

Udacity Data Science Nano-Degree

Stroop Effect

Jamie Brand - brandjamie@hotmail.com

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

The independent variable is the condition of congruent or incongruent words.

The dependent variable is the number of seconds taken to name the colour of each word in a list.

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 null hypothesis is that there is no difference between the number of seconds taken to read the congruent or incongruent words.

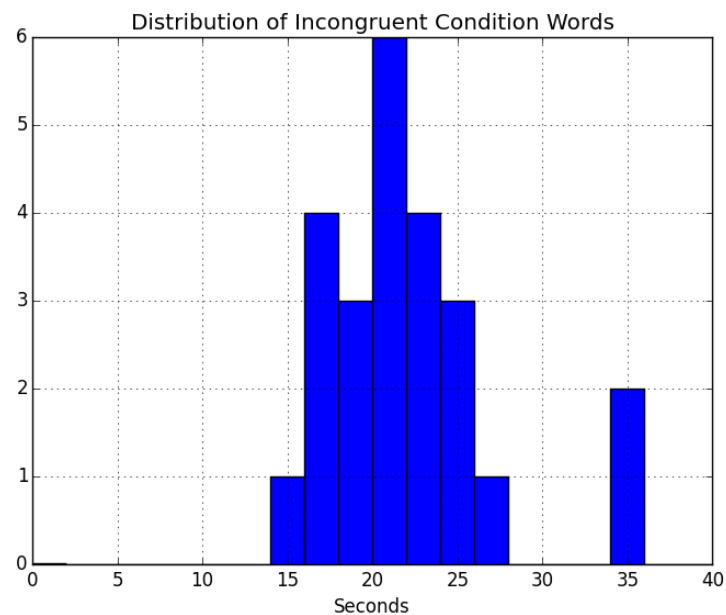
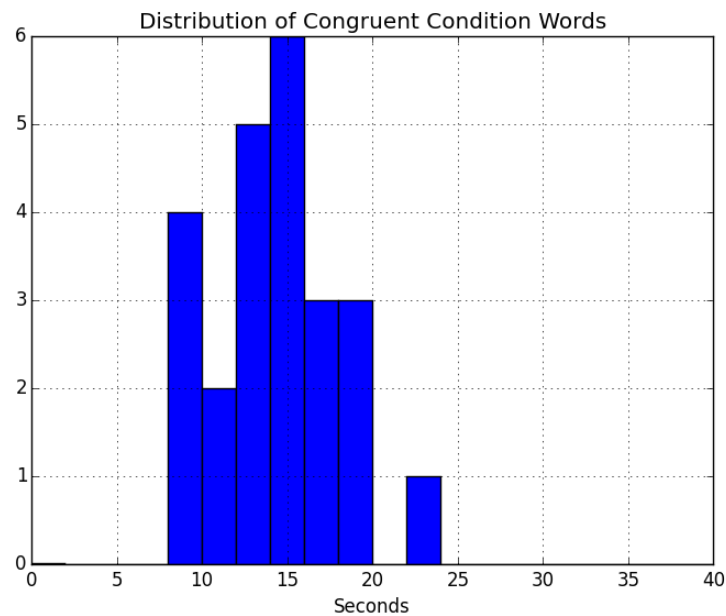
The hypothesis is that it takes significantly more seconds to count the incongruent words than the congruent words.

As the data is matched I will be doing a one tailed two sample dependent t-test.

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

	Congruent	Incongruent
Mean	14.051	22.016
Variance	12.67	23.012

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.



Both histograms show a normal distribution. The centre for the distribution of the incongruent condition words seems to be further to the right indicating longer times taken to do the test with the incongruent condition than with the congruent condition.

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?

I chose an alpha level of 0.5. The critical t value for an alpha of 0.5 is -1.711. This is for a one tailed test where we expect the mean of the incongruent words condition to be higher.

$t(24) = -8.02, p < .05, \text{one-tailed}$

The t-score is -8.021. As this is much lower than our t-critical value we can reject the null hypothesis and accept the hypothesis that there it takes significantly longer for a person to read the list of incongruent words condition than the congruent words condition. .

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!

It seems that the participant is momentarily confused by having different information being presented at the same time. After some background reading on the Stroop effect, most explanations imply that processing colour is more difficult and/or takes longer for the brain to accomplish than understanding words. This accounts for some of the difference although not all. The participant is not told that the words and the colour are the same in the first test or that they are different in the second. I imagine that the participant reads the word (meaning) then evaluates the colour and if there is no difference they say the word immediately otherwise confusion arises and they must re-evaluate the colour taking more time.

A similar effect I have noticed is the difficulty of counting (say a pile of papers) while someone is reading numbers to you. An interesting experiment derived from this would be to have people try and remember a telephone number for two minutes. One group could be allowed to remember in silence while the other group would be read a number of other telephone numbers. The respondents would then be tested for how accurately they could remember the number. Of course this is looking different senses and brain functions to the Stroop effect. However, it is similar in its focus on the interference between different brain functions.

References

<http://www.math.unt.edu/~tam/SelfTests/StroopEffects.html>

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

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

http://matplotlib.org/api/pyplot_api.html

<http://stattrek.com/statistics/dictionary.aspx>

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