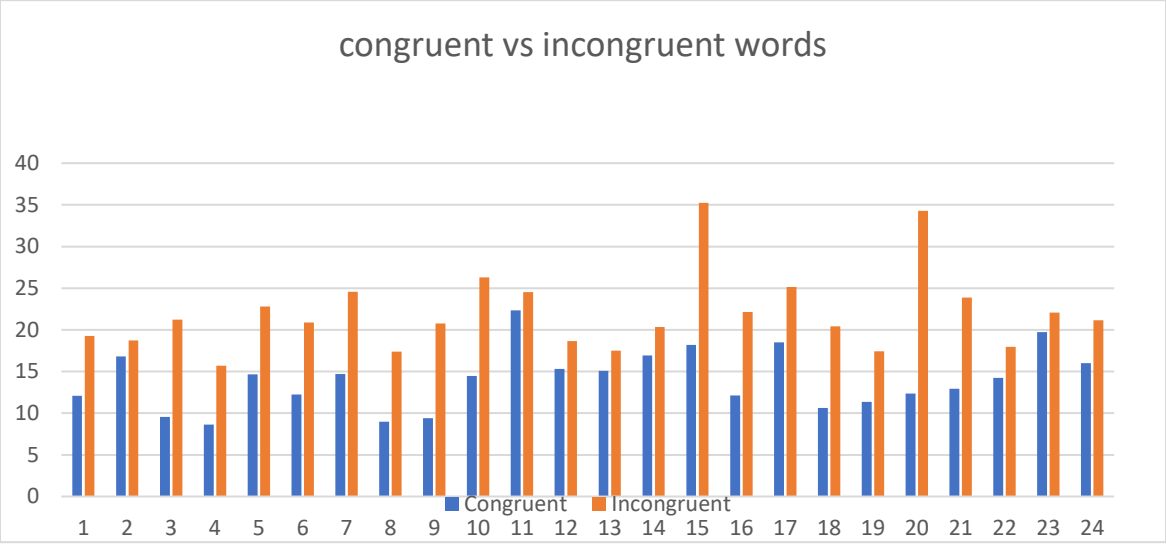
- Mean: 14.05
- Median: 14.36
- Variance: 12.67
- Standard Deviation: 3.56

Incongruent

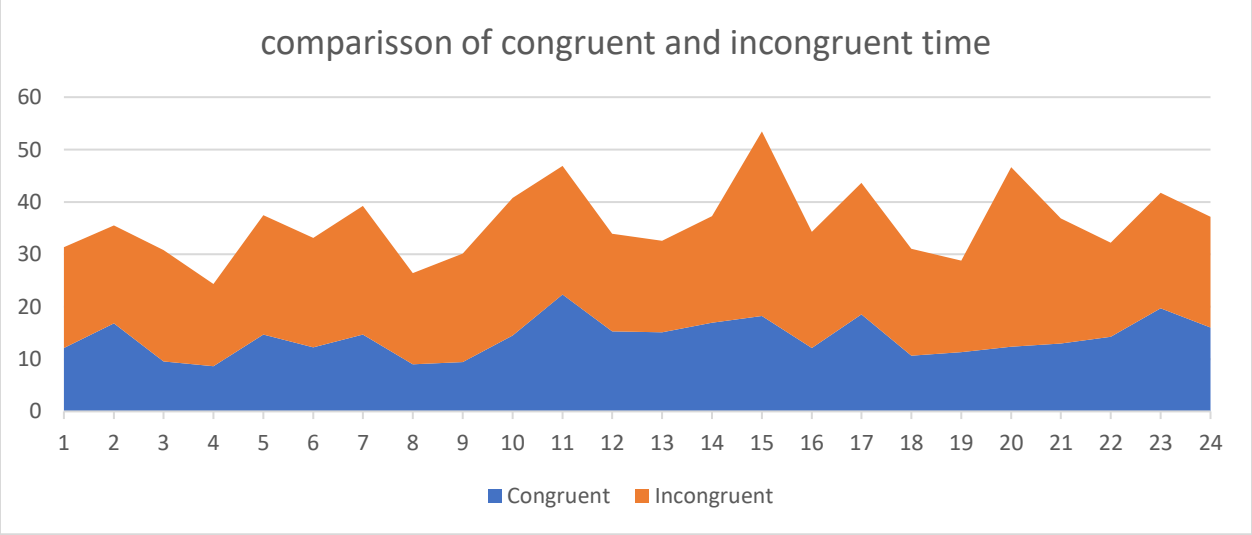
- Mean: 22.02
- Median: 21.02
- Variance: 23.01
- Standard Deviation: 4.80

Difference in means :14.05-22.02=-7.97

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.



There is a very significant difference observable here between the congruent and incongruent times, there is no single category where the incongruent words column exceeded the congruent words column, there also seem to be some outliers in the 15th and 20th data points



This visual clearly shows the variation between the congruent and incongruent times, the range of the congruent words is around 8 seconds to 22 seconds. The range of the incongruent words is 15 seconds to 36 seconds

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?

$\alpha = .005$

df = 23

t-statistic = -8.02

at the 99% confidence level, and 23 degrees of freedom = +-2.807

Based on the t statistic we **reject** the Null Hypothesis
The t statistic being in the critical area, we establish that reading the incongruent words take more time than it takes to read out congruent words These are the results I expected since the trends in all categories indicated this rise in time, even in my own experience and my friends who took the test all had increases in time between the two categories.

6. Optional: What do you think is responsible for the effects observed? Can you think of an alternative or similar task that would result in a similar effect? Some research about the problem will be helpful for thinking about these two questions!

I think that since we learn to read efficiently, the use of words alone have a much stronger influence over a person's ability to say the color, the brain's cognitive ability is interrupted by trying to relate the words with the color. Similar tasks that could be related to the Stroop effect would probably be in driving, our minds see green as a sign that we need to move ahead and red to stop, danger is associated with the red color signs, if for example we replaced traffic signals and signs that are red with green color, it would cause a lot of confusion because our minds have continually learned to associate green to move safely and red to stop or exercise caution.

Resources utilized

https://en.wikipedia.org/wiki/Stroop_effect

https://faculty.washington.edu/chudler/java/ready.html

http://imbs.uci.edu/~kjameson/ECST/MacLeod_TheStroopEffect.pdf

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