Final Project - Stroop Effect - Submission

Project material for Stroop Effect

> user name: musray
> udacity account: churui.ctec@gmail.com
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Dependent and Independent Variable

1. Independent variable:
   Whether it is an incongruent test where the words are not same with their printed color or a congruent test where the words and their printed color are the same.

2. Dependent variable:
   The reaction time from each condition.

Design of Test

1. Kind of test
   The hypothesis we will make is that the mean of total time consumption in congruent test will be shorter than the one recorded in an incongruent test. A one sample paired test could be appropriate for this purpose.

   To test this, we can arrange a groups of participants, and each participant will take both incongurent and congurent tests. The reaction time for both tests will be recoreded.

2. Hypothesis
   Suppose that μ_c is the mean of results for congruent test, while μ_i is the mean of results for incongruent test, then:

   - $H_0 : \mu_c - \mu_i \leq 0$ (printed color matching the word or not will not have an statistically significance.)
   - $H_a : \mu_i$ - $\mu_c > 0$ (pritned color matching the word will result in a shorter reaction time than the mismatch condition.)

   A one-tailed test with $\alpha = 0.05$ should be considarded appropriate for our purpose.

Calculation

Here's the sheet for time recording, and some calculations I've done on it.

Participant	Congruent	Incongruent	Difference
1	12.079	19.278	7.199
2	16.791	18.741	1.95
3	9.564	21.214	11.65
4	8.63	15.687	7.057
5	14.669	22.803	8.134
6	12.238	20.878	8.64
7	14.692	24.572	9.88
8	8.987	17.394	8.407
9	9.401	20.762	11.361
10	14.48	26.282	11.802
11	22.328	24.524	2.196
12	15.298	18.644	3.346
13	15.073	17.51	2.437
14	16.929	20.33	3.401
15	18.2	35.255	17.055
16	12.13	22.158	10.028
17	18.495	25.139	6.644
18	10.639	20.429	9.79
19	11.344	17.425	6.081
20	12.369	34.288	21.919
21	12.944	23.894	10.95
22	14.233	17.96	3.727
23	19.71	22.058	2.348
24	16.004	21.157	5.153

Central Tendency and variability:

Item	Congurent	Incongurent	Difference
n	24	24	24
mean	14.051125	22.01591667	7.964791667
median	14.3565	21.0175	NA
standard deviation(SD)	NA	NA	4.86482691
standard error(SEM)	NA	NA	0.9930286348
df	NA	NA	23

Plot

The box chart of Congurent:
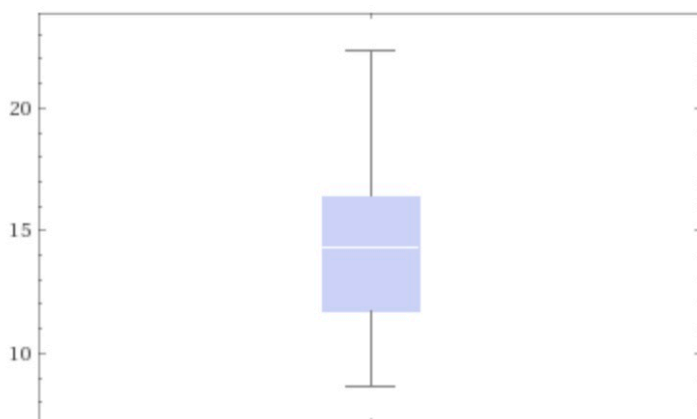
The box chart of Incongurent:
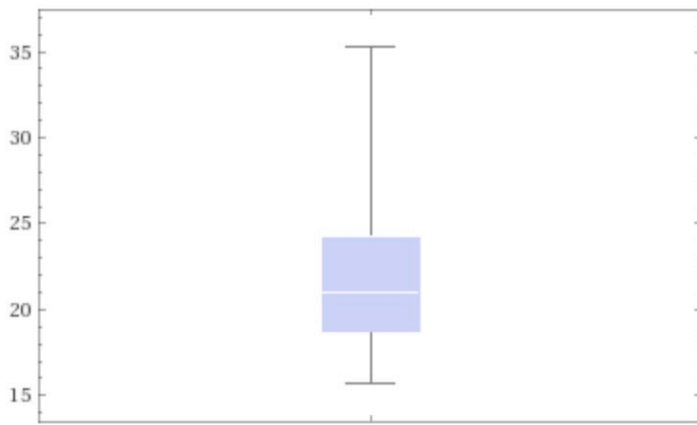
By comparing the above two box charts, we can tell that the reaction time of congurent test is shorter than that of incongurent test.
The histogram

t-test

A dependent sample one-tailed test with confidence area $\alpha = 0.05$ will be conducted.

First, do some calculation.
Look up for the t-table with params (α = 0.05, df = 23):

> t-critial = 1.714

According to the calucation in above stpes, we already have something to use:

> $\bar{x}_i - \bar{x}_c$ = 7.965
> SD = 4.865
> n = 24

Now we can calculate the t-statistical:

> standard error(SE) =
> t-statistic = $\frac{\bar{x}_i - \bar{x}_c}{\frac{SD}{\sqrt{n}}}$ = 8.02

Finally, by comparing the t-critical and t-statiscal values, we found that t-statiscal value is far more bigger than the t-critical value, which mean that t-statical value falls in the confidenc area. As a result, the concolusions for this test:

> We reject the *null*,
> and the H_a is correct hypothesis.
> The test result matches up with the expectation.

Reference

- [t-testing the stroop effect](#)
- [wiki - stroop effect](#)
- [Google Spread Sheet of My Calculation](#)