

Project P1- Perceptual Phenomenon

1. The independent variable is the outcome of the two experiments (Congruent and Incongruent) conducted to the same individuals to test word color congruency/ incongruency and the dependent variable is the time elapsed in seconds for each participant to identify the ink color of the words.
2. The appropriate test of hypothesis is:

Null hypothesis : Congruent and Incongruent have exactly the same mean effect on the time to read (name) the colors of color words.

Alternative hypothesis: It takes more time to read the colors of color words if it doesn't match the colors that the words denote (Incongruent has greater mean time to read compared to congruent).

μ_1 = mean of Incongruent

μ_2 = mean of Congruent

μ_d = mean of the difference ($\mu_1 - \mu_2$)

$H_0 : \mu_1 - \mu_2 = 0$

$H_a : \mu_1 - \mu_2 > 0$

$H_0 : \mu_d = 0$

$H_a : \mu_d > 0$

The statistical test that is applied for this is a **paired t-Test** because the experiment is dependent (the difference scores of the elapsed time are based on repeated measurement; each participant is paired with two different performance, the congruent and incongruent outcomes), and also the difference results are normally distributed (see fig.4b below).

- 3.

measure of central tendency	Congruent	Incongruent
Mean	14.051	22.016
median	14.357	21.018
mode	13.698	19.568
standard deviation	3.559	4.797

4. The plot box and the histogram depicted below shows the distribution of the data. The frequency distribution of the difference (histogram) shows that the data is approximately a normal distribution. Based on the plot box, most of the observations are above the median for both Congruent and Incongruent. Using the median value, Incongruent appears to have greater median time reading and the data spread out more ($Q4=35.22$) compared to Congruent ($Q4=22.32$).

Fig 4a.

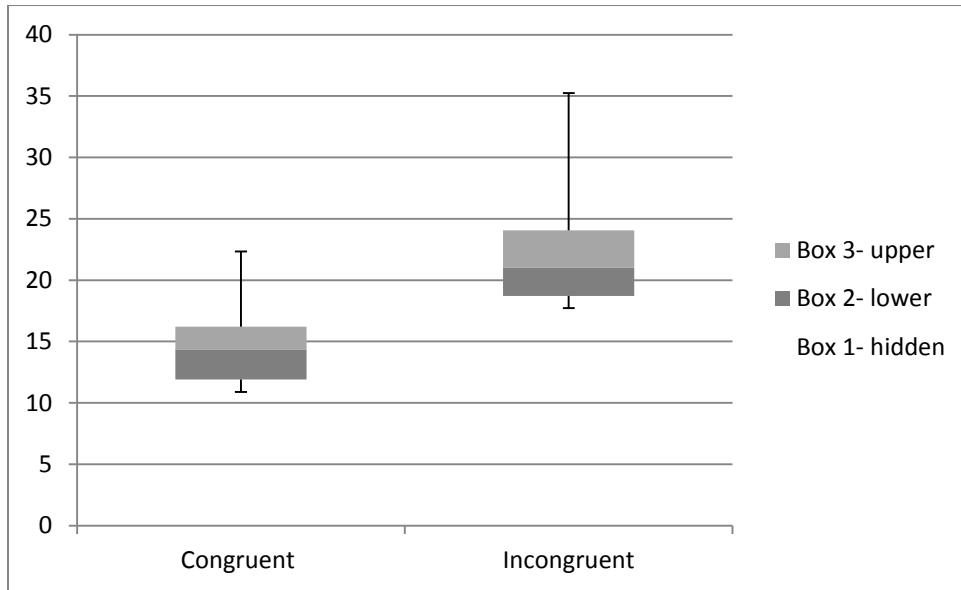
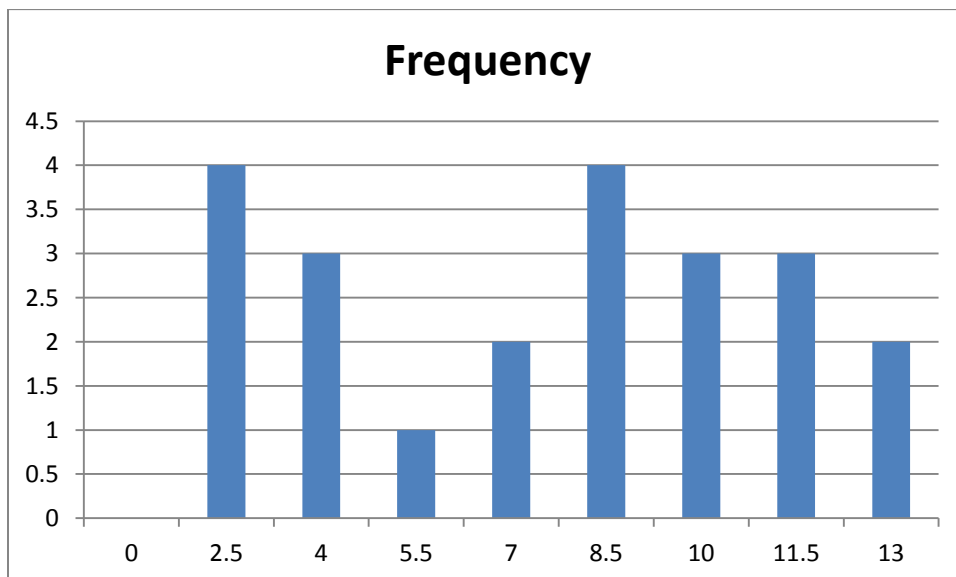


