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

Now it's your chance to try out the Stroop task for yourself. Go to this link, which has a Java-based applet for performing the Stroop task. Record the times that you received on the task (you do not need to submit your times to the site.) Now, download this dataset which contains results from a number of participants in the task. Each row of the dataset contains the performance for one participant, with the first number their results on the congruent task and the second number their performance on the incongruent task.

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

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.

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?

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!

Question 1: Identify variables in the experiment	Question response correctly identifies the independent and dependent variables in the experiment.
Question 2: Establish a hypothesis and statistical test	Null and alternative hypotheses are clearly stated in words and mathematically. Symbols in the mathematical statement are defined.
	A statistical test has been proposed which will distinguish the proposed hypotheses. Any assumptions made by the statistical test are addressed.
Question 3: Report descriptive statistics	Descriptive statistics, including at least one measure of centrality and one measure of variability, have been computed for the dataset's groups.
Question 4: Plot the data	One or two visualizations have been created that show off the data, including comments on what can be observed in the plot or plots.
Question 5: Perform the statistical test and interpret your results	A statistical test has been correctly performed and reported, including test statistic, critical test statistic or p-value, and test result. The test results are interpreted in terms of the experimental task performed.
Question 6: Digging deeper and extending the investigation	Hypotheses regarding the reasons for the effect observed are presented. An extension or related experiment to the performed Stroop task is provided, that may produce similar effects. This question is optional and does not need to be answered in order to meet project specifications.