Statistics: The Science of Decisions Project Instructions

Background Information

In a Stroop task, participants are presented with a list of words, with each word displayed in a color of ink. The participant's task is to say out loud the *color of the ink* in which the word is printed. The task has two conditions: a congruent words condition, and an incongruent words condition. In the *congruent words* condition, the words being displayed are color words whose names match the colors in which they are printed: for example RED, BLUE. In the *incongruent words* condition, the words displayed are color words whose names do not match the colors in which they are printed: for example PURPLE, ORANGE. In each case, we measure the time it takes to name the ink colors in equally-sized lists. Each participant will go through and record a time from each condition.

Questions For Investigation

As a general note, be sure to keep a record of any resources that you use or refer to in the creation of your project. You will need to report your sources as part of the project submission.

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

Independent: The word and color displayed.
Dependent: Reaction time

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

There is a longer reaction time and/or miss-identification when the word does not match the color. Thus, μC will be less than μI.

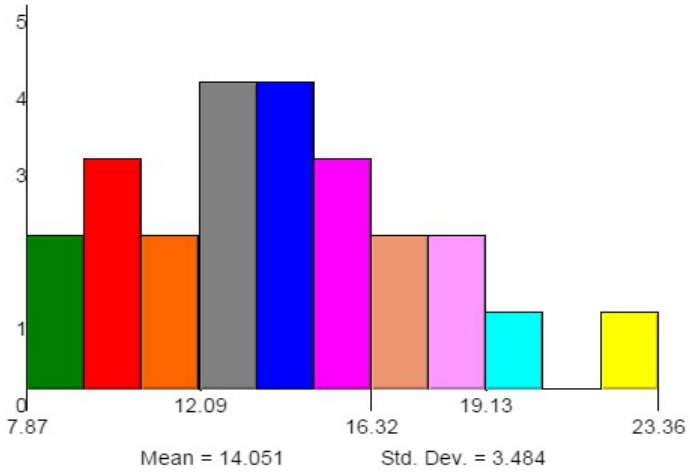
Univariate testing. The only variable is whether it is congruent or incongruent. Also, my prediction is that the data will fit a bell curve. Most people will fall around a particular mean with a symmetrical distribution.

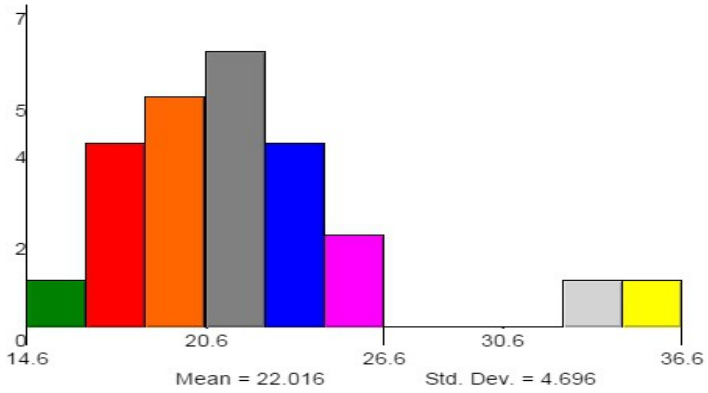
3. **Report some descriptive statistics regarding this data set. Include at least one measure of central tendency and at least one measure of variability.**

Congruent Mean Time from Data Set: 14.051
Congruent Standard Deviation from Data Set: 3.559

Incongruent Mean Time from Data Set: 22.016
Incongruent Standard Deviation from Data Set: 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.**





The standard deviation was much higher with the incongruent test. This might suggest there was a wider variance of people's ability to complete the project.

The mean time for the incongruent test was significantly higher. This would suggest the test was more difficult for people to perform and/or require more concentration.

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?**

	Congruent	Incongruent
	13.452	23.735
	15.112	19.024
	10.988	21.342
	14.352	26.53
	13.269	20.561
	12.737	26.325
Mean	**13.318**	**22.920**
Std Dev	**1.419**	**3.115**

SD(congruent) = 3.559/sqrt(6) = 1.453
SD(incongruent) = 4.797/sqrt(6) = 1.958

Confidence Level:
Congruent Mean Time from Data Set: 14.051
Incongruent Mean Time from Data Set: 22.016

95% congruent → 14.051 +/- 1.96* 1.453 → (11.203, 16.899)
95% incongruent → 22.016 +/- 1.96*1.958 → (18.173, 25.853)

Critical Statistic Value:
t(congruent) = (14.051 – 13.318)/(3.559/sqrt (6)) = 0.504
t(incongruent) = (22.016 – 22.920)/(4.797/sqrt (6)) = -0.462

Fail to reject the null hypotheses.

The data I gathered falls in line with the statistics provided with the project. The mean of the congruent and incongruent data sets fall within the 95% confidence interval.

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!**