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

   <u>**Independent variable**</u>
   The Independent variable is whether the font name and the color were similar or different.
   <u>**Dependent variable**</u>
   dependent variable is the reaction time between the stimulus and the response.

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

   The appropriate set of hypotheses for this task would be as follows:
   <u>**Null hypotheses(H0):**</u> The two samples t—statistic does not differ at an alpha of 0.5
   <u>**Alternate hypotheses(Ha):**</u> The two samples t—statistic differ at an alpha of 0.5

   I have performed T-Test to verify this.
   We can use a two-sided paired student T-test.
   This is because: one, we need to address the uncertainty in sample standard error resulted from the unknown population standard deviation;
   And comparing the means of two groups that are dependent and the same subject is involved under both conditions.
   <u>**Here is the Test conducted:**</u>

   H0: mu_diff = 0 (The real difference between group population means is zero)
   HA: mu_diff != 0 (The real difference between group population means is not zero)

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

   <u>**Central Tendency:**</u>

   Standard Deviation, Mean, Median) of Congruent
   (3.4844157127666326, 14.051125000000004, 14.3565)

   Standard Deviation, Mean, Median of Incongruent
   (4.696055134513317, 22.01591666666667, 21.017499999999998)

   <u>**Measure of Variability:**</u>

   Calculating IQR of Congruent group

   IQR of 1st Quartile = 16.201
   IQR of 3rd Quartile = 11.895
   IQR(C) = 16.201 - 11.895 = 4.306

   Calculating IQR of Incongruent group:

IQR of 1st Quartile = 24.052
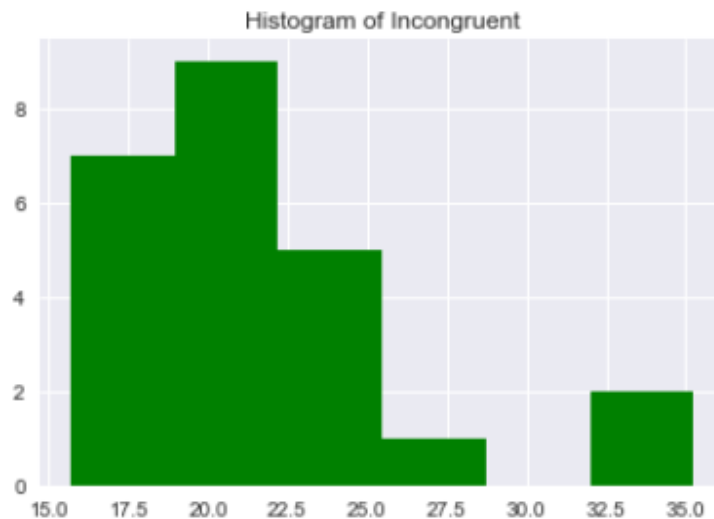IQR of 3rd Quartile = 18.717
 IQR(I) = 24.052-18.717

Considering the variability of each test group we see when ordering the values and finding the range we get (Range of designated congruent sample and range of incongruent sample):
Crange = 13.70 Irange = 19.57

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 histograms generated from Incongruent sample and Congruent samples shows that its positively skewed distribution of Data.
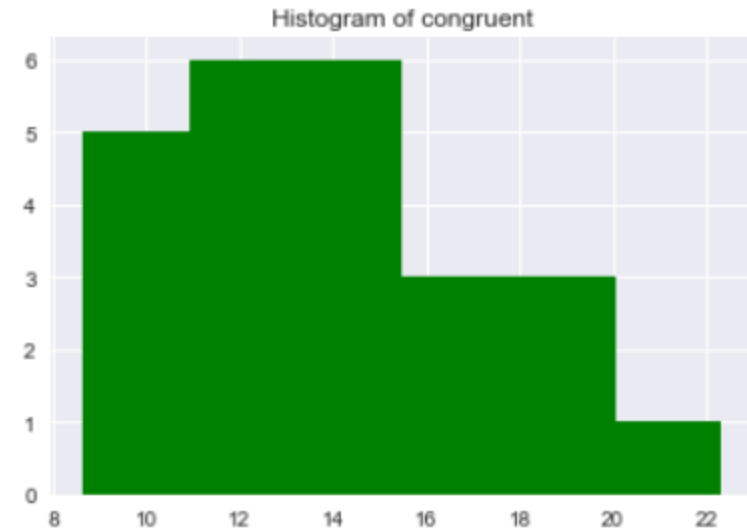
```
plt.hist(dataset.Congruent,bins='auto',color='green')
plt.title('Histogram of congruent')
```

<matplotlib.text.Text at 0x24ad05d9898>

Histogram of congruent

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-Test statistical test for the Stroop Effect experiment.

Mean of Congruent = **14.05** and Mean of InCongruent = **22.02**

Point of estimate could be 14.05-22.02 = **-7.97**

As Average of the differences should match the **point estimate of -7.97**

So we subtract that value from the differences of each person and then square it:

(Difference of Congruent and Incongruent – Average of differences)2

Square of Sums of difference of sample means = 544.330

Variance of difference = Square of sums of difference of sample means /(n-1)

Where n = 24 (number of observations)

Variance of difference = 23.667

Standard Deviation of Differences(s)

Square root of (Variance of difference) **= 4.865**

Calculating T-Stats for the difference = T-Stats :

T-statistic = Mean(congruent)- Mean(Incongruent)/√n

As the numerator is the point estimate or average of the differences (both equal the same value), "s" was determined a step earlier and "n" is the number of participants , Stroop experiment can be **calculated as T-Statistic: $-7.97\,/4.865/\sqrt{22}$**

$= -8.026$

T-Critical value

N = 23 and **α = 0.005**

99% Confidence Level: need to be between **+- 2.807**

This confirms that the expected incongruent tests would normally take longer than congruent tests as congruent test linked both visual colors with the correct printed name of the color while incongruent required to try to separate the visual color and the name of the color which required a bit more time to do