Fig. 4b



5. The following table shows the results of the statistical test

t-Test: Paired Two Sample for Means

	<i>Incongruent</i>	<i>Congruent</i>
Mean	22.01591667	14.051125
Variance	23.01175704	12.66902907
Observations	24	24
Pearson Correlation	0.351819527	
Hypothesized Mean Difference	0	
df	23	
t Stat	8.020706944	
P(T<=t) one-tail	2.0515E-08	
t Critical one-tail	1.713871528	
P(T<=t) two-tail	4.103E-08	
t Critical two-tail	2.06865761	

H0 : $\mu_d = 0$

Ha : $\mu_d > 0$

t Stat = 8.02

t Critical= 1.71

Confidence level = 95%

p value= 2.05E-08

At 95% confidence level, the null hypothesis (H0: $\mu_d = 0$) is rejected because p value is less than 0.05. In other words, there is significant difference in the time of reading the colors of color words if it doesn't match the colors that the words printed (Incongruent has greater mean time to read compared to congruent). Those results match up with my expectation as it took me more time to read the colors of color words when it didn't match the colors that the words printed.

6. As in the case of **Stroop effect**, the effect is due to processing speed (word processing is significantly faster in the brain compared to color processing), selective attention (color recognition requires more attention than word encoding), automaticity (brain automatically understands the meaning of words as a result of habitual reading) and parallel distributed processing (in brain different and specific pathways are developed for different tasks).

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

The **McGurk effect** is a [perceptual](#) phenomenon that demonstrates an interaction between [hearing](#) and [vision](#) in [speech perception](#). The illusion occurs when the auditory component of one sound is paired with the visual component of another sound, leading to the perception of a third sound.^[1] The visual information a person gets from seeing a person speak changes the way they hear the sound.^[2] People who are used to watching dubbed movies may be among people who are not susceptible to the McGurk effect because they have, to some extent, learned to ignore the information they are getting from the mouths of the "speakers".^[3] If a person is getting poor quality auditory information but good quality visual information, they may be more likely to experience the McGurk effect.^[4] Integration abilities for audio and visual information may also influence whether a person will experience the effect. People who are better at [sensory integration](#) have been shown to be more susceptible to the effect.^[2] Many people are affected differently by the McGurk effect based on many factors, including brain damage and other disorders.

Source: https://en.wikipedia.org/wiki/McGurk_effect