

## PROJECT 01-TEST A PERCEPTUAL PHENOMENA

1.

### Independent Variable

The color words

### Dependent Variable

The time it takes to name the ink colors

2.

### Hypothesis

Our null hypothesis is there is not going to be much difference in the amount of time taken to read the ink colors in both congruent and incongruent words. That is, if the experiment was conducted to the whole population and not just the 24 sample participants, there wouldn't be significant difference between the time it takes to read the congruent and incongruent words. While our alternative analysis is going to be that if the test was conducted to the whole population, we would see a significant difference in the time it takes to read the ink colors in the congruent and incongruent words.

Mathematically,  $H_0: \mu_c = \mu_{ic}$

$H_A: \mu_c \neq \mu_{ic}$

### Statistical Test

We are going to use a T-test as we don't know the population parameters and all we have is just a sample (24 participants) from the population. Since the same participants are used in both trials, we have dependent/paired participants. Thus, we are going to perform a ***Dependent T-test for paired samples***.

Also, we will do a ***two sided/tailed test with  $\alpha=0.05$*** . Two sides is opted because we are not sure what the outcome would be i.e. whether the incongruent color words could impact the reading time positively or negatively.

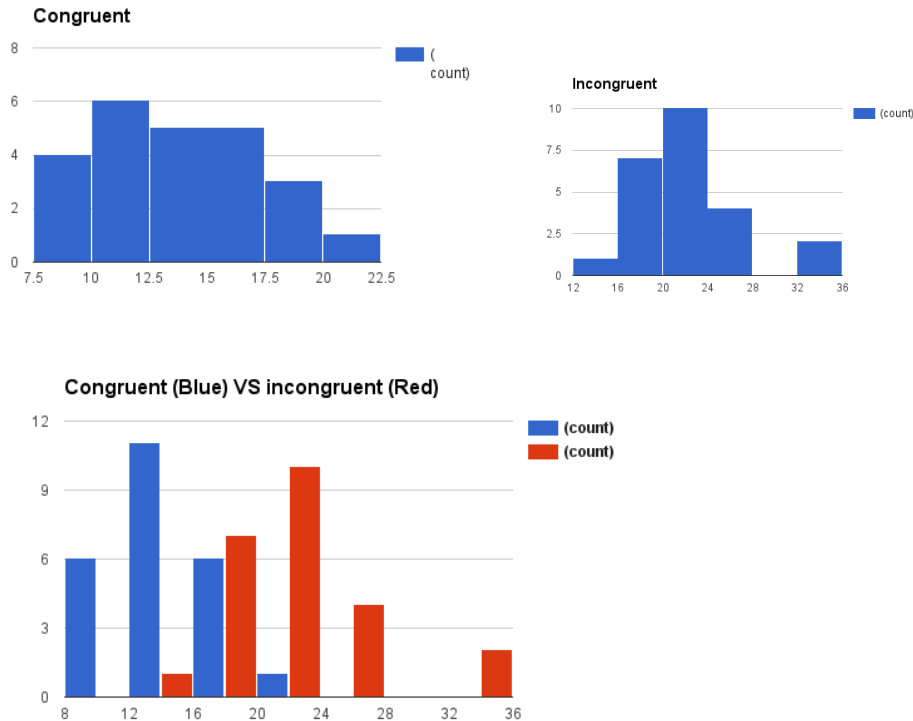
3.

	congruent	Incongruent
Mean	14.05113	22.015917
Median	14.3565	21.0175
Variance	12.66903	23.01176
Standard deviation	3.559358	4.797057

4.

Here is a Histogram plot in both cases i.e. Congruent and Incongruent. For comparative assessment, a third histogram is shown where both results are plotted on the same axis.

As can be seen from the composite histogram, on average, the time it took to read the ink colors is more in the case of incongruent than the congruent as the histogram is almost completely shifted to the right. This is also supported by the table in Q3. We seem to have outliers in both cases as well. Also, you could see from the histogram, approximately 16 of the participants (more than half) took more time in the incongruent test than anyone took in the congruent case.



5.

We did a two tailed test with confidence level of 95%. For degree of freedom  $DF=23$ , t-critical is  $\pm 2.069$ . Our point estimate is  $-7.96479$ . The standard deviation of each difference is  $4.864827$ . With  $n=24$ , the standard error of the difference is  $0.993029$ . The t-statistics is  $-8.02071$ .

The calculated t-stat is much further outside the t-critical indicating this is not a random effect. That is, the participant took much shorter time to read the ink colors in the case of congruent words when compared to the incongruent words. Thus, we reject the null hypothesis. This was the expected conclusion, especially after taking the test myself.

6.

I think this has to do with the fact that we read faster than we can identify colors. To support this idea further, I would probably make a similar experiment and in addition to the timing, I would also count the number of errors made. Those errors are most likely to be because of the fact that we are reading the word before we can actually identify the color.

To come back to the question, more time is taken because we have to double check ourselves to avoid the interference that is coming by reading the word.

After doing a little research, a similar experiment is spatial stop effect where a down and up arrow appears randomly above a central point.

Materials Used:

<http://www.sjsu.edu/faculty/gerstman/StatPrimer/t-table.pdf>

Wikipedia

Course materials