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

In Stroop Effect the independent variable is the combination of the word and the color, since there is no effect on them whereas the dependent variable is the time required to process the words.

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:

In this case the null hypotheses states that the time required for both congruent and incongruent will not differ. And the alternate statistics states that the time required could be more than or is indifferent.

$\mu_0 - \mu_a = 0$

$\mu_0 = \mu_a$

$\mu_a > \mu_0$

$\mu_a \neq \mu_0$

Statistical Test: In this case since the time can increase the test to be used is dependent t-test and one direction in the positive direction. Dependent t-test because both the test are done by the same people. The use of t - test is there because of the lack of parameters of population since we have a dataset of only 24 values.

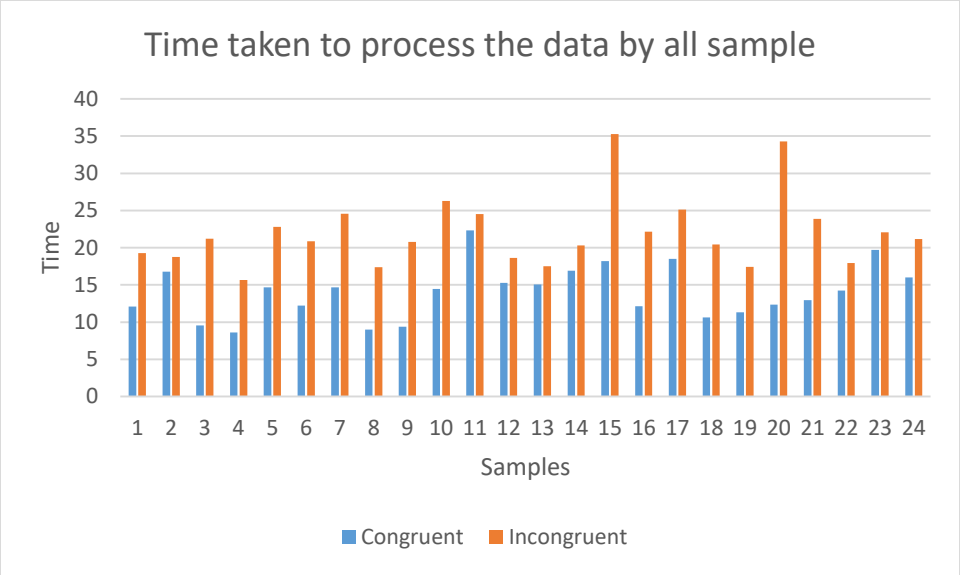
3. Report some descriptive statistics regarding this dataset. Include at least one measure of central tendency and at least one measure of variability.

Congruent	Incongruent	difference
12.079	19.278	7.199
16.791	18.741	1.95
9.564	21.214	11.65
8.63	15.687	7.057
14.669	22.803	8.134
12.238	20.878	8.64
14.692	24.572	9.88
8.987	17.394	8.407
9.401	20.762	11.361

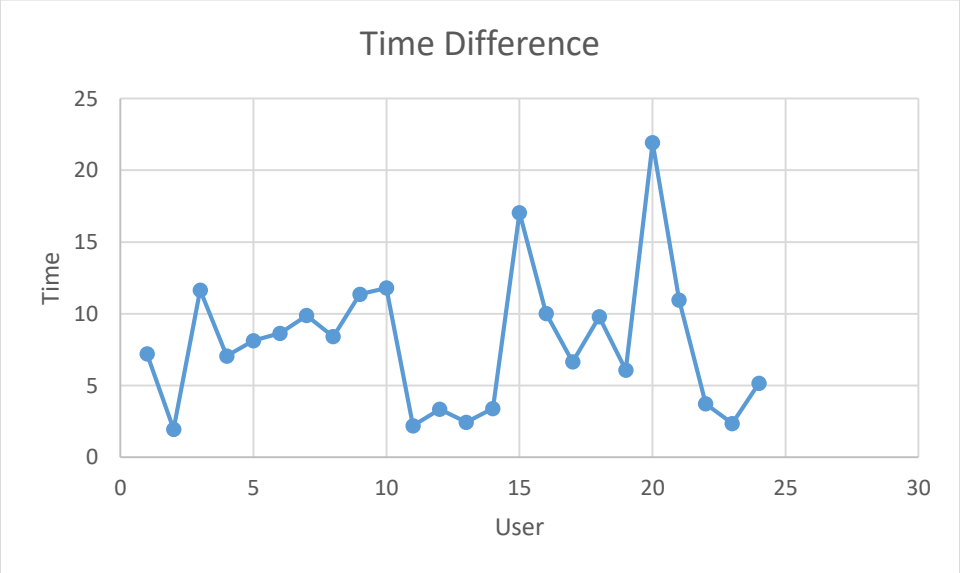
14.48	26.282	11.802
22.328	24.524	2.196
15.298	18.644	3.346
15.073	17.51	2.437
16.929	20.33	3.401
18.2	35.255	17.055
12.13	22.158	10.028
18.495	25.139	6.644
10.639	20.429	9.79
11.344	17.425	6.081
12.369	34.288	21.919
12.944	23.894	10.95
14.233	17.96	3.727
19.71	22.058	2.348
16.004	21.157	5.153

Average:	14.051125	22.01591667	7.964791667
STDEV	3.559357958	4.797057122	4.86482691
Df	24 – 1 = 23		

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.



The above bar graphs shows the time required by the sample persons to process the incongruent Stroop data and the incongruent Stroop data, as observed the Incongruent data takes more time then the congruent data.



In the above graph the difference of timing of congruent and incongruent is plot against the sample users.

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?

$\mu_a > \mu_0 = 7.96 > 0$ Confidence level to be used 95% i.e. $\alpha = 0.05 = 5\%$

SEM = $4.8648/\sqrt{24} = 0.9930$

t-value = $(x - \mu_0) / (SEM)$

$= 7.9647 / 0.9930$

$= 8.0208$

t-critical = 1.714 for (n-1) = 23 degrees of freedom at one-tail probability (p-value) of 5% t-value

$R^2 = (8.0208)^2 / (8.0208)^2 + 23$

$= 0.7336$

CI = $7.9647 \pm (1.714 * 0.9330)$

$= 7.9647 - (1.5991), \quad 7.9647 + (1.5991)$

$= \quad 6.3656 \quad , \quad 9.5638$

As observed from the results the 95% of the values lies till 1.714 but the t values lies within the t critical range therefore we reject the null hypotheses. The result matches the expectation.

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!

The reason is that while congruent data is analyzed the color and the words are similar and the brain responses to it quickly but in incongruent data the rain receives mixed inputs like red written with blue, so to sort this the brain takes time and the response is slower.

One of the similar examples can be of keyboards, one is the normal QWERTY keyboard and the other SORTED ABC keyboard. It can produce similar kind of effect.