

Test a Perceptual Phenomenon (Stroop Task)

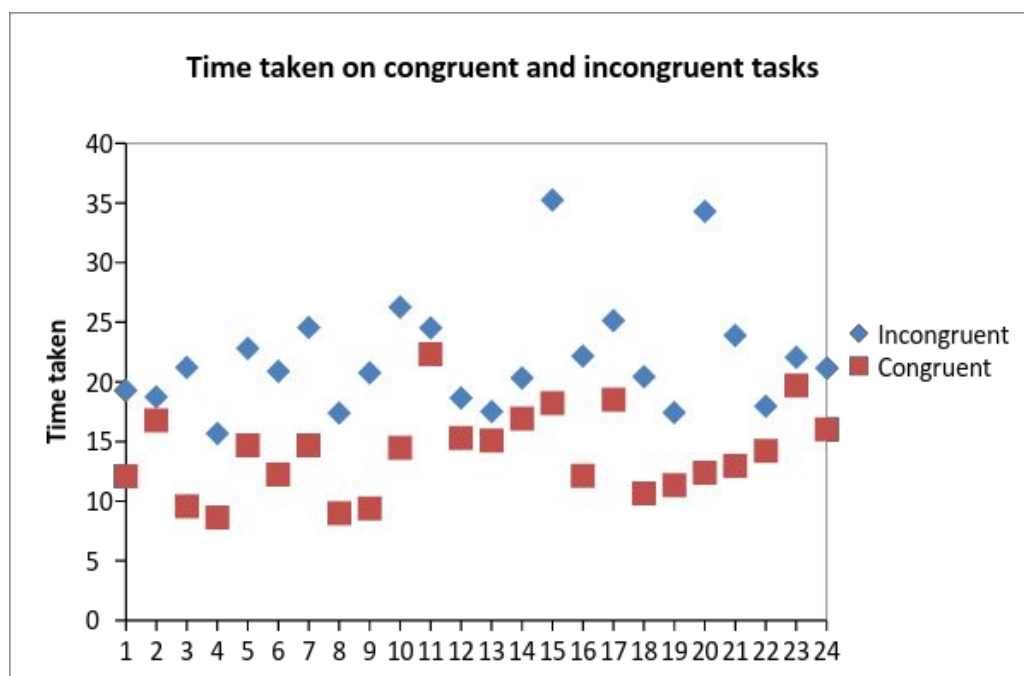
Background

In a Stroop task, participants are presented with a list of words, with each word displayed in a color of ink. The participant's task is to say out loud the *color 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 color words whose names match the colors in which they are printed. In the *incongruent words* condition, the words displayed are color words whose names do not match the colors in which they are printed.

For this analysis, the data was from 24 participants going through both incongruent and congruent tasks with equally-sized lists. The time taken to name the ink colors was recorded for each case.

Statistical tests and visualizations were carried out to study if there was a difference between the mean performances on the two tasks (incongruent vs congruent). Note that only Excel was used in this analysis to facilitate manual calculations and visualizations.

Visualizations



The time taken for the incongruent task is generally greater than that taken for the congruent task. Each participant performed worse on the incongruent task.

Statistical Test

Independent Variable: Congruency of words

Variable:

Dependent Variable: Dependent Variable

Statistical Test: The two-tailed paired t-test was used as observations are paired, i.e. each pair of data corresponds to a single subject's performance on the two different tasks. The number of samples is less than 30 and the population standard deviation is unknown.

Null Hypothesis, H_0 : There is no difference between mean performance on the congruent task (μ_C) and the mean performance on the incongruent task (μ_I) . i.e $\mu_C = \mu_I$

Alternative Hypothesis, H_A : There is a difference between the performance on the congruent task and the performance on the incongruent task. i.e. $\mu_C \neq \mu_I$

Findings

Mean difference in performance: **$d = 7.96$**

Standard deviation of the differences: **$s = 4.86$**

t-statistic : 8.02

Conclusions: At a confidence level of 95% and 23 degrees of freedom, **tcrit** = -2.069, 2.069.

As the t-statistic > tcrit, **reject the null hypothesis**. At a 95% confidence level, there is a statistically significant difference between the performance on the congruent task and the performance on the incongruent task.

The results were as expected and correspond well the observations made based on the visualizations.