

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?

The independent Variable is the type of test (Congruent & Incongruent). Meanwhile, the dependent variable is the time it takes of completing the test.

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

Null hypothesis H_0 : there is no difference between two tests. $M_{\text{congruent}} - M_{\text{incongruent}} = 0$ ($\alpha = .05$).

Alternative hypothesis H_a : the time of completing should be higher for the incongruent test. Therefore, we should have a one tail t test on the positive end (right tail). $M_{\text{congruent}} - M_{\text{incongruent}} > 0$ ($\alpha = .05$).

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.

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

Congruent Test	MEAN	MEDIAN	IQR 25	IQR 75	MAX	MIN	RANGE	STDDEV
	14.051125	14.3565	11.89525	24.0515	22.328	8.63	13.698	3.484415713
Incongruent Test	MEAN	MEDIAN	IQR 25	IQR 75	MAX	MIN	RANGE	STDDEV
	22.01591667	21.0175	18.71675	24.0515	35.255	15.687	19.568	4.696055135

- 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.

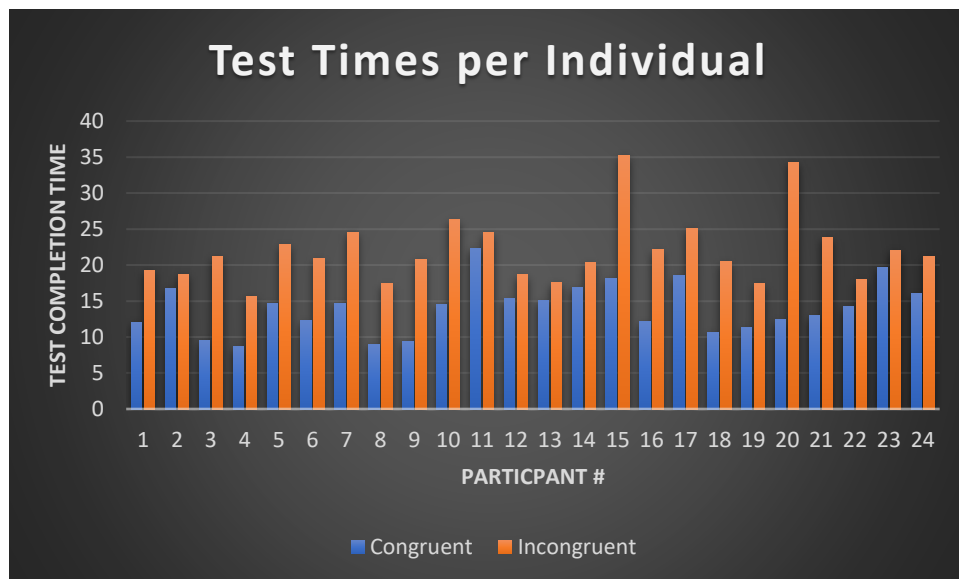


Figure 1.1

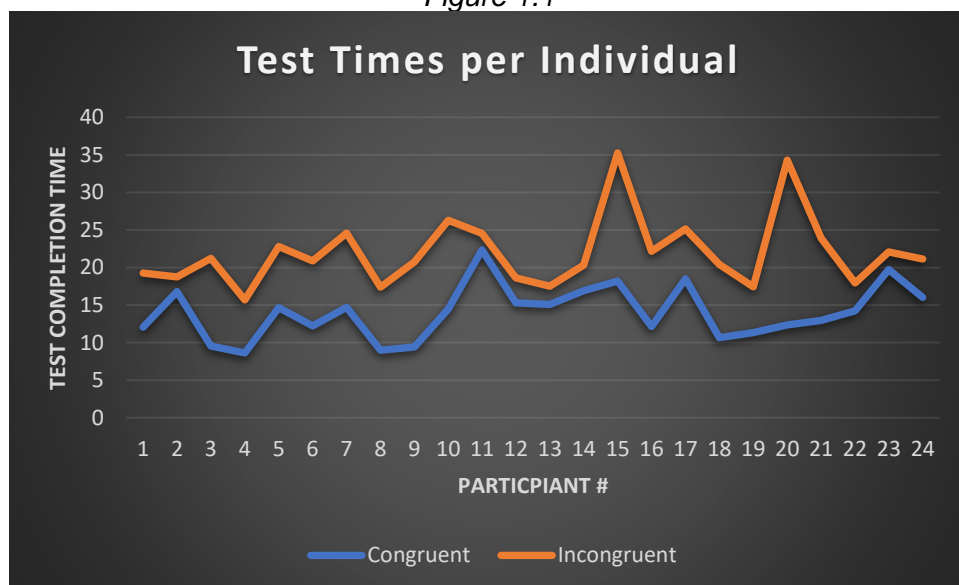


Figure 1.2

From the above graphs, we can safely conclude that all participants took longer times to complete the incongruent test.

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?

Results indicate significant longer time for completing the incongruent test ($M = 14.05$, $SD = 3.48$) over the congruent test ($M = 22.02$, $SD = 4.70$), $t(46) = 6.53$, $p < .05$. The two variables were strongly correlated, $r(46) = .48$, $p < .05$.

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!

I believe that the order of taking tests might have had an effect with the results of the test. As it takes time to familiarize oneself with the initial test. One could eliminate that possibility by giving a practice test beforehand.