Project 1

Test A Perceptual Phenomenon

Overview:

In a task participants are presented with a list of words, with each word displayed in a colour of ink. The participants are required to say out loud the colour of the ink in which the word is printed. The task has two conditions: a congruent words condition, and an incongruent words condition. In the congruent words condition, the words being displayed are colour words whose names match the colours in which they are printed, whereas, in the incongruent words condition, the words do not match the colours in which they are printed. In each case, we measure the time it takes to name the ink colours in equally-sized lists. Each participant goes through and records time from each condition.

1. Variables:

Independent Variable: Words list from congruent or incongruent condition.

Dependent Variable : Time to name the words.

2. Hypotheses and Test:

Null Hypothesis: There is no significant difference in the participant's response times of naming each words of list in congruent and incongruent condition.

Alternative Hypothesis: There is significant difference the participant's response time in naming the congruent and incongruent words.

Mathematically;

$\mu_{congruent}$ = population mean response time for congruent condition.

$\mu_{incongruent}$ = population mean response time for incongruent condition.

μ_d = population mean difference in response time for incongruent and congruent condition.

$\mathbf{H_0:}\ \mu_{congruent} - \mu_{incongruent} = 0$

$\mu_d = 0$

$\mathbf{H_a:}\ \mu_{congruent} - \mu_{incongruent} \neq 0$

$\mu_d \neq 0$

A two-tailed t-test is needed to be performed as the dataset comprises of Dependent samples and population parameters are unknown.

3. Descriptive Statistics:

Congruent Condition:

$\bar{x}_{con} = 14.05$

$S_{con} = 3.56$

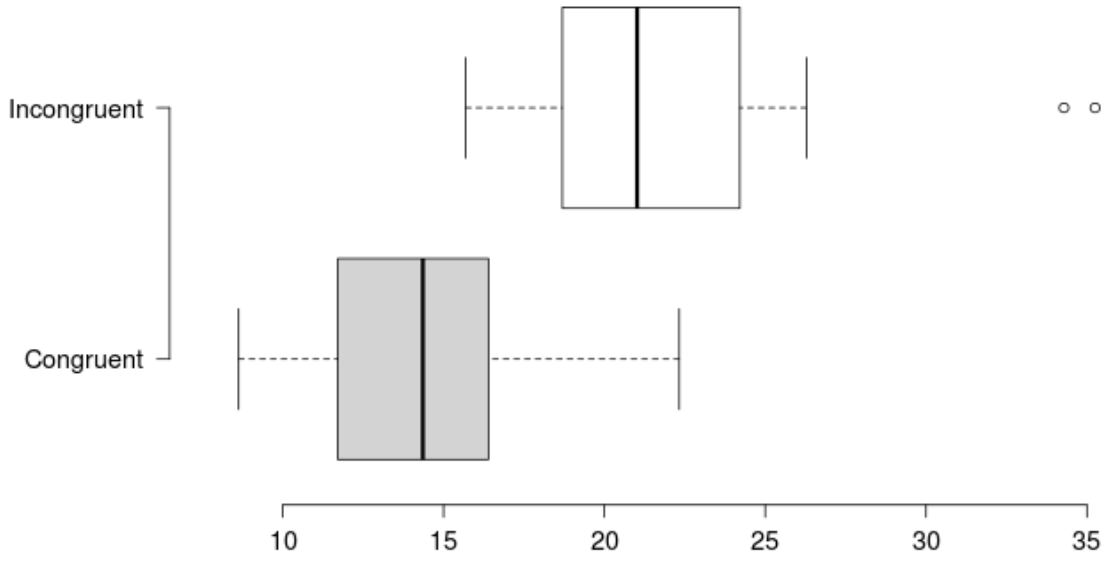
Incongruent Condition:

$\bar{x}_{inc} = 22.02$

$S_{inc} = 4.8$

4. Data Visualisation :

From the boxplot it can be observed that the participant's response time for completing the task in incongruent condition is higher that the response time for congruent condition. A clear difference between the response times can be observed.



5. Inferential Statistics:

For two-tailed t-test with 95% confidence interval: $\alpha = 0.05$

$\bar{x}_d = -7.96$, $S_D = 4.86$

t(critical) = ± 2.069

df =23

SEM= 1.01

t = -8.02

$p < 0.0001$

Conclusion: Reject the null as the t-statistics lie in the critical region.

$$H_a : \mu_D \neq 0$$

$$\mu_{incongruent} > \mu_{congruent}$$

Thus it can be said that people take more time in completing the task of reciting the colours of words in case of incongruent condition than the congruent condition. This outcome was expected.

6. Inferences:

The effect is caused by the strong influence of words over the ability to say the colour. The interference between the different information the brain receives causes the problem. An alternative task with same effect can be recognising the direction of moving words (such as : left, right, up, down).

Resources :

https://faculty.washington.edu/chudler/words.html#seffect
http://www.graphpad.com/quickcalcs/
http://shiny.chemgrid.org/boxplotr/