PERCEPTUAL PHENOMENON

Version 1.0#

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Revision History

Date	Version	Description	Author
02/05/2018	1.0		Kuldeep Chitrakar

1 INTRODUCTION

1.1 Project 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: 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.

1.2 Source Data

https://drive.google.com/file/d/0B9Yf01UaIbUgQXpYb2NhZ29yX1U/view?usp=sharing

2 PREPARATION

2.1 Hypothesis

2.1.1 Null Hypothesis ($H_0 : \mu_c = \mu_i$)

Response time taken by population to say out the congruent and incongruent words is same.

2.1.2 Alternative Hypothesis ($H_A : \mu_c \neq \mu_i$)

Response time taken by population to say out the congruent and incongruent words is not same and it may either be less or more for congruent word and incongruent words and vice versa.

Note:

μ_c – congruent words mean response time

μ_i – Incongruent words mean response time

2.2 Statistical Test

We will be performing dependent t-test (two-tailed). Below points can elaborate the reasons behind choice of our test.

- Why Dependent?
  - Same participants are given two tests. So same subject group being tested.
- Why two - Tailed?
  - Since we don't know whether the response time increases or decreases in case of incongruent word as compared to congruent words. We need to perform the two-tailed test to determine if it increases, decreases or remains same.

Assumptions:

