1. Based on the correlation matrix and the PCA test, whether a question indicated to positive or negative attitude has been determined. I flipped the value on the following questions based on *new value = Max value + 1-old value.*

The following features were flipped:

1) Frustrated 2) Critical and Quarrelsome 3) Anxious and easily upset 4) Disorganized and careless.

After this step, all questions are in a same scale (higher value means positive, lower value means negative).

The data can be found at <https://github.com/Jasoncho0914/Lamwitty_part2/blob/master/Data/qualtrics_03_27_scaled.csv>

2. I run ANOVA for every questions, it seems that the following questions are similar among all conditions. (p>0.05)

1) Extraverted, enthusiastic

2)Reserved, Quiet

3)Calm, emotionally stable

4)Conventional, uncreative

see ANOVA table at <https://github.com/Jasoncho0914/Lamwitty_part2/blob/master/ANOVA_multiCom_homo_26%20questions.pdf>

3. I run ANOVA for four conditions with and without these four questions, the outcome is 1 > 3&4 > 2.

There are limited difference between C1&C3, C3&C4 (see homogeneous subsets)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Descriptives** | | | | | | | | |
| TOTAL | | | | | | | | |
|  | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
| Lower Bound | Upper Bound |
| 1 | 21 | 119.76 | 13.874 | 3.028 | 113.45 | 126.08 | 88 | 143 |
| 2 | 15 | 74.07 | 10.997 | 2.839 | 67.98 | 80.16 | 54 | 91 |
| 3 | 12 | 107.67 | 16.087 | 4.644 | 97.45 | 117.89 | 78 | 126 |
| 4 | 19 | 105.37 | 12.641 | 2.900 | 99.28 | 111.46 | 89 | 131 |
| Total | 67 | 103.28 | 21.350 | 2.608 | 98.08 | 108.49 | 54 | 143 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ANOVA** | | | | | |
| TOTAL | | | | | |
|  | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 18819.781 | 3 | 6273.260 | 35.081 | .000 |
| Within Groups | 11265.831 | 63 | 178.823 |  |  |
| Total | 30085.612 | 66 |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Multiple Comparisons** | | | | | | |
| Dependent Variable: TOTAL | | | | | | |
| Tukey HSD | | | | | | |
| (I) Participantstudy | (J) Participantstudy | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| 1 | 2 | 45.695\* | 4.521 | .000 | 33.77 | 57.63 |
| 3 | 12.095 | 4.839 | .070 | -.68 | 24.87 |
| 4 | 14.393\* | 4.234 | .006 | 3.22 | 25.57 |
| 2 | 1 | -45.695\* | 4.521 | .000 | -57.63 | -33.77 |
| 3 | -33.600\* | 5.179 | .000 | -47.27 | -19.93 |
| 4 | -31.302\* | 4.619 | .000 | -43.49 | -19.11 |
| 3 | 1 | -12.095 | 4.839 | .070 | -24.87 | .68 |
| 2 | 33.600\* | 5.179 | .000 | 19.93 | 47.27 |
| 4 | 2.298 | 4.931 | .966 | -10.71 | 15.31 |
| 4 | 1 | -14.393\* | 4.234 | .006 | -25.57 | -3.22 |
| 2 | 31.302\* | 4.619 | .000 | 19.11 | 43.49 |
| 3 | -2.298 | 4.931 | .966 | -15.31 | 10.71 |
| \*. The mean difference is significant at the 0.05 level. | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **homogeneous subsets** | | | | |
| Tukey HSDa,b | | | | |
| Participantstudy | N | Subset for alpha = 0.05 | | |
| 1 | 2 | 3 |
| 2 | 15 | 74.07 |  |  |
| 4 | 19 |  | 105.37 |  |
| 3 | 12 |  | 107.67 | 107.67 |
| 1 | 21 |  |  | 119.76 |
| Sig. |  | 1.000 | .962 | .061 |
| Means for groups in homogeneous subsets are displayed. | | | | |
| a. Uses Harmonic Mean Sample Size = 15.984. | | | | |
| b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed. | | | | |

