Project P1

Report prepared by

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The data sample from Stroop task experiment represent a "repeated measure design" and Dependent Samples t-test will be used in order to perform the statistical analysis.

1. Words condition (congruent or incongruent) is our independent variable and the time it takes to name the ink colors in equally-sized lists is our dependent variable.

2. Stroop task experiment represents a "repeated measure design" where the same sample receives two different conditions and we analysis two sets of reactions. Therefore, we are performing a t-test (Dependent Samples) on our sample data to see if there is a significant difference between our population means. In other words, we are investigating to see if the words condition (congruent or incongruent) has an effect on the time it takes to name the ink colors in equally-sized lists.

Here, D values are defined as a difference between two sample data values (Table 1). The null hypothesis is that the change in words condition (congruent or incongruent) has no effect on time values and there is no significant difference between the population average times under these two experimental conditions (as if the population mean of D values is zero). The alternative would be if there is a significant difference between the populations average times of these two experimental conditions.

$H_0: \mu_1 - \mu_2 = 0$

$H_a: \mu_1 - \mu_2 \neq 0$

3. Table 2 shows our sample statistics including Mean, Standard deviation, Standard Error and t point value along with the α level of 0.05 (0.025 for two tailed test) and critical t-values.

4. Fig. 1 shows the histogram plot of the sample time differences (D) with bin size of 5 seconds. The distribution is positively skewed with the mean located at 7.96th second. The sampling distribution plot will be a normal t-distribution.

5. Confidence level of 95% (α level of 0.05 with 0.025 at each tail) has been used to determine the critical values of t (see Table 2). Since our t-point value is past t-critical values we'll reject the null hypothesis. In other words, the words condition (congruent or incongruent) has significant effect on the time it takes to name the ink colors in equally-sized lists. Moreover, it takes significantly more time for participants to perform the incongruent task than congruent task (positive t-value).

These results match up with my expectations and my personal test results as well.

6. The r^2 (calculated using t-value and DF value) shows that 73% of difference in average time between these two experiments are due to the words condition (congruent or incongruent) and this shows the stroop effect is significant comparing to other lurking variables.

The spatial Stroop effect is a variation of stroop effect test which demonstrates interference between the stimulus location with the location information in the stimuli. In one version of the spatial Stroop task, an up or down-pointing arrow appears randomly above or below a central point. Despite being asked to discriminate the direction of the arrow while ignoring its location, individuals typically make faster and more accurate responses to congruent stimuli (i.e., a down-pointing arrow located below the fixation sign) than to incongruent ones (i.e., an up-pointing arrow located below the fixation sign). [1]

Table 1: Sample Data values and the Differences

Congruent	Incongruent	D
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

Table 2: Sample statistics and t-statistics

n	24
DF	23
Mean	7.96
SS	544.33
Variance	23.67
SD	4.86
SE	0.99
t value	8.02
alpha level	0.05
t critical	±2.069

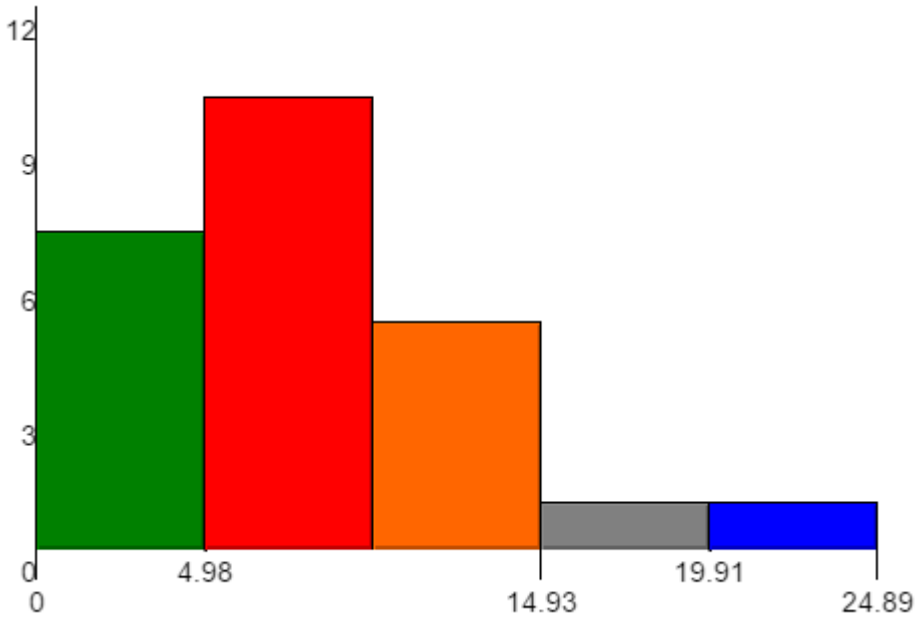

Fig.1 Histogram of sample data time differences (D) in seconds with bin size of 5 seconds.

References

[1] https://en.wikipedia.org/wiki/Stroop_effect#Variations