

Questions for Investigation

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

Ans:Independent Variable: Words are congruent or incongruent with ink colours
Dependent Variable: Time taken to name the word

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

Ans: $\mu_{\text{congruent}}$ = Population Mean time take to read Congruent words
 $\mu_{\text{incongruent}}$ = Population Mean time taken to read Incongruent words

Null Hypothesis $H_0: \mu_{\text{congruent}} = \mu_{\text{incongruent}}$
Alternate Hypothesis $H_a: \mu_{\text{congruent}} < \mu_{\text{incongruent}}$

Null Hypothesis states that the time taken to name both Congruent and Incongruent words are same.
Alternate Hypothesis states that the time taken to name Incongruent words will be higher than the time taken to name Congruent words.

I would like to perform one tailed t-test(one directional) with $\alpha=0.05$ with the following assumptions:

1. t test is used since population mean and population standard deviation are not known and the sample size is less than 30.

2. Data follows normal distribution.

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

Ans:

Central Tendency Congruent:

Mean=14.05

Median=14.36

Mode=12.35

Central Tendency Incongruent:

Mean=22.02

Median=21.02

Mode=17.57

Variability Congruent:

Q1=11.71

Q3=16.40

IQR=4.69

Standard Deviation=3.56

Variability Incongruent:

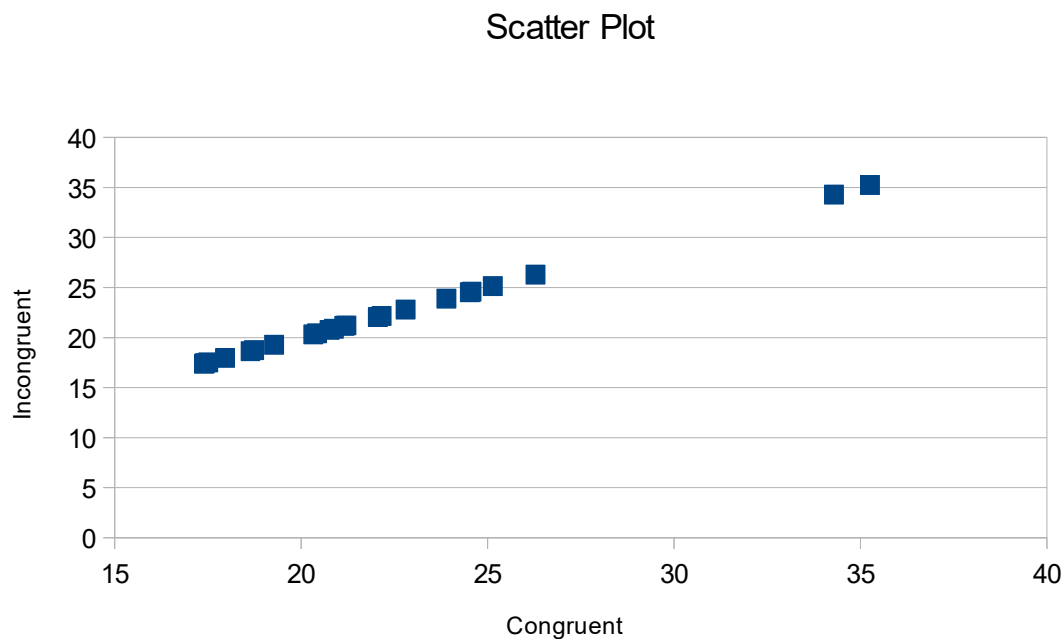
Q1=18.69

Q3=24.21

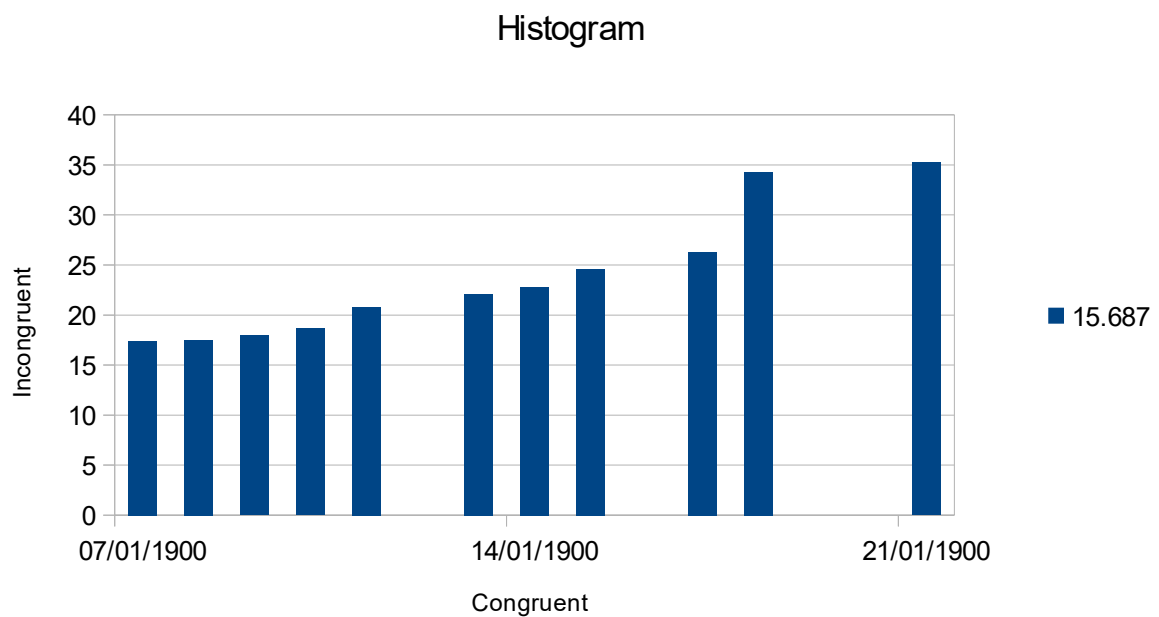
IQR=5.52

Standard deviation=4.80

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.



As the time taken to read Congruent words increases, time taken to read incongruent words also increases. This follows linear model.



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?

Ans:

One tailed t-test with 95% CI .

$\alpha=0.05$

$\mu_{\text{incongruent}}=22.02$

$\mu_{\text{congruent}}=14.05$

$df=23$

Mean difference $\bar{d} = -7.96$

Standard deviation of difference $Sd=4.86$

Standard Error=0.99

t statistic= -8.021

$p<0.0001$

$t_{\text{critical}}=+1.714, -1.714$

$CI = (-9.66, -6.26)$

The results rejected the null hypothesis as t statistics fall inside t critical region.

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!

Ans:Our brain responds fastly to name stimulus than to colour stimulus..Interactive Number Stroop effect experiment where the subject is required to count the number of words in each box.It produces similar effect.Time taken to count the number of words in each square will be greater than the time taken to read the word by itself.

References:1.<http://psych.hanover.edu/classes/Cognition/papers/stroop%201933.pdf>

2.<https://faculty.washington.edu/chudler/java/readyn.html>