Test a Perceptual Phenomenon

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

Ans: *Dependent Variable*: Time to name the colors of the words

Independent Variable: Whether the words were congruent or incongruent

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

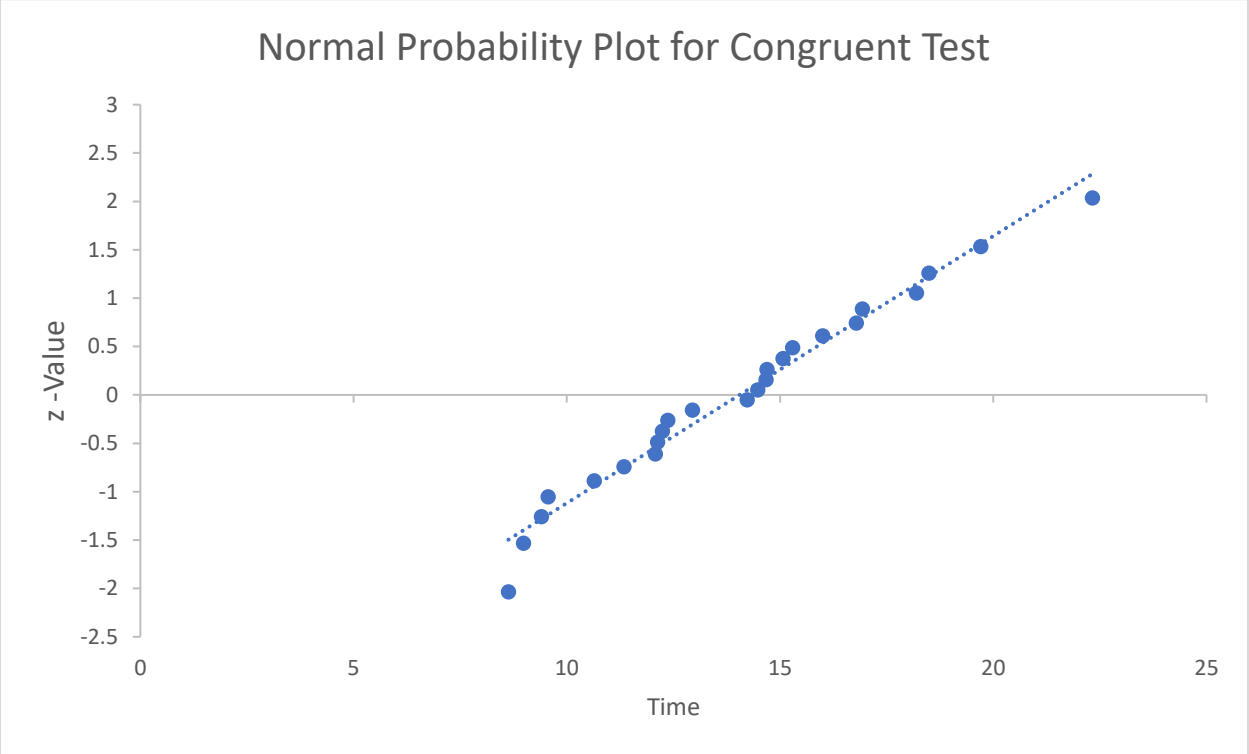
Ans:

Hypothesis Test-

H_0 – Time it takes to name the ink colors is the same for congruent and incongruent tests.

H_A – Time it takes to name the ink colors is ***not*** the same for congruent and incongruent tests.

