1.

**Independent variable**: whether the ink color and word name are the same or different

**Dependent variable:** the time it take to name the ink colors in equally sized lists

2.

The **null hypothesis** is that difference in the ink color and the word name will not effect the time it takes to read the lists

Ho : Mc - Mi = 0 or Mc = Mi, where we assume that the sample means mc and mi are part of the same population and their population means Mc and Mi are equal. So the Mc is the population mean of the time spent naming the words for the congruent condition, while Mi is the population mean for the incongruent condition.

The **alternative hypotesis** is that the time it takes to read the list will be longer when the ink color and the word name are different (incongruent condition).

Ha : Mc < Mi, where we assume that the sample means mc and mi are part of the same population and with the incongurent condition we assume that the time to read the list will be longer. So the Mc is the population mean of the time spent naming the words for the congruent condition, while Mi is the population mean for the incongruent condition.

I would use a dependent t-test with paired samples as we have a two conditions within subject design, so we measure the same subjects with a congruent and with an incongurent condition. I would use a one-tailed test as - according to our alternative hypothesis - we expect that in the incongruent condition the reaction time will be longer, so we expect to have a greater sample mean in the incongruent condition.

According to the assumption's of a paired sample t-test, this is a comparison of two different measurement where the measurements are applied to the same subjects and also we have less than 30 samples, we don't know the population's mean and standard deviation and we assume that the distributions are normal.

3.

**Descriptive statistics**

n = 24

$_{mc}$ = 14.05

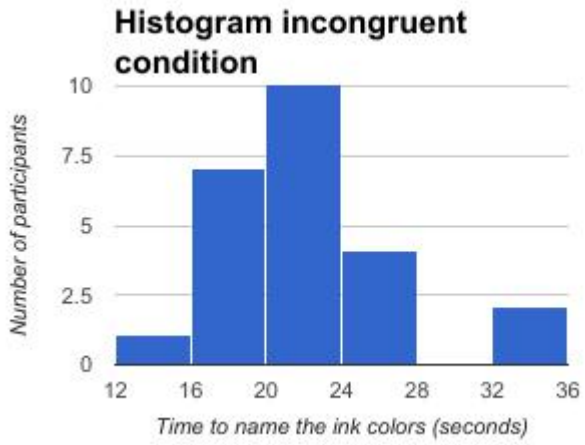
$_{mi}$ = 22.02

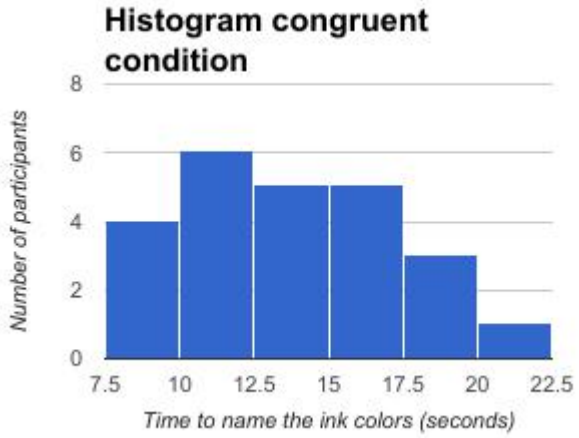
$s_c$ = 3.56

$s_i$ = 4.80

4.

Both histograms show a normal distribution (although the congruent one has a little bit positively skewed shape), but the most of the values are in the middle of the distribution, while there are less values on the tails without outliers. Just seeing the histogram the mode of the congruent condition is somewhere between 10 and 12.5 seconds, while in the congruent condition between 20 and 24 seconds. In the incongruent condition the time varies on a broader range, so in the congruent condition the distribution is skinnier.




5.

**Inferential statistics**

**Hypothesis test** - one- tailed dependent t-test paired samples ($\alpha$ = .05)

df = 23

$\alpha$ = .05

t-critical = 1.677

direction of the test is negative as we expect that the time to read will be larger in the incongruent condition

t (24) = 8.02, $\alpha$=.05

$t = M_d / SEM_d = M_d / (s_d / \text{sqrt } n) = 7.96 / 0.99 = 8.02$ on 23 df

$p < 0.0001$

**Confidence intervals** (95%)

$CI = M_d$ +- t-critical x ($s_d$/sqrt n) = 7.96 +- 1.677 (4.86/sqrt 24) = 7.96 +- 1.67

95% CI = (6.30, 9.63)

**Effect size measures**

$r^2 = t^2 / t^2 + df = 8.02^2 / (8.02^2 + 23) = .74$

Cohen's $d = M_i - M_c / s_d = (22.02 - 14.05 )/ 4.86 = 1.64$

According to the results we shall reject the null hypothesis, so we can say that in the

incongruent condition the time to name the ink colors was significantly higher. These results are as expected according to the original Stroop experiment.

References

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