Project-1

According to the given information each participant task is to say the color of the ink in Stroop test and there are two conditions for the participant 1. Color words matched with the colors in which they printed 2. Color words doesn't match with the color of the ink.

So, we are taking the time to spell a word in congruent condition and in incongruent condition by the same person one after other it can conclude that the given data is belongs to the *dependent variables.* And the *independent variable* is color in which the word is written.

Now calculating the mean of congruent and incongruent to decide the alternative hypothesis.

Mean of congruent data ($\bar{x}_i$) = 14.051125

Mean of incongruent data ($\bar{x}_c$) = 22.01591667

It clearly showing that $\bar{x}i > \bar{x}c$ it means people taking more time to read the incongruent words then the congruent words. Mathematically,

H_1: $\mu_i - \mu_c > 0$; here, H_1 denotes alternative hypothesis.

Taking the mean difference between incongruent and congruent words for further calculations.

Mean of the difference (between congruent and incongruent) data given $\bar{d}$ = 7.964791667

The given sample data is n=24 (n: number of samples in given data.)

And the degree of freedom (df) = n-1 = 24-1 =23, it says about number of choices we can make in data (independent pieces of information).

Calculating a Variance: (mean of squared deviations for a sample data.)

$$\text{Variance} = \frac{(d-\bar{d})^2}{n-1} = 23.66654087$$

And the sample standard deviation for the given data:(A number used to tell how measurements spread out from the average.)

$$\text{The sample standard deviation } s_d = \sqrt{\boldsymbol{Varience}} = 4.86482691$$

using the sample standard deviation **s** we calculate,

$$\text{Standard Error } \mathbf{SE_d} = s_d/\sqrt{\boldsymbol{n}} = 0.9930286348$$

$\mathbf{SE_d}$ = The standard deviations of the sample in a frequency distribution.

t-test is more suitable for the given sample data because number of people in sample data is less than 30 and we can't calculate standard deviation (it is calculated for the total population denoted by '**σ**') for the given data. So, with the given samples we can calculate *sample standard deviation*(**s**) but not standard deviation.

Now, the t statistic is: (ratio of mean difference and the standard error.)

$$t_{statistic} = \frac{\bar{d}}{Sd/\sqrt{n}} = 8.020706944$$

By considering given sample data as one tailed t-test because of the mean of incongruent is more than the congruent mean of given dependent variables.

So, taking critical values at $\alpha=0.05$ the t-critical value is 1.714 (from the t-table).

Here, $t_{statistic}$ is greater than the t-critical value so, *we reject the null hypothesis* (H_0)

So,

Null Hypothesis (H_0) :-

H_0 : There is no change in mean time consumption to spell a incongruent words(μ_i) and congruent words(μ_c).

H_0 : $\mu_i = \mu_c \Rightarrow \mu_i - \mu_c = 0$. (mean time taken by a population to read incongruent words (μ_i) is equal to mean time taken to read congruent words (μ_c).)

Alternative Hypothesis (H_1) :-

H_1 : It takes more mean time to spell incongruent words then the congruent words.

H_1: $\mu_i > \mu_c \Rightarrow \mu_i - \mu c > 0$. mean time taken by a population to read incongruent words (μ_i) more than the mean time taken to read congruent words (μ_c).)

μ_i & μc are the population parameters of a incongruent word and congruent word mean times.

The confidence interval (**CI**) for the data at 95% is:

CI= $\bar{d}$ +/- t-critiacal*SE_d = 7.964791667 +/- (1.1714* 0.9930286348)

CI = (6.262740587, 9.666842747). It is a lower and upper bond of given data at critical interval at 95%.

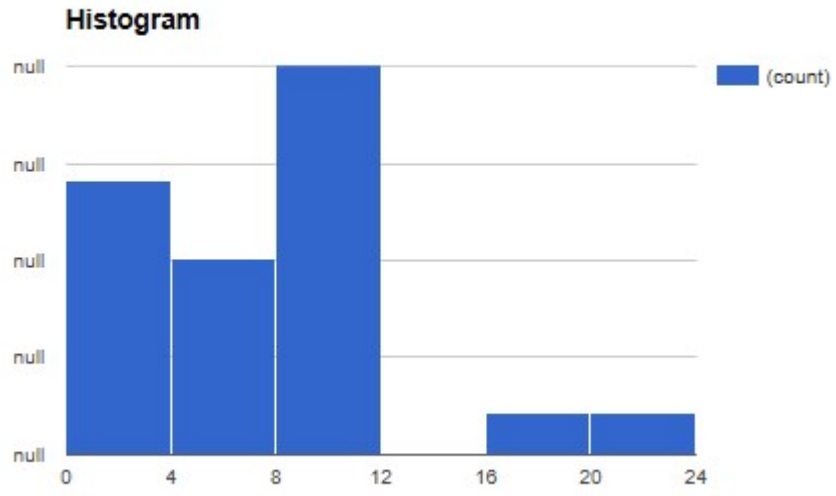
The statistical values are:

Cohen's d = $\bar{d}$/ s = 1.637219949. The d says that the distance between the two mean values in the standard deviation Units.

$r^2 = \frac{(tstatistical)^2}{(tstatistical)^2+d}$ = 0.7366364161 (coefficient of determination.)

p-value:-

t-statistic=8.020706944 DF=23 probability P value is less than 0.0001 By conventional criteria, this difference is considered to be extremely statistically significant.



Histogram is drawn by taking the mean differences of all the congruent and incongruent data given the table here we can observe the mode is in between 8-12. And the mean of sample data is lies at 8 theoretically 7.9647.

Links used for the project:

http://www.graphpad.com/quickcalcs/pValue2/