In this experiment, we are given various texts with color. E.g., RED, GREEN, YELLOW etc. Our dependent variables are the time taken by each participant to read the text color. Based on the text and color we choose, the time it takes to read also changes and varies. So, the independent variable is whether each example is congruent or not.

In this experiment of Stroop effect, my hypothesis is pretty simple. It will generally take more time for a participant to read words in incongruent condition than words in congruent condition. In order to establish that ink colors can be identified faster under the congruent condition, when the colors match the words, we formulate two hypotheses: an *alternative hypothesis* and a *null hypothesis*.

- The alternative hypothesis states: over the entire population, mean response time under the incongruent condition is greater than mean response time under the congruent condition; i.e. $u_i - u_c < 0$

  The corresponding null hypothesis states: the population means under the incongruent and congruent conditions are the same, i.e. $u_i - u_c >= 0$

  According to the null hypothesis, the observed differences in sample mean response times under the incongruent and the congruent conditions are the result of pure chance, and cannot be generalized to the entire population.

I am looking to perform mean and variance times of response times for both congruent and incongruent condition. Below is the dataset that we have:

Congruent	Incongruent
12.079	19.278
16.791	18.741
9.564	21.214
8.63	15.687
14.669	22.803
12.238	20.88
14.692	24.572
8.987	17.394
9.401	20.762
14.48	26.282
22.328	24.524
15.298	18.644
15.073	17.51
16.929	20.33
18.2	35.255
12.13	22.158

18.495	25.139
10.639	20.429
11.344	17.425
12.369	34.288
12.944	23.894
14.233	17.96
19.71	22.058
16.004	21.157

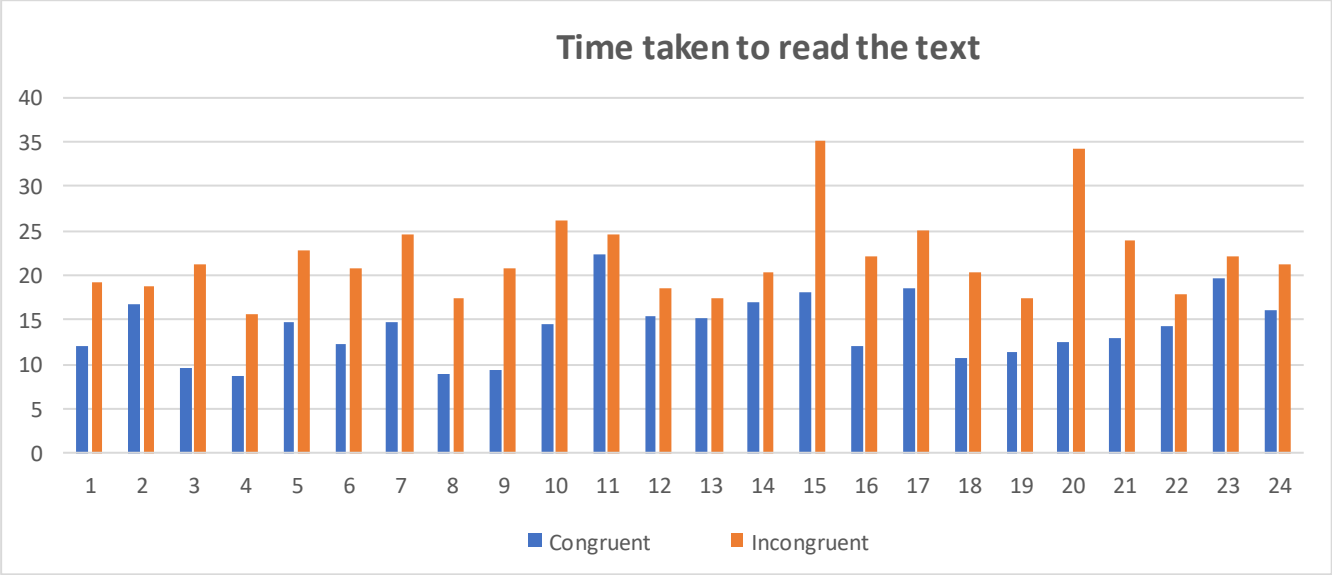
mean response time under congruent condition: $x_c = 14.051$

