

Q1: Question response correctly identifies the independent and dependent variables in the experiment.

Independent variable: Color Congruency;

Dependent variable: the time that it takes to name the ink colors in equally-sized lists

Q2a: Null and alternative hypotheses are clearly stated in words and mathematically. Symbols in the mathematical statement are defined.

H0: There is no difference in population means between incongruent and congruent conditions ($H_0: \mu_C = \mu_I$),

Ha: Population mean of the incongruent condition will not be equal to the congruent condition ($H_a: \mu_C \neq \mu_I$)

So, this would be a two-tailed test.

Q2b: A statistical test is proposed which will distinguish the proposed hypotheses. Any assumptions made by the statistical test are addressed.

Please provide a thorough rationale for your test choices:

T-test is applicable. We have less than 30 samples and we compare two sets of data to see if they are significantly different from each other. A t-test is most commonly when the test statistic would follow a normal distribution. We can estimate that the distributions are Gaussian based on the samples we have.

Since repeated measures in two different conditions were applied, I'd like to choose a dependent sample test.

I don't know whether the μ_C is greater or less than μ_I , so $\mu_C \neq \mu_I$ is the alternative hypothesis. As a result, I'd like to choose a two tailed test.

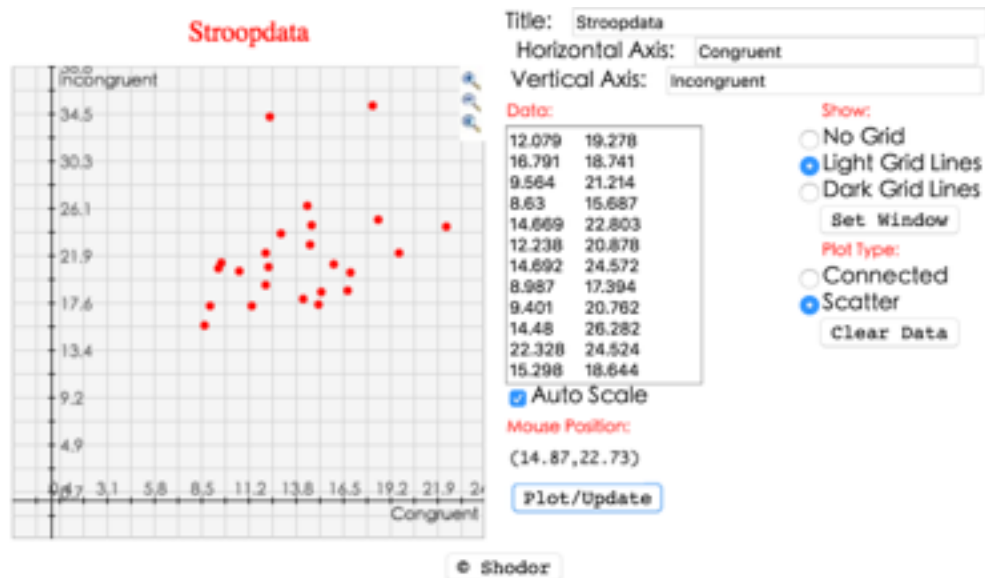
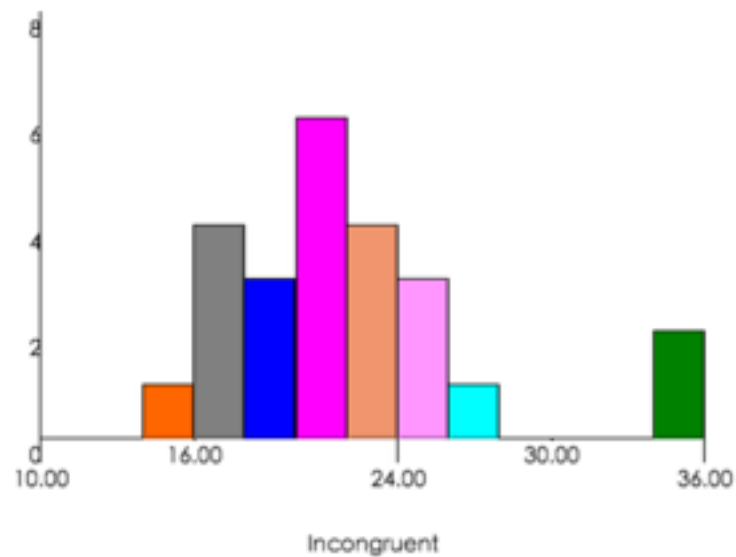
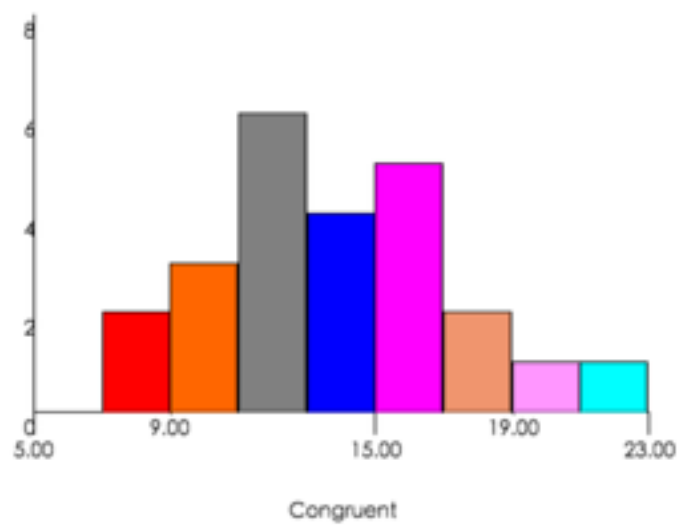
Q3: Descriptive statistics, including at least one measure of centrality and one measure of variability, have been computed for the dataset's groups.

