Project 1 - Stroop Effect

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

Independent variable: whether or not the task is **congruent** or **incongruent**

Dependent variable: the time needed to finish a task.

2. What is an appropriate set of hypotheses for this task?

Null Hypotheses: There is no difference in terms of the time required to finish **congruent** or **incongruent** tasks.

$$\mu = \mu_I$$

Alternative Hypotheses: The time required to finish in**congruent tasks** is longer than that for **congruent tasks.**

$$\mu < \mu_I$$

μ: population mean of the time required to finish **congruent tasks**

μ_I population mean of the time required to finish in**congruent tasks**

What kind of statistical test do you expect to perform? Justify your choices.

Student's t-test:

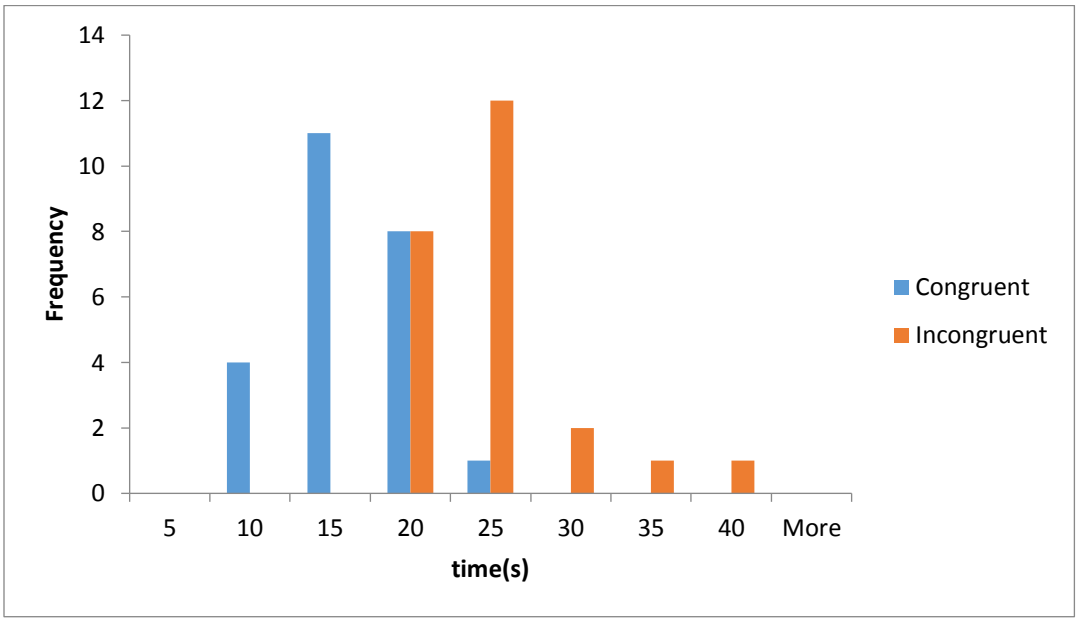
- Population mean and standard deviation is unknown
- The samples are dependent paired samples
- The sample size is below 30

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

	CONGRUENT	INCONGRUENT
MIN	8.63	15.69
MAX	22.33	35.26
MEAN	14.05	22.02
MEDIAN	14.36	21.02
SE	3.56	4.80

Both **congruent** or **incongruent have skewed distribution.**

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.



- Both **congruent** or **incongruent have skewed distribution.**
- **Congruent tasks have max frequency at 15 seconds, while Incongruent tasks have max frequency at 25 seconds.**
- In most cases, Congruent tasks take short time than Incongruent tasks
- For some samples, Congruent tasks take even longer time than Incongruent tasks

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?

$$t = \frac{\mu_I - \mu}{S/\sqrt{n}} = \frac{7.96}{4.86/\sqrt{24}} = 8.02$$

With α = 0.05 (one tail), t-critical = 1.714.

Since 8.02 > 1.714, i.e. the t stat is in the critical region, H_0 is rejected. Therefore the time required to finish in**congruent tasks** is longer than that for **congruent tasks.**

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?

When people find there is a discrepancy between what's seen visually and what's the meaning behind the word, people's brain may feel confused for a short period of time, which slows down the reading process. If people were to ask to read the word "Large" and "Small" with the font size set in a opposite way, something similar may happen.