TEST A PERCEPTUAL PHENOMENON

1.What is our dependent and independent variable?

Dependent variable: Performance of people (in terms of time)
Independent variable: Congruent and incongruent tasks

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: The time taken by the people to complete both the task (congruent and incongruent) is same.

$$\mu_C = \mu_i$$

Alternate hypothesis: The time taken by the people to complete both the task is different.

$$\mu_C \neq \mu_i$$

The statistical test that I will perform for this task is **dependent t-test for paired samples**. This is because the data deals with the same person's performance on two different tasks. And also to find if there is any difference between their means. (μc, μi)

μ_C = mean of congruent

μ_i = mean of incongruent

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

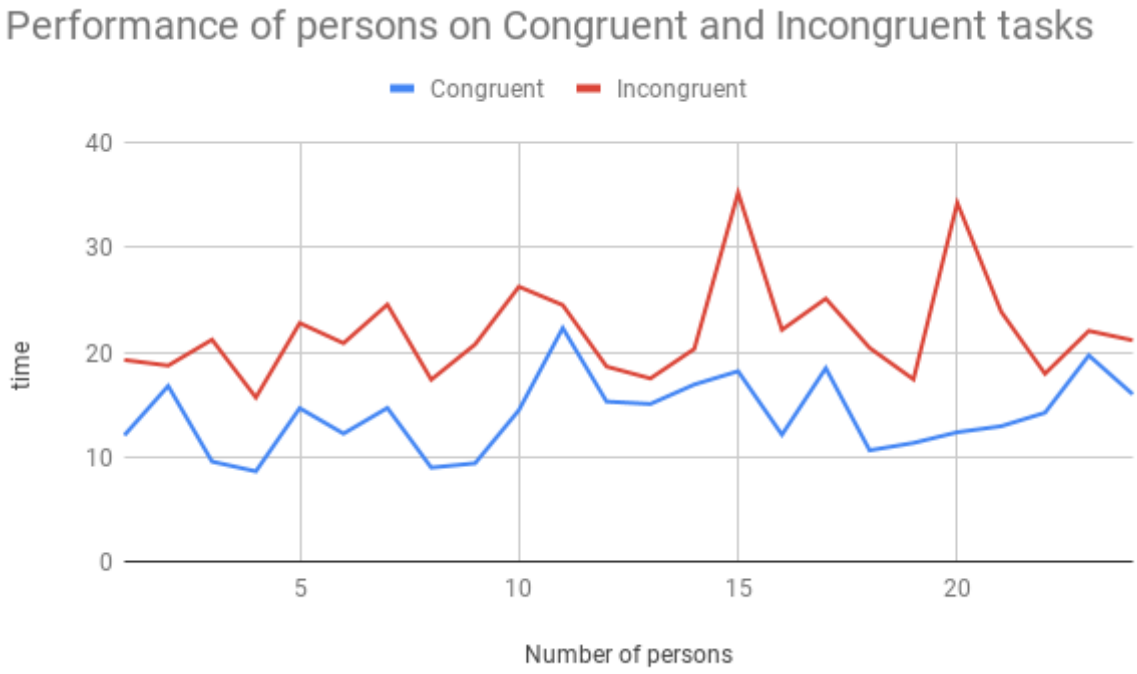
MEASURES OF CENTAL TENDENCY

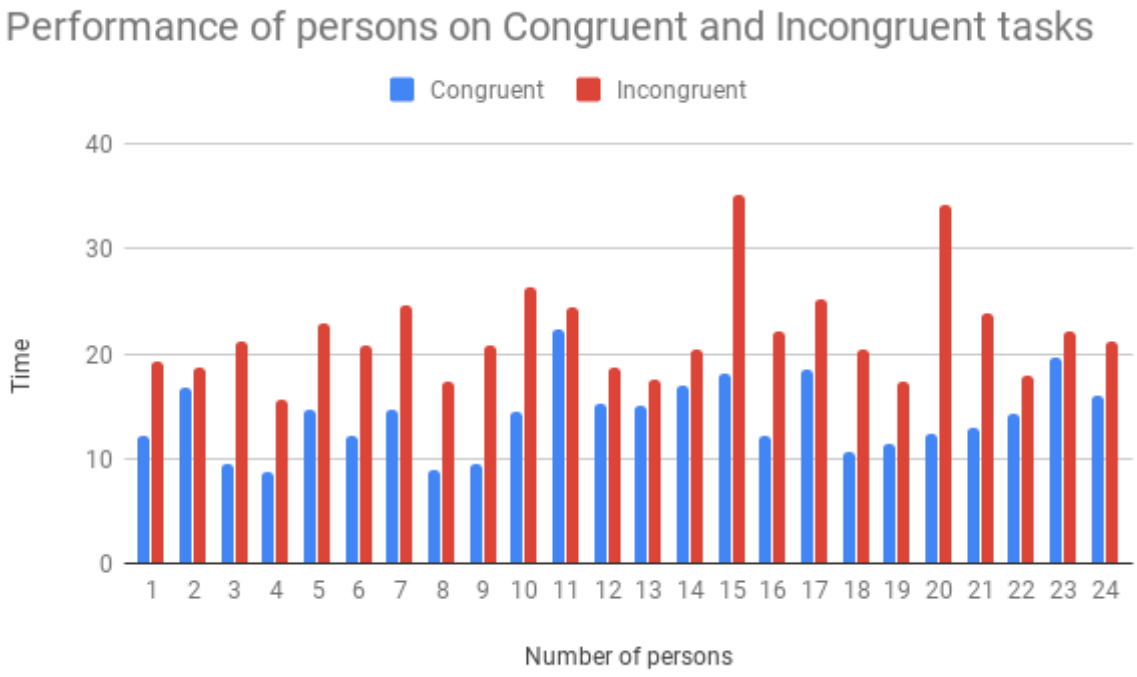
	Congruent	Incongruent
1. **Mean**	14.0511	22.0159
2. **Median**	14.3565	21.0175

MEASURES OF VARIATION

	Congruent	Incongruent
1. Range	13.698	19.568
2. Variance	12.669	23.011
3. Standard deviation	3.559	4.797

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 chart, it is observed that people found the incongruent task a bit difficult that they took more time than the congruent task. Hence, it is also evident that there is an ample difference in their means.

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?

DEPENDENT T-TEST FOR PAIRED SAMPLES:

Confidence level: 95%

With confidence level of 95% , α value would be 0.05

Degree of Freedom: n-1 = 24-1 = 23
(where n = number of samples)

The t-critical is computed for α=0.05 and
degree of freedom = 23 from the t-table.

t-critical = -2.068

Mean deviation(M_D): Congruent mean – Incongruent mean
= 14.0511 – 22.0159
= -7.96

Standard deviation difference(S_D): 4.86

t-statistic: M_D

$$\frac{M_D}{S_D/\sqrt{n}} = -8.02$$

The null hypothesis is rejected because the t-statistic value is less than the t-critical and also p value = 0.00

NULL HYPOTHESIS RULE:

It is rejected when t-statistic is less than or greater than the t- critical value.

The result matches up with my expectations that as seen from the chart mentioned above , there's a significant difference in time that people took for the 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? Some research about the problem will be helpful for thinking about these two questions!

An example of a task that would result in a similar effect is "Emotional Stroop test" wherein mixture of negative emotional words and normal words are given in different colours. The participants should name the colours of those words. The response time of the participants to name the colours is recorded.
It is said that people who are emotionally disturbed might take little more time to name the colours of the emotional words.

REFERENCES:

https://en.wikipedia.org/wiki/Emotional_Stroop_test

www.statisticssolution.com