Statistical Analysis of Stroop Effect

This project is aiming to analyze the Stroop effect data gathered from research related to the following resource.

https://faculty.washington.edu/chudler/java/timesc.html

SAS/STAT package is being used to implement the analysis. The analytical results, relevant findings and graphs can be found in the .html file in this repository.

The Stroop effect is a demonstration of the phenomenon that the brain's reaction

time slows down when it has to deal with conflicting information. This slowed

reaction time happens because of interference, or a processing delay caused by

competing or incompatible functions in the brain. The effect became widely known

after John Ridley Stroop, an American psychologist, published a paper on it in

1935, but it had been studied by several other researchers before Stroop.

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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

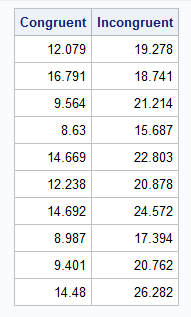
names match the colors in which they are printed: for example RED, BLUE.

In the incongruent words condition, the words displayed are color words

whose names do not match the colors in which they are printed.

The following table (Table 1) shows a sample of the records in the data set for the variables Congruent and Incongruent. The units of the records are time (in seconds) taken to complete the test based on the particular test criteria.

Table 1: A sample of the data in the Stroop test dataset (units: time in seconds)



The Figure 1 and Figure 2 show the histograms and density plots of data distribution of congruent and incongruent test results, respectively. The distribution of data of both plots shows fairly Gaussian like (see the density kernels) behaviors for bath variables. Based on the data in Figure 2, some individuals require relative large amount of time to complete the incongruent test.

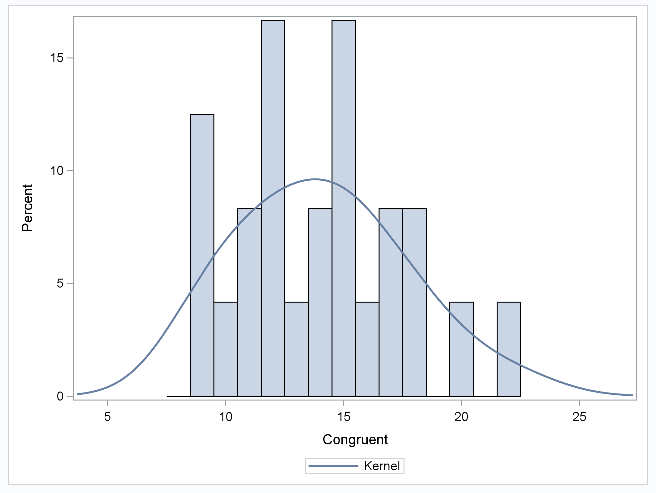


Figure 1: The data distribution of congruent test values.

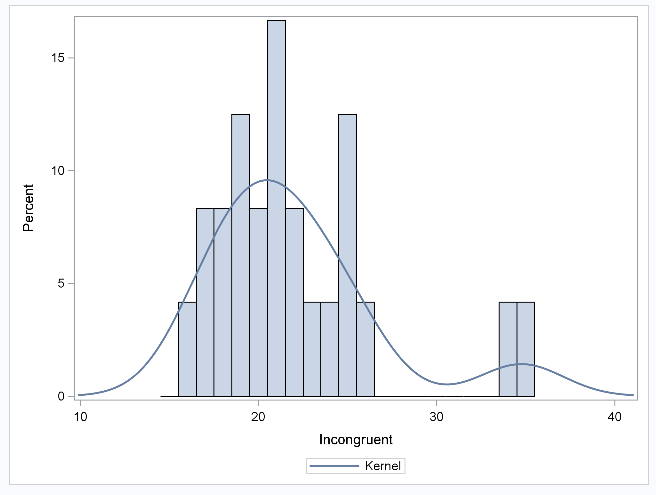
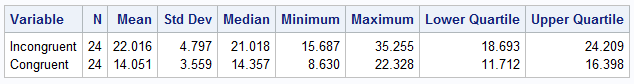


Figure 2: The data distribution of incongruent test values.

The Table 2 shows some summery statistics of the Stroop test dataset.

Table 2: The descriptive statistics of the Stroop test dataset



As shown in the Table 2, the Stroop test dataset contains 24 records for different individuals. Based on the data in Table 2, all the measured and calculated values for incongruent Stroop are greater than the corresponding values of congruent test values. The ranges (max - min) of data for incongruent and congruent tests values are 19.568 and 13.698 seconds, respectively.

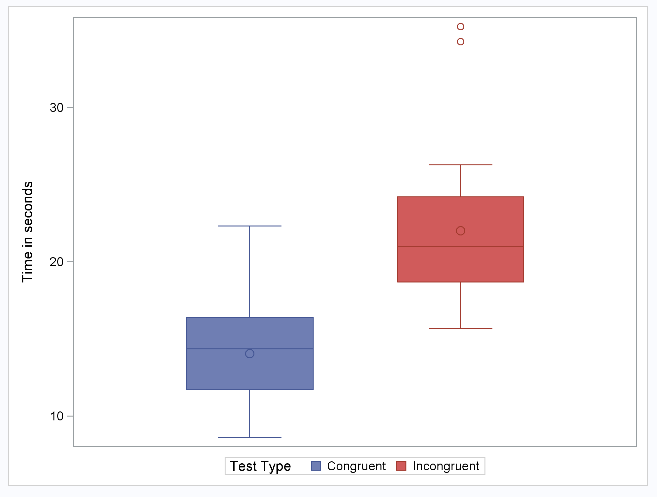


Figure :

The values of incongruent and congruent tests are independent each other, because, the test criteria are different for the tests. The individual personal wise factors effect on congruent test can be affect to the incongruent test. Therefore, for this analysis, the **independent variable** is *congruent test value* and **dependent variable** is *incongruent test value* for the particular person tested.

Since the incongruent test values (Table 1 and Table 2) are greater than congruent test values, the incongruent test values can be significantly greater than the congruent values. To test this hypothesis, two-way t-test can be carried out.

For this purpose the null hypothesis (H0) is there is no significant different between two means.

i.e., µ *(congruent)* = µ *(incongruent)*

Therefore, the alternative hypothesis (H1) is,

µ *(congruent)* < µ *(incongruent),*

where, µ *(congruent)* and µ *(incongruent)* are means of congruent and incongruent test results, respectively.