- Sample size are approximately same – 24 each

3 EXECUTION

3.1 Measures of Central Tendency and Variability

3.1.1 Congruent

Measure of Central Tendency - Mean ($\bar{X}_c$) = **14.05**

Measure of variability - STD **(s) = 3.56**

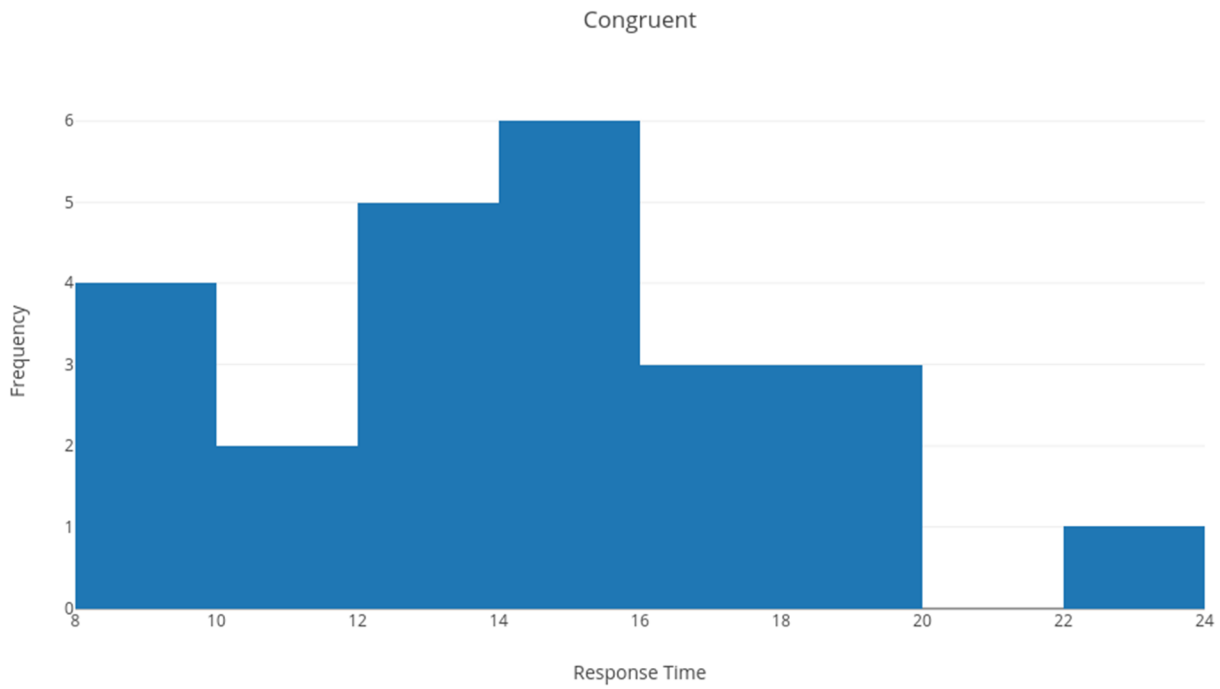
3.1.2 Incongruent

Measure of Central Tendency - Mean ($\bar{X}_i$) = 22**.02**

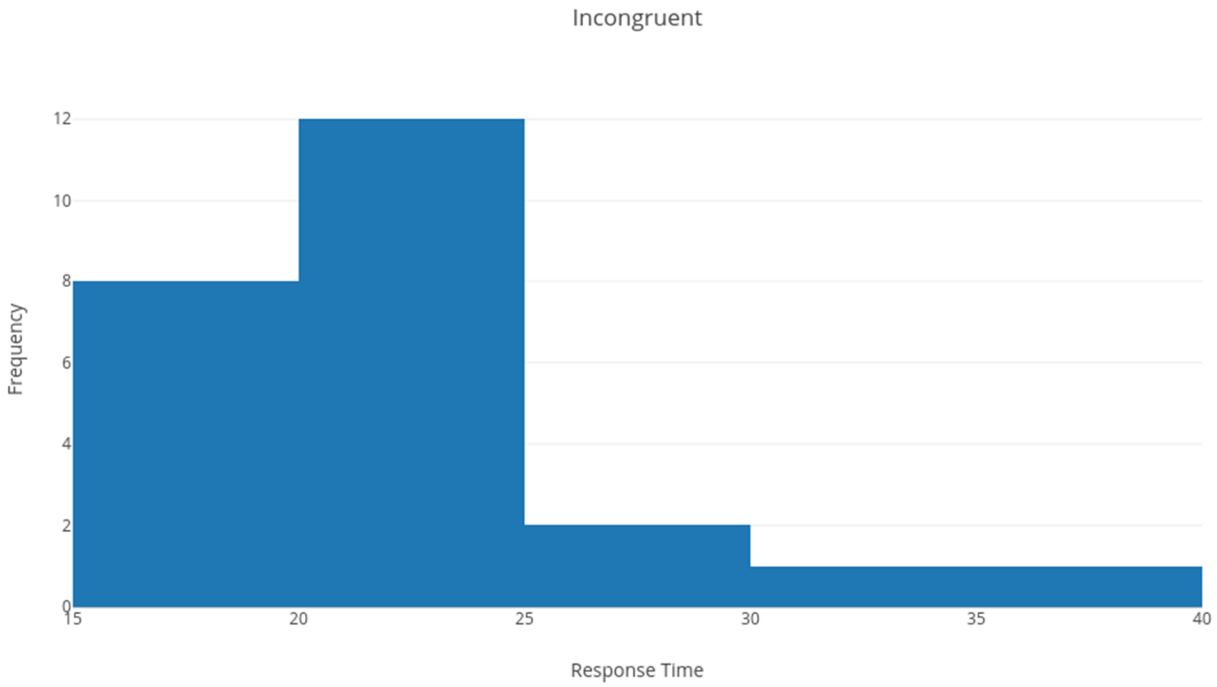
Measure of variability - STD **(s) = 4.8**

3.2 How are samples distributed

3.2.1 Congruent



3.2.2 Incongruent



Looking at the distribution, the congruent sample looks normally distributed whereas incongruent sample looks positively distributed

4 T-TEST

4.1 T-Test

4.1.1 Point Estimate

$\mu_c - \mu_i = 14.05 - 22.02 =$ **-7.97**

4.1.2 STD of differences

S = 4.86

Congruent	Incongruent	Differences	STD of Differences = >	4.864827
12.079	19.278	-7.199		
16.791	18.741	-1.95		
9.564	21.214	-11.65		

8.63	15.687	-7.057		
14.669	22.803	-8.134		
12.238	20.878	-8.64		
14.692	24.572	-9.88		
8.987	17.394	-8.407		
9.401	20.762	-11.361		
14.48	26.282	-11.802		
22.328	24.524	-2.196		
15.298	18.644	-3.346		
15.073	17.51	-2.437		
16.929	20.33	-3.401		
18.2	35.255	-17.055		
12.13	22.158	-10.028		
18.495	25.139	-6.644		
10.639	20.429	-9.79		
11.344	17.425	-6.081		
12.369	34.288	-21.919		
12.944	23.894	-10.95		
14.233	17.96	-3.727		
19.71	22.058	-2.348		
16.004	21.157	-5.153		

4.1.1 Standard Error

SE = 0.99

4.1.2 t - Statistics

t-stat = -7.97/0.99 = **-8.02**

4.1.3 t – critical values

α = 0.05

so

t-critical = ±2.069

4.1.4 Degree of Freedom

DF = (N-1) = 23

4.1.5 p-value

p-value is less < 0.0001

5 DECISION

5.1 Interpretation

At $\alpha = 0.05$, Based on the t-stat which is past the t-critical values we reject the Null Hypothesis.

Decision – Null Hypothesis ($H_0 : \mu_c = \mu_i$) **Rejected**

6 MISC – QUESTIONS 6

Human brain is trained to recognize the shape of letters first than the colors of font. This test can also be performed by jumbling the letters of a word by keeping only first and last letter same.

7 REFERENCE

https://plot.ly

MS Excel

https://www.graphpad.com/quickcalcs/pvalue1.cfm

https://en.wikipedia.org/wiki/Stroop_effect