A: What is our independent variable? What is our dependent variable?

The independent variable is two conditions, one is congruent condition and another one is incongruent condition. The dependent variable is the same group of people.

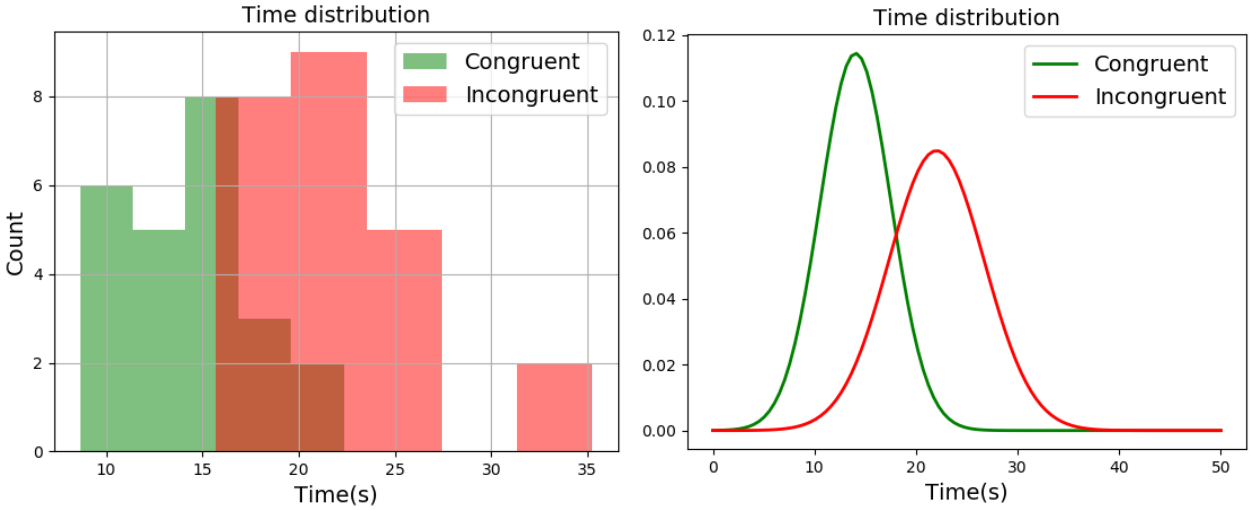
B: What is an appropriate set of hypotheses for this task? What kind of statistical test do you expect to perform? Justify your choices.

The hypotheses for this task is that the group of participant has same performance on the incongruent task and congruent task. It should be the T test, since we do not have any population data.

C: Report some descriptive statistics regarding this dataset. Include at least one measure of central tendency and at least one measure of variability.

The mean data for congruent and incongruent condition is 14.05 and 22.02, respectively. So the average time for congruent group is less than incongruent group. Besides that, the std deviation for congruent and incongruent condition is 3.56 and 4.80, respectively, which means the variability for incongruent group is large than the congruent group.

D: Provide one or two visualizations that show the distribution of the sample data. Write one or two sentences noting what you observe about the plot or plots.



From the graph, it is clearly demonstrated that the mean and std deviation for congruent and incongruent group.

E: Now, perform the statistical test and report your results. What is your confidence level and your critical statistic value? Do you reject the null hypothesis or fail to reject it? Come to a conclusion in terms of the experiment task. Did the results match up with your expectations?

The confidence level is 95%. Since there has 24 data points, which mean the degree of freedom is 23. Thus the t-critical value is 2.069. Since the value I got is much high than this value, so I reject the null hypothesis. The conclusion is that the performance between two groups of participant is significantly different.

F: Optional: What do you think is responsible for the effects observed? Can you think of an alternative or similar task that would result in a similar effect? Some research about the problem will be helpful for thinking about these two questions!

The reason is that the color match with the word would help human recognize the work more quickly. Another reason would be the sequence. We can assume that the participant take part in congruent task at first and incongruent task second. In this way, the participant status in two independent task is different, which would influence the result and cause such significantly difference. We can choose two group of people, one group perform the congruent task and another group perform the congruent task. In this way, it would be better. Because the participant is independent, which will not have any side effect for the result.