4. I try to figure out where the difference/similarity come from by doing a multiple comparison test for all questions.

Result:

**1-2 no difference in following questions**

Extraverted and enthusiastic, anxious and easily upset, experience and complex, reserved and quiet, Sympathetic and warm, calm and emotional stable, conventional and uncreative,

**1-2 difference in following questions**

Successful, frustrated, helped, efficient, Happy, Agile, Pragmatic, critical and quarrelsome, dependable and self-disciplined, dis organized and careless, smart, trustworthy, likeable, pragmatic, helpful.

**1-3 no difference**

Successful, frustrated, helped, efficient, Happy, Agile, Pragmatic, Extraverted and enthusiastic, critical and quarrelsome, dependable and self-disciplined, open to new experience and complex, reserved and quiet, Sympathetic and warm, dis organized and careless, calm and emotional stable, conventional and uncreative, smart, trustworthy, likeable, pragmatic, helpful.

**1-3 difference**

anxious and easily upset,

**1-4 no difference**

helped, Happy, Agile,Pragmatic, Extraverted and enthusiastic, critical and quarrelsome, anxious and easily upset, open to new experience and complex, reserved and quiet, Sympathetic and warm, calm and emotional stable, conventional and uncreative, smart, trustworthy, likeable, helpful.

**1-4 difference**

Successful, frustrated, efficient, dependable and self-disciplined, dis organized and careless, pragmatic,

**2-3 no difference**

Agile, Extraverted and enthusiastic, open to new experience and complex, reserved and quiet, calm and emotional stable, conventional and uncreative, pragmatic,

**2-3 difference**

Successful, frustrated, helped, efficient, Pragmatic, critical and quarrelsome, dependable and self-disciplined, anxious and easily upset, Sympathetic and warm, dis organized and careless, smart, trustworthy, likeable, helpful. Happy,

**2-4 no difference**

frustrated, Agile, Extraverted and enthusiastic, reserved and quiet, conventional and uncreative, dis organized and careless, helpful. anxious and easily upset,

**2-4 difference**

Successful, helped, efficient, Happy, Pragmatic, critical and quarrelsome, dependable and self-disciplined, open to new experience and complex, calm and emotional stable, Sympathetic and warm, smart, trustworthy, likeable, pragmatic,

**3-4 no difference**

Successful, frustrated, helped, efficient, Happy, Agile, Pragmatic, Extraverted and enthusiastic, critical and quarrelsome, dependable and self-disciplined, open to new experience and complex, reserved and quiet, Sympathetic and warm, smart, calm and emotional stable, conventional and uncreative, trustworthy, likeable, pragmatic, helpful.

**3-4 difference**

anxious and easily upset, dis organized and careless

**More information about this part can be found at** <https://github.com/Jasoncho0914/Lamwitty_part2/blob/master/ANOVA_multiCom_homo_26%20questions.pdf> under multiple comparision

## **Other findings seem interesting to me**

1. The following features seems irrelevant from others (all correlation efficiency < 0.3, or few slightly bigger than 0.3 ).

1)Open to new experience, complex.

2)Reserved, quiet.

3)Sympathetic, warm

4)Conventional, uncreative.

2. The extraverted and enthusiastic seems interesting. It has weak dependency with almost all features but likeable (CE = 0.51).

3. C3 is significant higher than all conditions in “anxious, easily upset”

I didn't include the last four questions in the analyze. I feel the experiment induce the result. For example, “A voice agent that always tried to correct itself after a mistake would waste my time”. C1 is significantly high than other 3 conditions. The reason of this result might be the participant from C1 can’t understand why they need repair (The Alexa is always perfect). However, the participant from C2 might really want the self-repair (They just had awful experience). Please let me know what do you guys think. I will also ask sue about this tomorrow.

Also, are all questions equally important? Shall we run the entropy?