Analyzing the Stroop Effect

(1) What is the independent variable? What is the dependent variable?

In the Stroop Effect, independent variable is words condition i.e whether it is Congruent or Incongruent. The dependent variable is the time taken to complete the task.

(2) What is an appropriate set of hypotheses for this task? Specify your null and alternative hypotheses, and clearly define any notation used. Justify your choices.

Assuming that the data is a sample from a population.Let μc and μic are the population mean values of the reaction time taken to complete the task for congruent words and incongruent words, respectively.

An appropriate set of hypotheses for the task is:

Null Hypothesis:

$$H_0 : \mu_{ic} - \mu_c = 0$$

Alternative Hypothesis :

$$H_1 : \mu_{ic} - \mu_c \geq 0$$

Before taking the Stroop test, we are not aware that the words are read faster than colors are named and there will be more time required to read the incongruent words. Since Null Hypothesis is the statement we believed to be true before collecting any data, therefore here in Null Hypothesis we believe that the reaction time taken for incongruent words and the congruent words are same. Alternative Hypothesis is what we would like to prove to be true, therefore alternative hypothesis is that the reaction time taken for incongruent words is much longer than the congruent words.

Here same participants are asked to perform the task under both the congruent words condition and the incongruent words condition,we should perform a dependent t-test for paired samples.

Assumptions made for this statistical test are:

The sample of differences should be roughly normal.

Samples should be dependent and it should be possible to pair them.

The both samples should be of equal size.

This particular statistical test is a better choice for this dataset,because the population parameters are unknown and the sample size is smaller than 30. As this is a dependent t-test where sample size is same, even though difference in variance is there, t-test should work.