mean response time under incongruent condition: $x_i = 22.016$

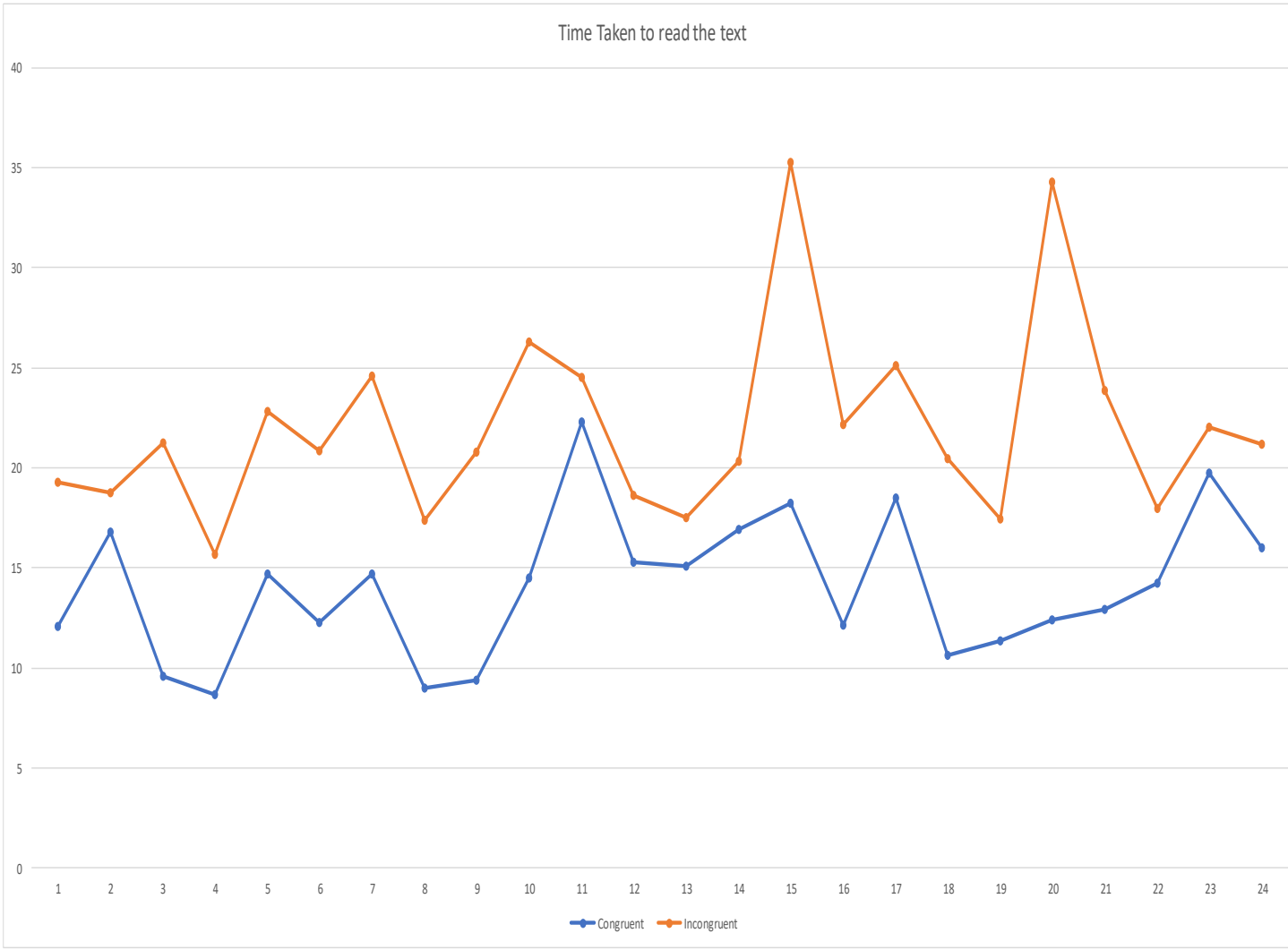
variance of response times under congruent condition: $s_c^2 = 12.66$

variance of response times under incongruent condition: $s_i^2 = 23.012$

To better understand the data, we can explore the response time by using visualization. Through the use of line graph and histogram, we can interpret the data easily.



Through the above histogram, we can see that the bar for the time taken for incongruent condition is taller than the Congruent condition.



The line graph also shows that participant takes longer to time read Incongruent words than congruent words.

Congruent		*Incongruent*	
Mean	14.05	Mean	22.02
Standard Error	0.73	Standard Error	0.98
Median	14.36	Median	21.02
Mode	#N/A	Mode	#N/A
Standard Deviation	3.56	Standard Deviati	4.80
Sample Variance	12.67	Sample Variance	23.01
Kurtosis	-0.21	Kurtosis	2.69
Skewness	0.42	Skewness	1.55
Range	13.70	Range	19.57
Minimum	8.63	Minimum	15.69
Maximum	22.33	Maximum	35.26
Sum	337.23	Sum	528.38
Count	24.00	Count	24.00

This table shows the difference of several statistical tests between the congruent and in congruent conditions. It includes the paired T-test by comparing the means under two separate conditions.

T-TEST AND P VALUE: we are doing two-tail T-Test.

t-Test: Two-Sample Assuming Equal Variances		
	Congruent	*Incongruent*
Mean	14.05	22.02
Variance	12.67	23.01
Observations	24.00	24.00
Pooled Variance	17.84	
Hypothesized M	0.00	
df	46.00	
t Stat	8.02	
P(T<=t) one-tail	0.00	
t Critical one-tai	1.68	
P(T<=t) two-tail	0.00	
t Critical two-tai	2.01	

The difference between two sets of data is significant as indicated by t =2.01.

Conclusion: I think the difference between the two sets of data is due to the thinking process it takes to read the words. People made to read the text in the same color have only one option to read that color. Whereas, people made to read the text with different color have two options. So, they think, pause and hesitate to read which takes longer time.

Another factor is the way our cognitive process is set up. We naturally tend to emphasize and prioritize reading the text rather than the looking at the color of the text.