

Test a Perceptual Phenomena.

28 Sep 2018

OVERVIEW

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: for example RED, BLUE. In the incongruent words condition, the words displayed are color words whose names do not match the colors in which they are printed: for example PURPLE, ORANGE. In each case, we measure the time it takes to name the ink colors in equally-sized lists. Each participant will go through and record a time from each condition. Below are the observations from the investigation of this experiment.

OBSERVATIONS

1. Independent variable : Congruency of the words with ink

Dependent variable : Time

2. Null hypothesis : The change in ink color does not have any effect on the response time of the users. I.e. Mean before intervention = Mean after intervention.

Alternative hypothesis : The change in ink color does have some effect on the response time of the users. I.e. Mean before intervention \neq Mean after intervention.

I intend to perform a **Dependent samples t-statistical** test since we don't know the population parameters and also the two samples are connected on the same person before/after the condition(congruent & incongruent).

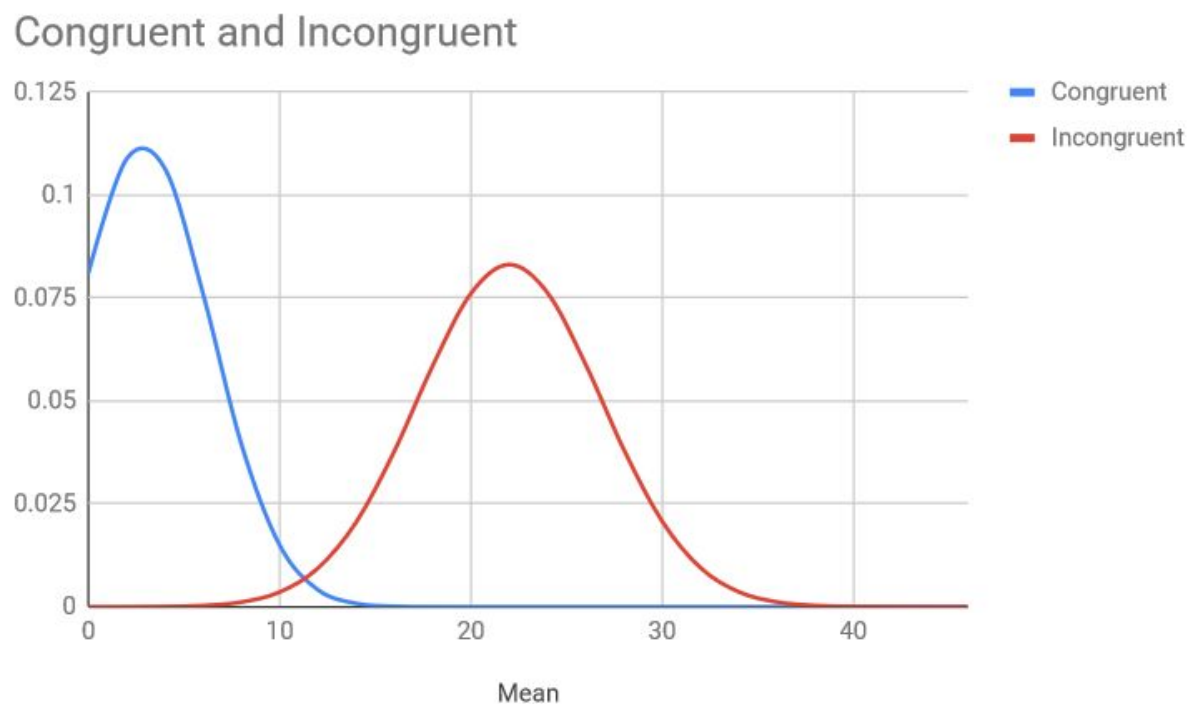
3. Descriptive statistics :

	Mean	Median	SD
Congruent	2.853114583	14.3565	3.559357958
Incongruent	22.01591667	21.0175	4.797057122

4. Data Visualisation :

Normal Distribution of Congruent & Incongruent data.

From the below chart, the mean of Incongruent data is far away from Congruent data which means there is an effect on the time taken to read the printed text in different color.



5. Statistical test :

T-test (Dependent samples) :

Mean (congruent) = 14.051125

Mean (incongruent) = 22.01591667

Mean difference (congruent - incongruent) = -7.964791667

SD = 0.3016662423

$$n = 24$$

$$t = \text{Mean difference} / (\text{SD}/\sqrt{n})$$

From the above formula we get a **t value** of -129.3460968.

Degrees of freedom will be 23 since our sample size is 24.

Now we calculate the P - value for $t = -129.3460968$ with 23 degrees of freedom for a two tailed test and the corresponding **P - value** is less than 0.0001.

Also the **Confidence Interval** is (-8.091887346,-7.837695988) by computing (Mean diff - $2.064(\text{sd}/\sqrt{n})$, Mean diff + $2.064(\text{sd}/\sqrt{n})$)

Inference :

1. The two tailed p value < 0.0001.
2. This is extremely statistically significant.
3. And $p < \alpha \text{ level}(0.05)$.
4. So we reject the null hypothesis.

Also the mean after intervention is greater than the mean before intervention, we can reject the null hypothesis and accept the alternative hypothesis.