Statistics: The Science of Decisions
Project

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

Our independent variable is the congruent or incongruent words condition. Our dependent variable is the time it takes to name the ink colors in equally-sized lists.

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

Our null hypothesis is that there is no difference in the time it takes to name ink colors between the two conditions. Our alternative hypothesis is that there is a difference in the time it takes to name in colors between the two conditions.

$H_0: \mu_c = \mu_{in}$ u_c is the population mean of the congruent words condition
$H_a: \mu_c \neq \mu_{in}$ μ_{in} is the population mean of the incongruent words condition

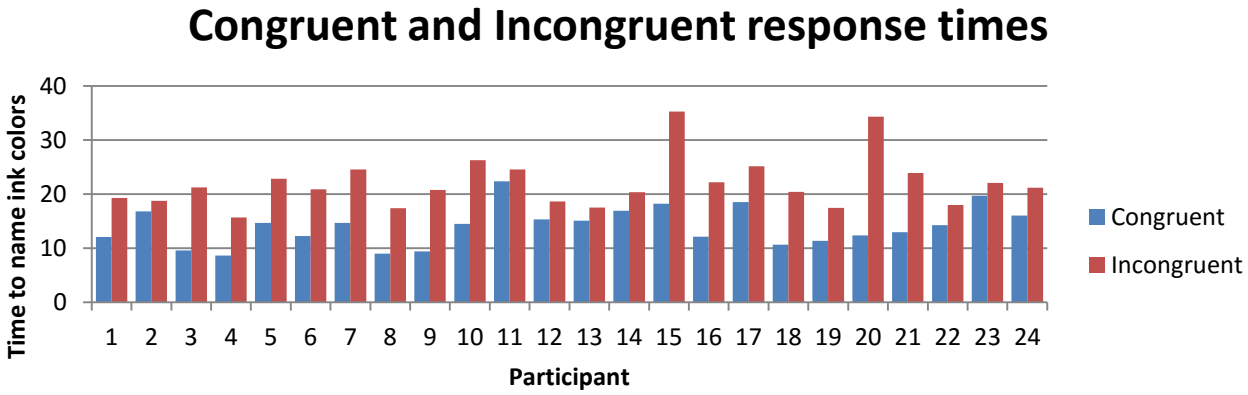
A double tailed T-test for dependent samples with two conditions will be used to determine whether or not we should accept or reject the null hypothesis. A T-test is best to use when we do not know the population standard deviation. If our T-Stat is greater than our T-Crit at a .05 significance level, we will reject 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.

<u>Congruent Group</u>
Mean: 14.051
Stdev: 3.559

<u>Incongruent Group</u>
Mean: 22.016
Stdev: 4.797

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.



For every participant in this study, it can be seen that their response time for the incongruent condition is longer than their response times for the congruent condition. On the graph, this is represented by the red bar being higher than the blue bar for each individual participant. Based solely on eyeballing the data, it appears that the incongruent condition correlates with longer naming times.

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?

Two-Tailed T-Test

$\mu_c - \mu_{in} = 14.051 - 22.016 = -7.965$

Confidence Level: 95%

Critical T-Value: -2.069

T-Statistic: -8.021

In this case, our T-Statistic is greater than our T-Critical Value which means it is unlikely that we got our result simply by chance. Accordingly, at a 95% confidence level, we can reject the Null Hypothesis that there is no difference in the time it takes to name ink colors between the two conditions.