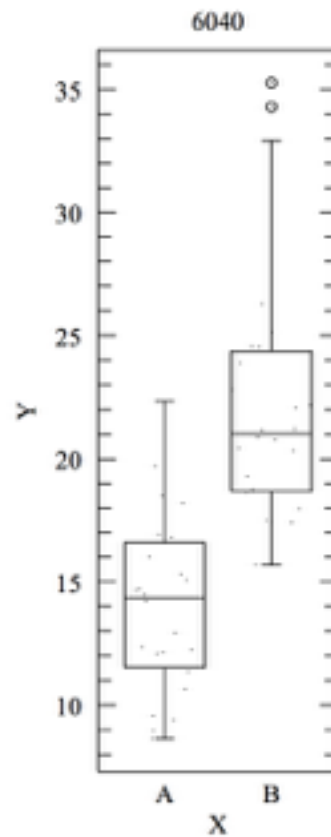
The means are denoted by μ_C and μ_I , the sample standard deviations are denoted by SDC and SDI, and the variances are denoted by VC and VI.

Word Set #1: μ_C is 14.05, VC is 12.67, and SDC is 3.56.

Word Set #2: μ_I is 22.02, VI is 23.01, and SDI is 4.80.

Q4: One or two visualizations have been created that show off the data, including comments on what can be observed in the plot or plots.





Data in congruent condition and incongruent condition are normally distributed in general. It tends to take participants more time to finish the test in an incongruent condition than in a congruent condition.

If one participant take a long time to finish the congruent word test, it is more likely that this person will also spend a long time on the incongruent word test. And vice versa. In general, people spent more time on the words in a congruent condition than in an incongruent condition.

Q5: A statistical test has been correctly performed and reported, including test statistic, p-value, and test result. The test results are interpreted in terms of the experimental task performed.

The standard deviation of the difference between μ_C and μ_I is denoted by SDD.

$\mu_C = 14.05$, $\mu_I = 22.02$

$\mu_C - \mu_I = -7.96$

SDD = 4.86

$t = (\mu_C - \mu_I) / (SDD / \sqrt{n}) = -7.96 / (4.86 / \sqrt{24}) = -7.96 / 0.99 = -8.04$

$\alpha = 0.05$ (a two-tailed test)

Critical Values (CV): (-2.069, 2.069)

SDD (4.86) > CV (2.069) \Rightarrow Reject H_0

CI : (-7.96-2.05, -7.96+2.05) \Rightarrow (-10.01, -5.91)

p-value < 0.05

Result : H_0 should be rejected.

Q6: Hypotheses regarding the reasons for the effect observed are presented. An extension or related experiment to the performed Stroop task is provided, that may produce similar effects.