Test a Perceptual Phenomenon
By Michaela Wonacott

Questions For Investigation

1. What is our independent variable? What is our dependent variable?
The independent variable is the congruent and incongruent words conditions.
The dependent variable is the mean time (in seconds) it takes a participant to name the ink colors outloud.

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 goal of this experiment is to determine a difference between the mean population of congruent word conditions and the mean population of incongruent words conditions.

The null hypothesis is that naming the ink colors for the incongruent words will take the same amount of time as naming ink colours of the congruent words. Hence, the null hypothesis is that there is no significant difference between the two populations.
Null Hypothesis $H_0 : \mu = \mu_0$

The alternative hypothesis is that naming the ink colors for the incongruent words will be different than naming the ink colors of the congruent words. So the alternative hypothesis shows there is a significant difference.
Alternative Hypothesis $H_a : \mu \neq \mu_0$

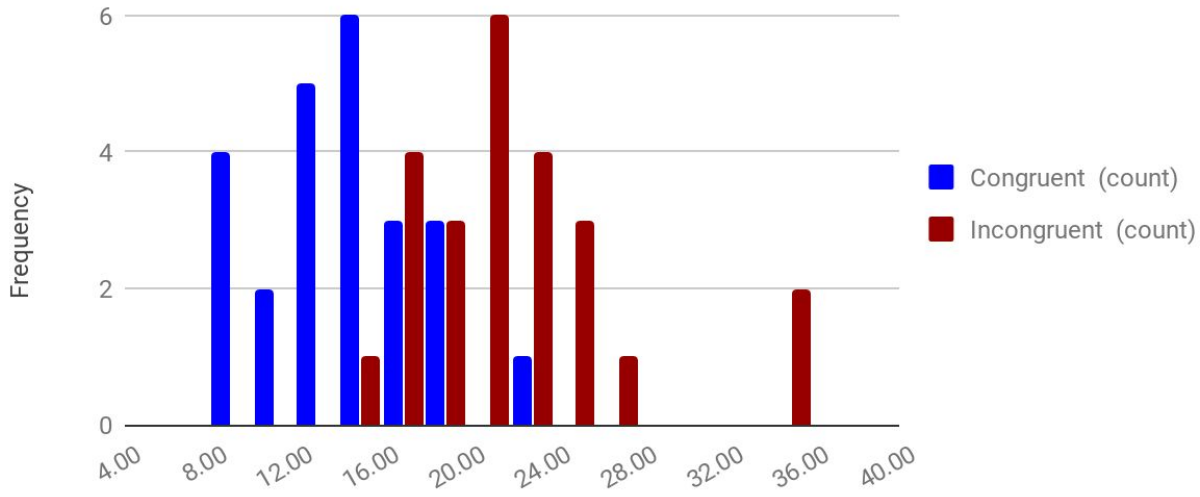
The statistical test I expect to perform is the **t-test**. Since it is not possible to gather the entire population, the t-test allows the sample population to closely resemble the actual population. Because we have no idea which direction the values will change, I will use a two-tailed t-test to determine critical regions.

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

Measure of Central Tendency: Mean of the congruent and incongruent words.
Measure of Variability: Standard Deviation of the congruent and incongruent words.

Condition	Sample Mean	Sample Variance	Sample Standard Deviation (SD)
Congruent	14.05	12.67	3.56
Incongruent	22.02	23.01	4.80

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.



The incongruent words mean is higher than the congruent words mean. There is a wider range of values for the incongruent words than the congruent words.

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?

t-statistic: 6.53
t-critical: 2.009
p-value: $p < 0.05$
Confidence Interval: CI [-10.42,-5.52], Therefore 95% confident of results
Test Result: I reject the null hypothesis since the p-value is less than 0.05. There is a statistical significance between the mean time of congruent words and mean time of incongruent words. I expected that it would take longer to say the incongruent words than the congruent words. These results matched my expectations.