Statistical Test



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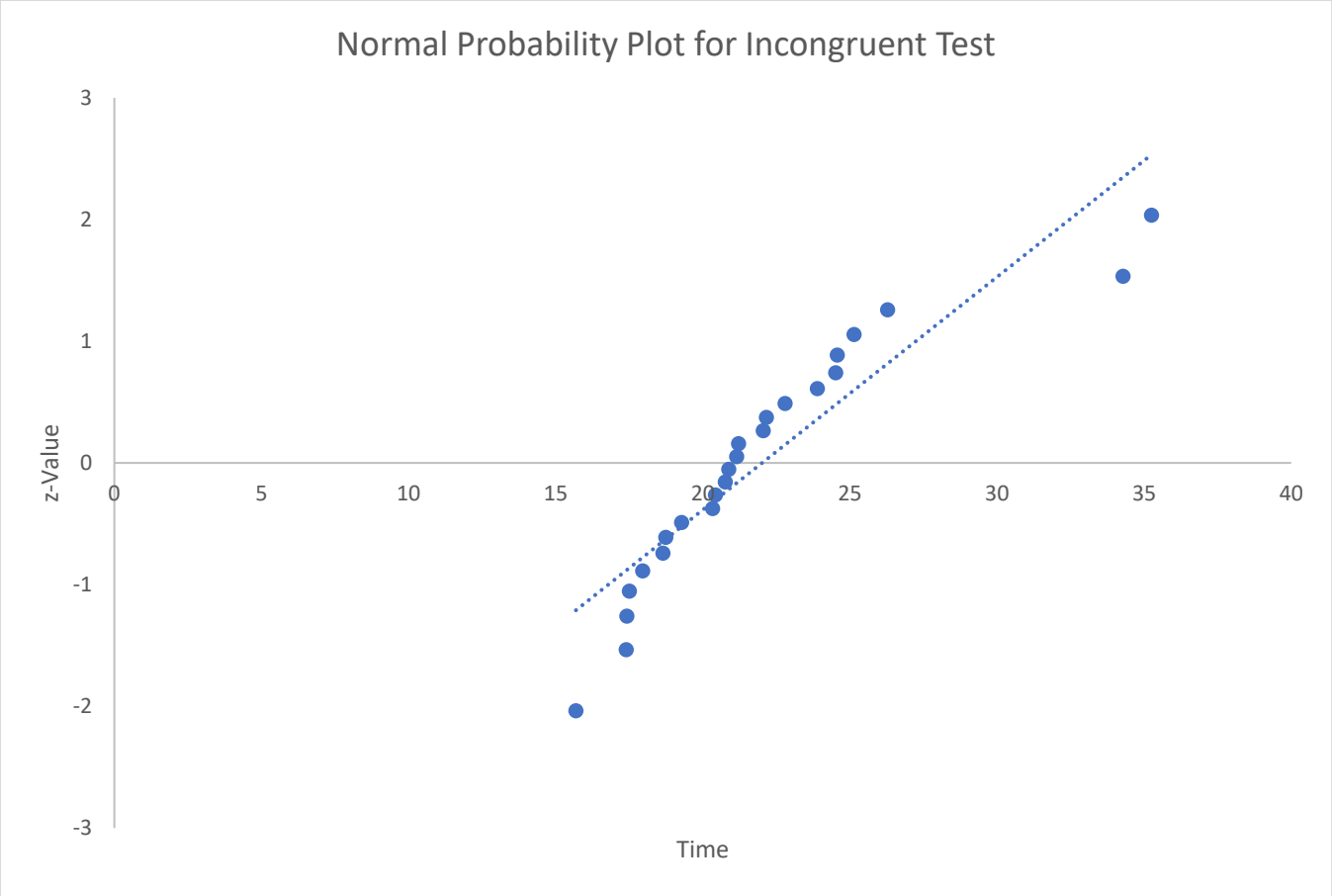


I calculated the z-value for the both the tests and plotted normal probability curves.

Since, I am testing to check if the times are equal or not for both the tests and we are dealing with two dependent samples of data, I will use a ***two-tailed dependent t-test***.

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

Ans:

