1. What is our independent variable? What is our dependent variable?
The independent variable is the word condition. Congruent and Incongruent words are not affected by any other part of this test.

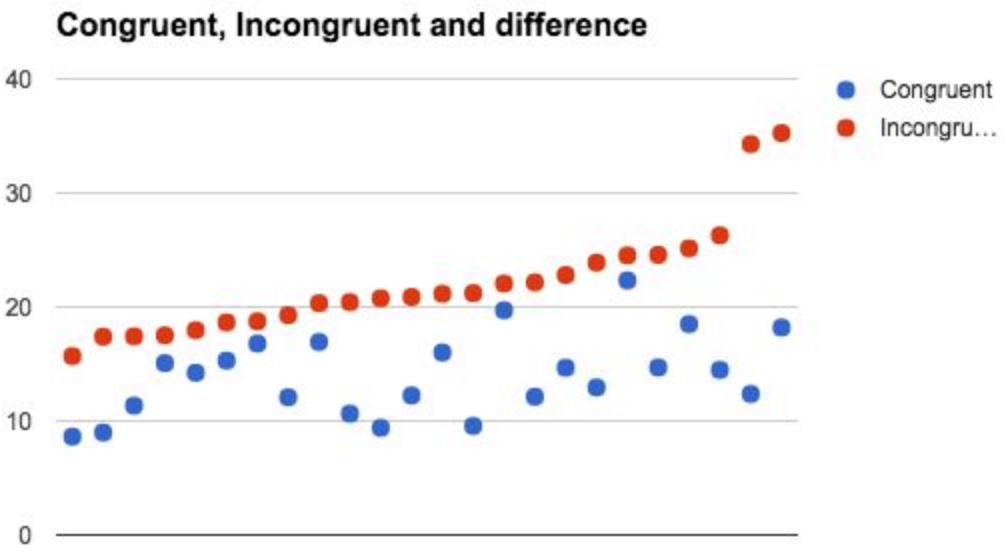
The dependent variable is the recorded time for an individual to name the ink colors in the Stroop test.

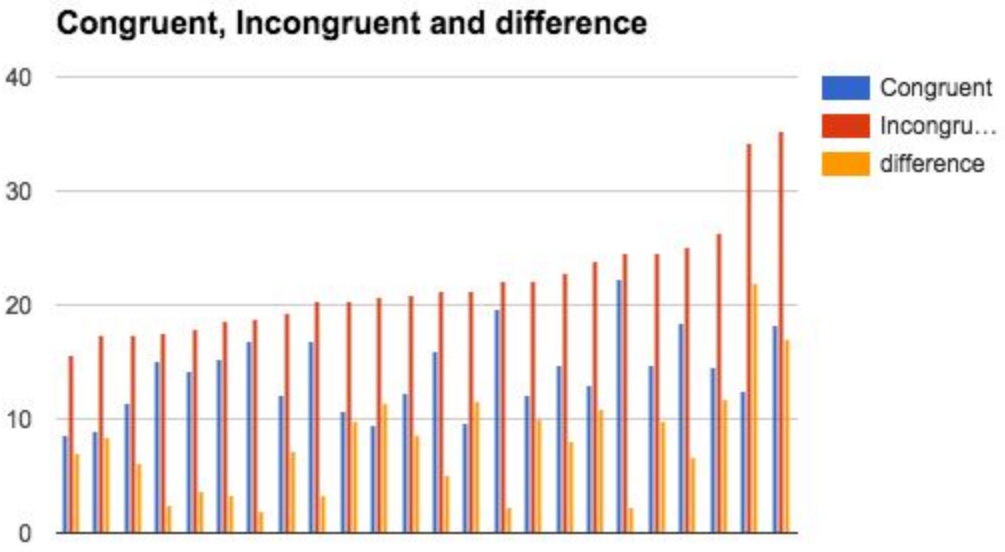
2. What is an appropriate set of hypotheses for this task? What kind of statistical test do you expect to perform? Justify your choices.
The appropriate null hypothesis (H0) would state that there is no relationship between the word condition and the recorded time for an individual to name the color of the ink (H0: uC = uI) . Conversely, the appropriate alternative hypothesis would state that there is definitely a correlation between the word condition and recorded time for an individual to name the color of the ink. Mathematically, we would state that the mean time for congruent words will be significantly less than the mean team for incongruent words (Ha: uC < uI).

