Test a Perceptual Phenomenon

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Overview:

"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:

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

Independent variable: *The word conditions, congruent words/ incongruent words.*

Dependent variable: *time takes to name the ink colors.*

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

Statistical test: Paired t-test, because I don't know what is the population standard deviation and data set is collect for the same subject but with two different conditions, so paired t-test is appropriate for that.

Hypotheses:

Null Hypotheses: amount of mean population time that participants take to say the ink color is the same for both conditions.

H_0: $\mu_1 = \mu_2$

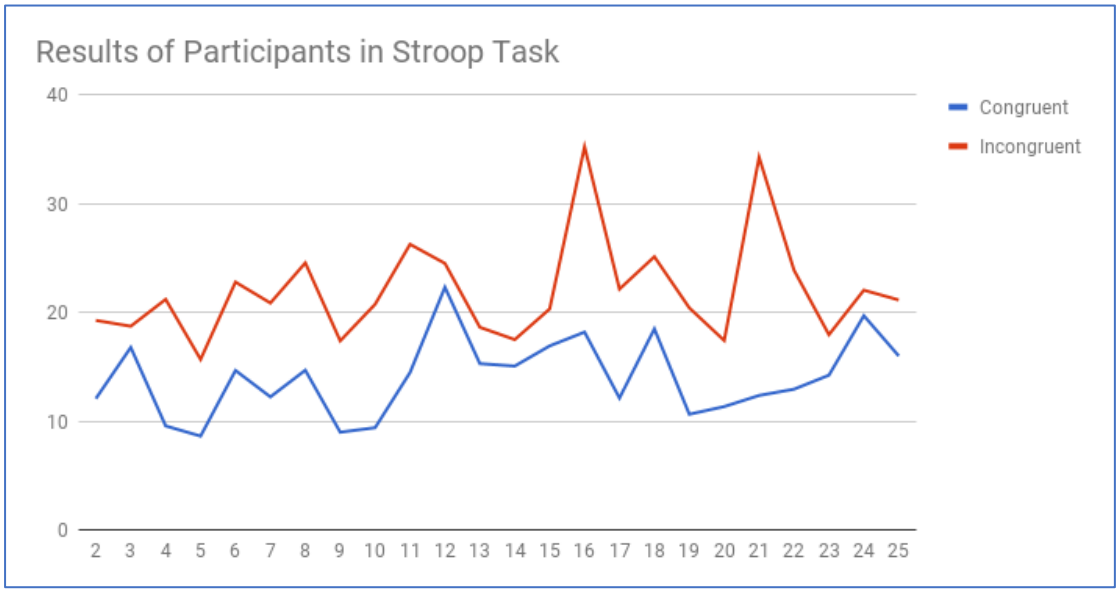
Alternative Hypotheses: amount of mean population time that participants take to say the ink color is the not the same for both conditions.

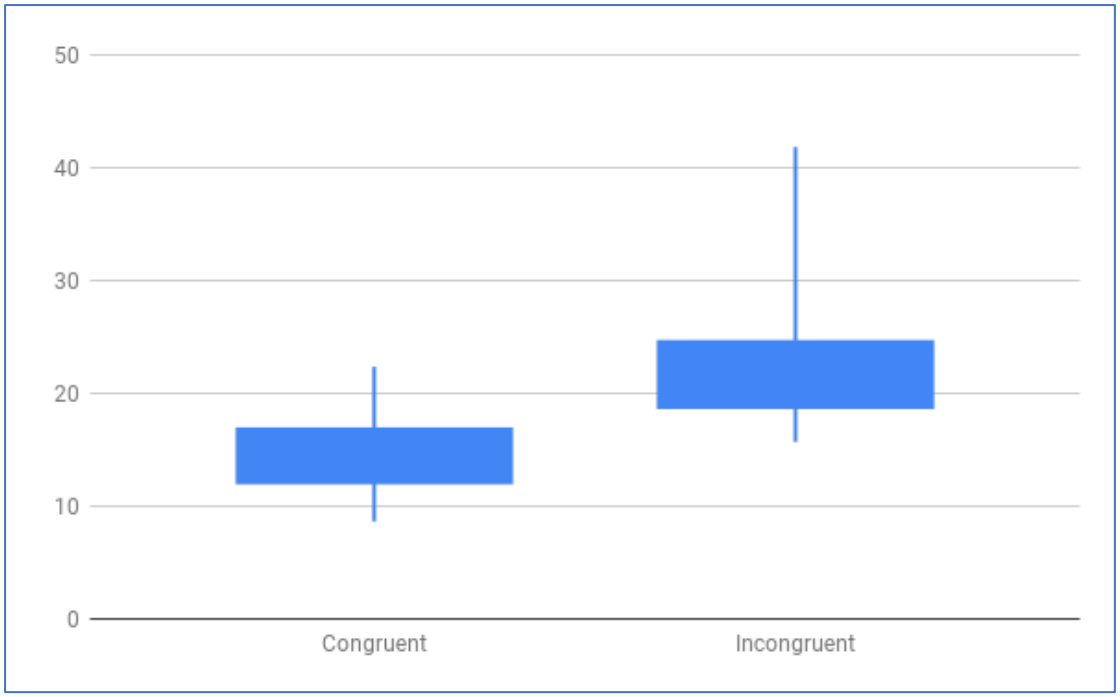
H_1: $\mu_1 \neq \mu_2$

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

Data Set	Congruent	Incongruent
Mean	14.051125	22.015917
Standard Deviation	3.559358	4.797057

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.





My Null hypotheses was that both conditions are taking the same time from participants to recognize, but two charts above shows otherwise, and still I can't say if Hypotheses is fail or not from only charts.

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?

Alpha value is 0.05

Calculate t score:

Mean of difference =-7.964791667
Standard Deviation= 4.86482691
Standard Error=0.9930286348

$$T = \frac{\bar{d}}{SE(\bar{d})}.$$

t= -8.020706944
Degree of freedom is n-1=>24-1=23
From t-table, p-value is 2.069.

t calculated is -8.020706944 and t-table value is 2.069, the calculated t value is greater than t-table value at alpha level 0.05, so I can reject the null hypotheses that says there is not different.