

# Statistics: The Science of Decisions Project Instructions

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

Independent variable: words condition (congruent or incongruent)

Dependent variable: time it takes to name the ink colors

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

Null hypothesis: there's no difference about time it takes to name the ink colors under two conditions, that is,  $t_1 = t_2$  (set  $t_1$  as average time performance under congruent condition;  $t_2$  as average time performance under incongruent condition)

Alternative hypothesis:  $t_1 \neq t_2$

I'm going to use dependent sample t-test because it is a "two conditions" question and each participant did the test under two conditions separately.

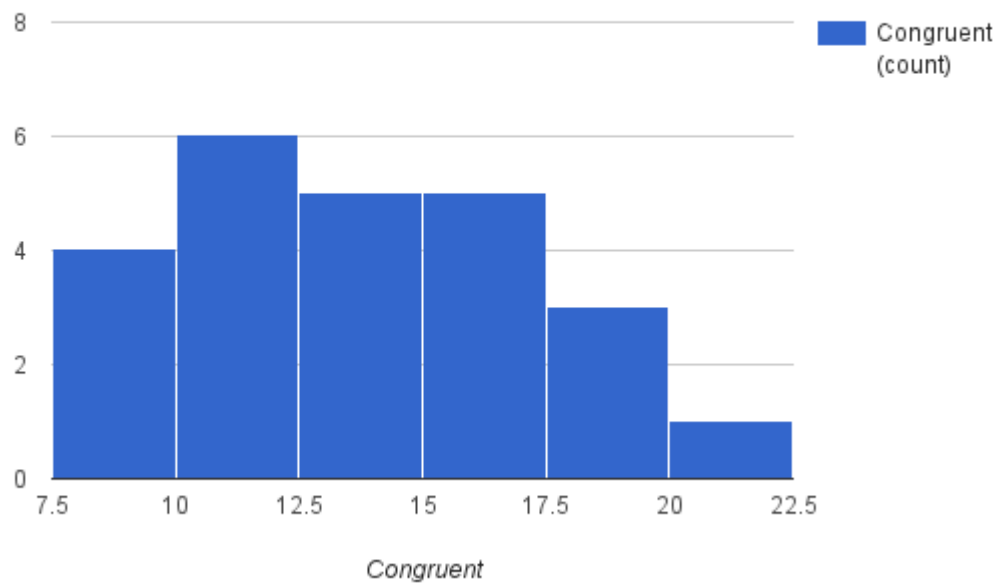
*3. Report some descriptive statistics regarding this dataset. Include at least one measure of central tendency and at least one measure of variability.*

	Sample mean	Sample standard deviation
congruent	14.051125	3.559357958
incongruent	22.01591667	4.797057122

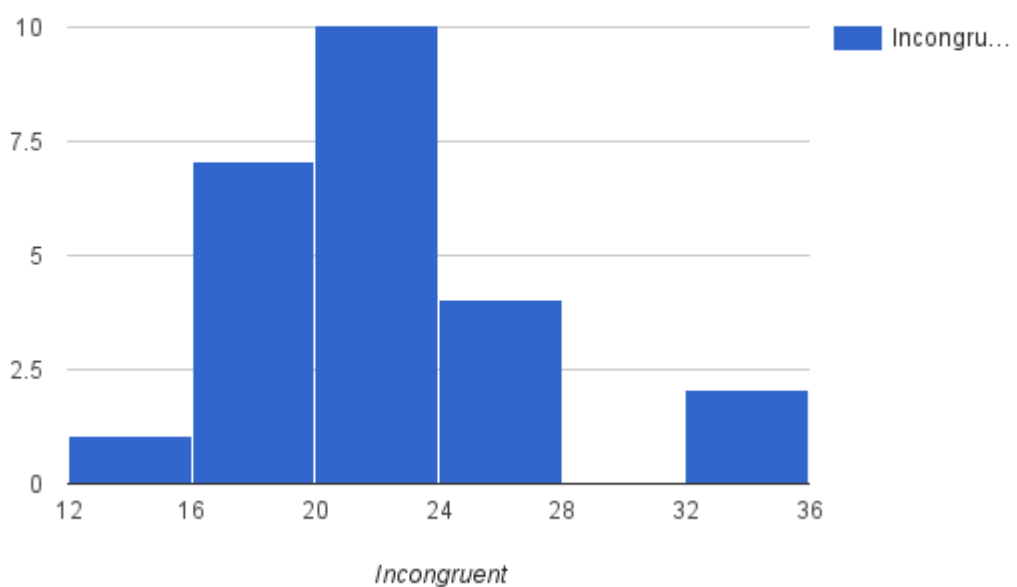
*4. Provide one or two visualizations that show the distribution of the sample data. Write one or two sentences noting what you observe about the plot or plots.*

Under congruent condition, most of participants (23 of 24) can finish the test under 20s; while only eight participants takes no more than 20s under incongruent condition.

**Histogram of Congruent**



**Histogram of Incongruent**



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?

Do a t-test:

Then we can get:  $t$  statistics = -7.85183104351

assume  $\alpha$ -level = .05

$df = 24 - 1 = 23$

it is a two-tailed test

$t$  critical value =  $\pm 2.069$

confidence intervals on performance difference under two conditions;

$95\% CI = (-7.964791667 \mp 2.069 * 1.0144) = (-10.064, -5.866)$

Because  $-7.85183104351 < -2.069$ , it's statistically significant.

So, reject to null which matches up my expectation.

Conclusion in terms of the experiment task: people's recognition ability will be affected by Stroop Effect. Under the incongruent condition, people would take more time to finish the task.