Descriptive Statistics for both the tests

Congruent Test

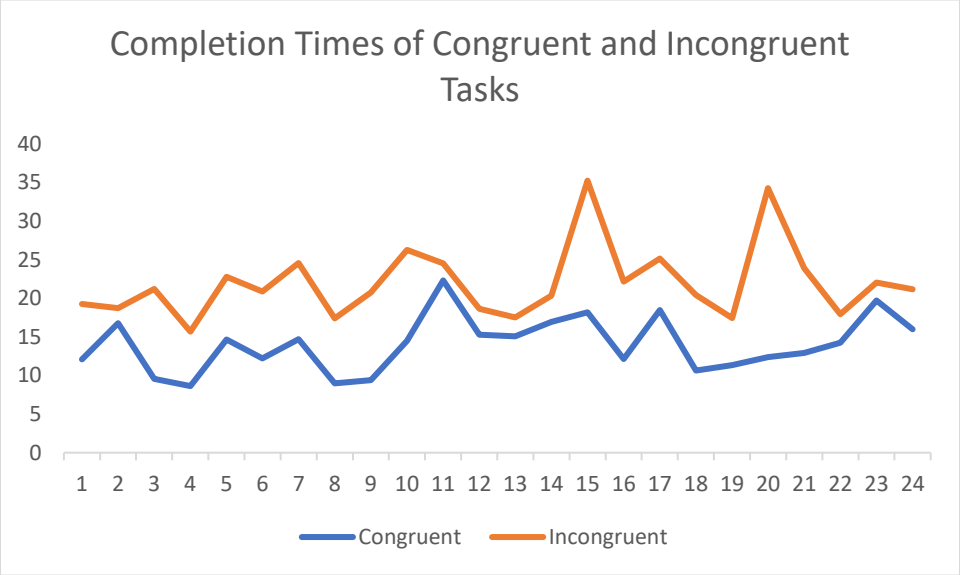
Mean	14.05113
Median	3.559358
Variance	12.14115
Standard Deviation	3.484416

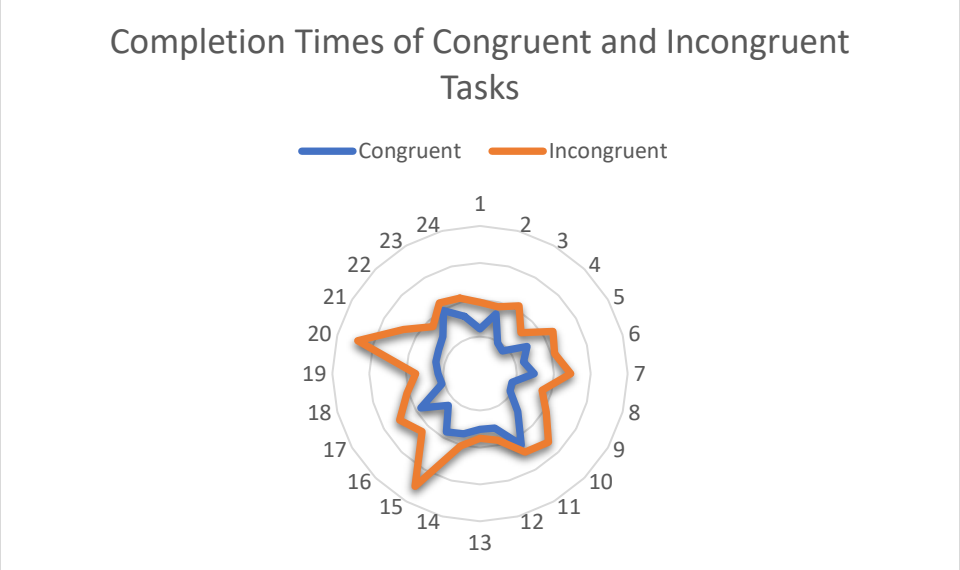
Incongruent Test

Mean	22.01592
Median	21.0175
Variance	22.05293
Standard Deviation	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.

Ans:





From the above two charts, the congruent tasks are always completed faster.

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?

Ans:

Mean Difference = 14.05113 - 22.01592 = -7.96479

Degrees of Freedom (df = n-1) = 23

p-Value (95%) = 0.05

Direction of Test = No direction as it is a 2-tailed test

Standard Deviation (σ) = 4.862206

Standard Error ($\sigma/\sqrt{n}$) = 0.992494

t – Value (Mean Difference/ Standard Error) = 8.025031

t – Critical (at α = 0.05) = ±2.069

Result:

Since the t-Value > t-Critical by a significant amount, we reject the null hypothesis that the response times between the two tests are significantly different. The speed at which people recognize the words when the meaning and colors match is significantly faster than when the meaning and colors do not match.

The results were as I expected.