1. **[Question] What is our independent variable? What is our dependent variable?**
   [Answer]

   In this case –

   Independent variable is the property of congruence between the alphabets of the words and the color of the words used in displaying alphabets of the words.

   Whereas **dependent variable** is the time taken to identify the color used in displaying words.

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

   The appropriate set of hypotheses are :
   H o : The difference between completion time between population means of congruent and incongruent conditions is zero (both are equal μ c = μ i).

   H a : Both population means of congruent and incongruent conditions are unequal (having a significant difference μ c ≠ μ i).

   We will use paired t-test on data because sample is dependendent and the size is less than 30.

   The standard deviation of the data is also unknown.

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

   [Answer]

	Congruent	Incongruent
Mean	14.05	22.015
Standard Deviation	3.56	4.80

4. **[Question] 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.**

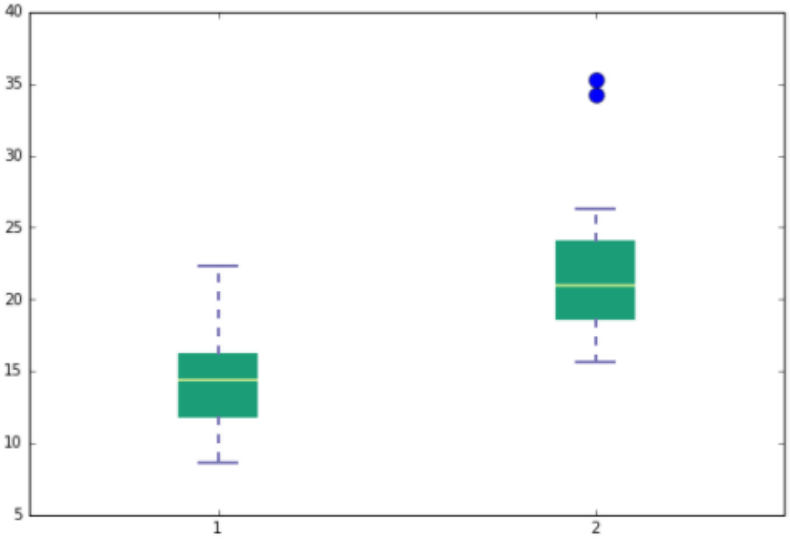
[Answer]

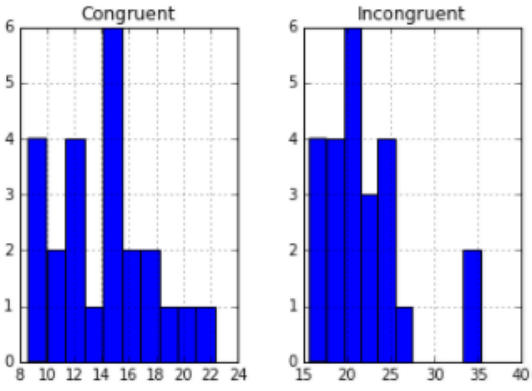
Plots

Please see below a boxplot and histogram which show the distribution of data from both congruent and incongruent conditions.

Observations

- ✓ From the boxplot, there are two somewhat obvious outliers or extraneous data, which would possible, skew the true mean of incongruent values.
- ✓ From the histogram plots, although both graphs visually appear somewhat positively skewed, the mean is pretty close to the peak in both graphs, which would indicate a normal distribution.





5. **[Question] 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?**

   [Answer]

mean difference, dbar = Σ(yi−xc)/nΣ(yi−xc)/n = 7.964

yi is incongruent, xc is the congruent values, n is the sample set

standard deviation, sd = 4.86

standard error of the difference, SE(dbar) = sd/√n = 4.86/√24 = 0.99

t-statistic, T = dbar/SE(dbar) = 7.964/0.99 = 8.04 on 23df

t-distribution with n-1 degrees of freedom (df = 23). Using the t-distribution table to find p-value...

The value of **p is < 0.0001**. The result is **significant at p < 0.05%**

Hypothesis

I reject the null hypothesis, the word/colour incongruent does cause a greater time response

Conclusion

The results match my expectations.

References

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http://www.ats.ucla.edu/stat/stata/whatstat/whatstat.htm

http://www.statstutor.ac.uk/resources/uploaded/paired-t-test.pdf

https://www.stat.tamu.edu/~lzhou/stat302/T-Table.pdf