A good test to perform is to determine the average, and find the average standard deviation to determine the impact of the different scores, and see which has a greater variance. As the sample size is less than 30, we can use a dependent t-test to test this, because we want to compare the mean time of the two groups (congruent and incongruent) to determine if there is a significant difference. Because the sample size is so small (and the fact that it would be nearly impossible to test an entire population), we can assume that it is a random sampling from the population, and scores will be normally distributed.

3. Report some descriptive statistics regarding this dataset. Include at least one measure of central tendency and at least one measure of variability.
The average time for congruent words was 14.05 sec., while the average time for incongruent words was 22.01 sec. The range of time for congruent words was 13.698 seconds, while range for incongruent words was 19.568 seconds.

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.





Based on the charts above, we can see that there is a significant difference between incongruent words and congruent words. It is evident that the word condition does have an impact on time.

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?

Congruent	Incongruent	**difference**	congruent variance	**column d squared**	incongruent variance	**column e squared**
8.63	15.687	7.057	-5.421125	29.38859627	-6.328916667	40.05518617
8.987	17.394	8.407	-5.064125	25.64536202	-4.621916667	21.36211367
11.344	17.425	6.081	-2.707125	7.328525766	-4.590916667	21.07651584
15.073	17.51	2.437	1.021875	1.044228516	-4.505916667	20.30328501
14.233	17.96	3.727	0.181875	0.03307851562	-4.055916667	16.45046001
15.298	18.644	3.346	1.246875	1.554697266	-3.371916667	11.36982201
16.791	18.741	1.95	2.739875	7.506915016	-3.274916667	10.72507917
12.079	19.278	7.199	-1.972125	3.889277016	-2.737916667	7.496187674
16.929	20.33	3.401	2.877875	8.282164516	-1.685916667	2.842315007
10.639	20.429	9.79	-3.412125	11.64259702	-1.586916667	2.518304507
9.401	20.762	11.361	-4.650125	21.62366252	-1.253916667	1.572307007
12.238	20.878	8.64	-1.813125	3.287422266	-1.137916667	1.29485434
16.004	21.157	5.153	1.952875	3.813720766	-0.858916667	0.7377378403
9.564	21.214	11.65	-4.487125	20.13429077	-0.801916667	0.6430703403
19.71	22.058	2.348	5.658875	32.02286627	0.042083333	0.001771006944
12.13	22.158	10.028	-1.921125	3.690721266	0.1420833333	0.02018767361
14.669	22.803	8.134	0.617875	0.3817695156	0.7870833333	0.6195001736
12.944	23.894	10.95	-1.107125	1.225725766	1.878083333	3.527197007
22.328	24.524	2.196	8.276875	68.50665977	2.508083333	6.290482007
14.692	24.572	9.88	0.640875	0.4107207656	2.556083333	6.533562007
18.495	25.139	6.644	4.443875	19.74802502	3.123083333	9.753649507
14.48	26.282	11.802	0.428875	0.1839337656	4.266083333	18.19946701
12.369	34.288	21.919	-1.682125	2.829544516	12.27208333	150.6040293
18.2	35.255	17.055	4.148875	17.21316377	13.23908333	175.2733275
mean is below	**mean is below**	**mean**	**variance**	**sum**	**variance**	**sum**

14.051125	22.01591667	7.964791667	12.66902907	291.3876686	23.01175704	529.2704118
congruentSD	**incongruentSD**					
3.559357958	4.797057122					
SEc	**SEi**					
0.7265509007	0.9791951848					
t-stat(c)	**t-stat(i)**					
10.96246892	8.134018417					

The variance (using Bessel's correction) for congruent words is 12.67 seconds, while for incongruent words, it is 23.01 seconds. The mean difference in time between congruent and incongruent words is 7.96 seconds. The standard error of mean difference for congruent words is 0.72, and 0.81 for incongruent words. If I am reading the t-table correctly, then our t-stat, on 23df, puts us at a very high confidence level.

I reject the null hypothesis because there is a statistical difference between the time and the word condition. The standard error of mean can indicate that the results are relatively accurate to the rest of the population.

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!
I think the mental aspect of seeing a text that is different than the actual color of the word slows down the reaction time.

An alternative task would be a test of spatial awareness, with an up or down-pointing arrow appearing above or below a particular point, with the subject tasked to describe the location of the arrow, as opposed to the direction the arrow is pointing.