P1 report

Scroop task

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In this project, we have two data samples named "Congruent" and "Incongruent" from Scroop task. In this task , We will wonder is the time participants taken in "Congruent" shorter "Incongruent" cases? Here is the process of analysis:

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

The color of words is independent variable.
The time of participant taken to name the ink colors is 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.

Hypotheses:
Here we could make two hypotheses:
1. Null Hypothesis: the time between two cases participate taken have no difference.
2. Alternative Hypothesis: the time in Incongruent case participant is longer than Congruent case.

Test:
One tailed depended sample t-test.

Reason:
• In this task we want to known the difference of data samples from normal distribution data sets, so we use t-test.
• The two data samples are taken from same participants, so we use depended sample t-test.
• From data we could see the mean of data in Congruent is 14.05, and the mean of data in Incongruent is 22.02, So we use one tailed t-test.

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

statics table

	Congruent	Incongruent	D
COUNT	24	24	24
MEAN	14.05	22.02	7.964792
STD	3.56	4.80	4.86

See the table above, the column of d is the difference of Congruent and Incongruent(Incongruent data - congruent data).

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.
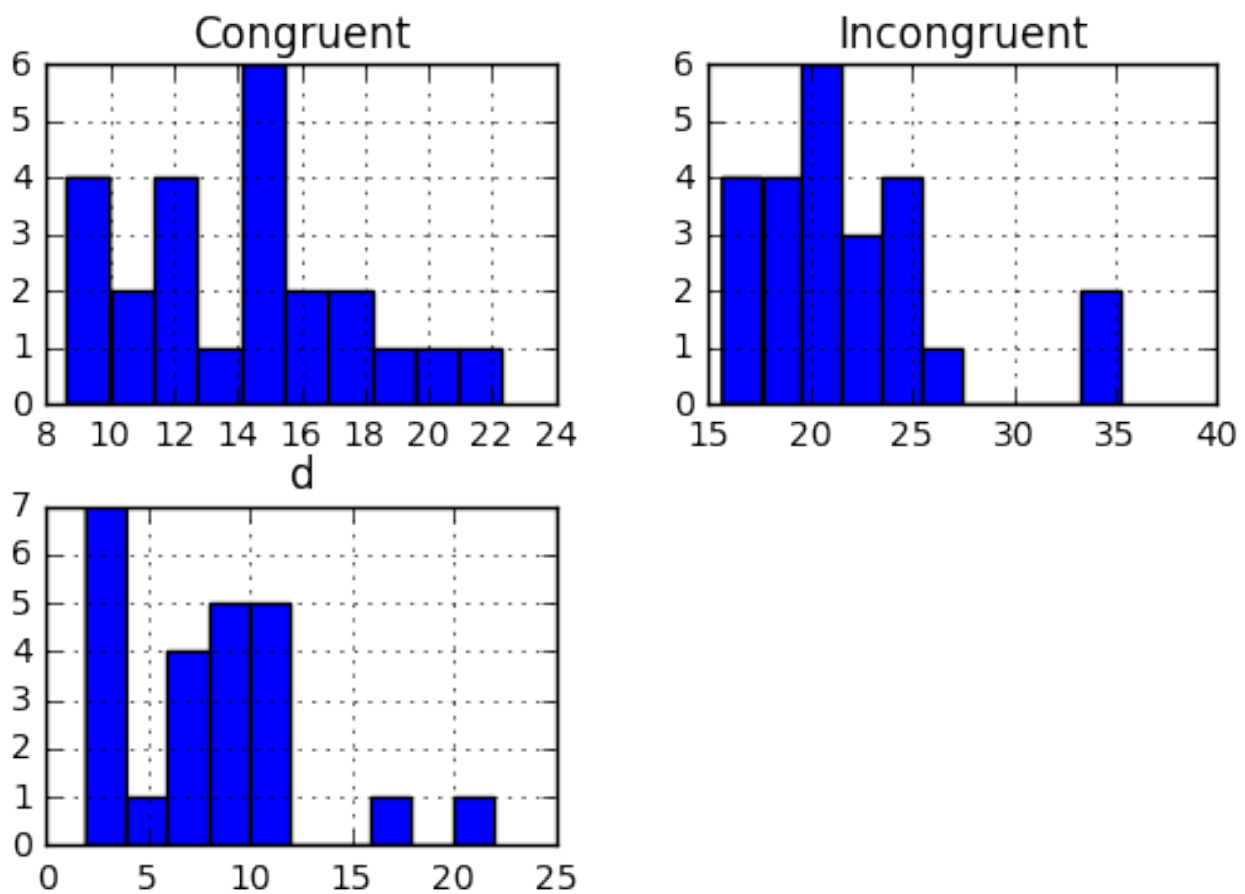
From the hist graph above, it is obvious that the mean, max, min data of incongruent is bigger than congruent's.
The distribution of congruent and incongruent is nearly to normal distribution.

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?

Hypotheses:

$$H_0 : \mu_a = \mu_b$$

$$H_1 : \mu_a < \mu_b$$

$$\alpha = 0.05$$

$$\mu_a : mean\,of\,congruent$$

$$\mu_b : mean\,of\,incongruent$$

t-value:
mean of congruent sample: 14.05
mean of incongruent sample: 22.02
std deviation of D: 4.86
n = 24
free variable: 23

$$t = \frac{22.02 - 14.05}{4.86/\sqrt{24}} = 8.03$$

from t-table:

$$t > t_{0.05}^{23} = 1.714$$

so we reject $H_0 : \mu_a = \mu_b$

and accept $H_1 : \mu_a < \mu_b$

Conclusion:
The time participants taken in incongruent words condition is more than in congruent words condition.Results match up with my expectations.