

**Do not be deceived by your emotions:
The Effects of Emotions on Cognitive Functioning and Perceived Crowdedness
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University of British Columbia
PSYC 321
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**Do not be deceived by your emotions:
The Effects of Emotions on Cognitive Functioning and Perceived
Crowdedness**

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University of British Columbia
Psychology 321

THE EFFECTS OF EMOTIONS ON COGNITIVE FUNCTIONING, PERCEIVED CROWDEDNESS

The Effects of Emotions on Cognitive Functioning and Perceived Crowdedness

Executive Summary

This report will provide a detailed description on our experiment on how emotions affect cognitive functioning and perceived crowdedness which was conducted through means of asking UBC students to fill out an online survey and tests. We hypothesized that participants' moods would affect their cognitive function and how well they perform on cognitive function tests. Higher score on positive emotions would result in better performance on the cognitive tests, whereas higher score on negative emotions would result in poorer performance on the cognitive tests. We also assumed that their emotions would affect the way they perceive crowdedness. We predicted that higher score in negative moods would result in increased perception of crowdedness while positive moods would decrease perception of crowdedness. The results from calculating the correlation between two sets of variables, emotions/crowdedness and emotions/cognitive test scores showed that there was no significant correlation between the variables. Rather, the opposite of our proposed correlation were found significant. The limitations, flaws and future study recommendations were also discussed in details in the last section of this report. Data, graphs and other information generated from this study can be found in the appendices.

Research Question and Hypothesis

With increasing focus on education importance in society, many people are aiming to excel in their academic performances in hopes to receive a degree and diploma to further pursue their career. Therefore, it is important to make notice of what could possibly be aiding and supportive in helping students to focus and be more effective in their studying. We decided to focus on how students' emotions affect their perception of crowdedness and their cognitive functions in informal learning spaces. To explore this question, we worked with a UBC Client and conducted a research to examine if individuals' moods affect their perception of crowdedness, and if their moods affect their performance on cognitive tests. First of all, we hypothesized that the participants moods would affect their performance on cognitive tests. For instance, if an individual has a higher score on positive emotions than negative emotions, it should positively correlate with a higher score in his/her cognitive function which is quantified in their scores on cognitive tests (the types of tests will be specified in method); and if someone scores higher in negative emotions than positive emotions, they should have a lower score on cognitive tests. Secondly, we hypothesized that participants' emotions affect their perceived crowdedness and we tested this hypothesis by calculating the correlation between emotions and perception of crowdedness; if an individual score higher on negative emotion rating, the perceived crowdedness should increase. In contrast, their perception of crowdedness should decrease when they score higher on positive emotions than negative emotions.

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Methods

Participants

The participants were 34 undergraduate students from different faculties attending the University of British Columbia. The age range was from 19 to 24 and most of them visited the learning places for academic purposes such as studying for examinations or doing assignments.

Conditions and Measures

All of the participants were asked to complete the online survey. The online survey consists of five main categories such as self-authenticity, affective states, environmental perception, cognitive tests, and demographics. The category of self-authenticity asked questions regarding how the participants would feel in this environment and how much they can truly be themselves in the informal learning space. The participants were advised to rate their authenticity on a scale from 1 (I feel inauthentic) to 7 (I feel authentic) (See appendix J). The affective states examined the participant's current emotional states in the current location. It included a scale that was comprised of a number of words that illustrate different feelings and emotions such as "attentive" and "upset". The participants chose their degree of feelings on the scale, ranging from 1 (Very Slightly or Not at All) to 5 (extremely) (See appendix I). Lastly, the cognitive tests were made to assess the participants' cognitive function including Raven's matrices (Raven test), spatial task test, and cognitive control task. The Raven test had questions that consisted of visual patterns (See appendix K). This task examined the ability of fluid intelligence such as using logic and thinking clearly about complex problems (Raven's Progressive Matrices (RPM), n.d.) (See appendix K). In the spatial test, the participants were tested for not only their working memory span but also their spatial ability, which includes spatial perception, mental rotation and spatial visualization (Bogue & Marra, 2003) (See appendix K). The cognitive control task was included to test participants' ability of executive function that is processing information and behaviour depending on the current goals (Cognitive Control, 2017) (See appendix K).

Procedure

In this research, we conducted the survey in informal learning spaces, the main level of Neville Scarfe and the third and fourth floor of Irving K. Barber. We approached students who were present at the three locations during the day and explained to them the purpose of the survey, and asked if they would agree to participate in our research. We also asked if they would like to provide their email addresses so they can be entered into a random draw to win a \$50 Starbucks Gift card at the end of our research project.

Participants were given the choice to fill out the survey on our laptops or on their own. Then, they were advised to take their time and be prepared to commit for around 30 minutes although most of participants finished the survey within 20 minutes. We wanted the participants to notice the duration of this survey would be longer than usual survey. At the end of the survey, we provided them with our E-mail addresses and told them to feel free to contact us if they have any further questions or if they would like to know the result of our study.

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Results

Based on the results of the participants negative emotions and positive emotions (PANAS), we took the average of those scores and the average of their test scores on the three different cognitive tests and we correlated the two. We also took the scores of the crowdedness that participants perceived in the environment and correlated that with their negative emotions and positive emotions. The results of the spatial test accuracy and positive emotions were significant with a p-value of 0.009038 and $r=0.441$ (See appendix A and L). This means that the more positive the emotions of the participants the more accurate the results were for the spatial test. As for the recall test and positive emotions there was a negative correlation of -0.555, this means that the more positive the emotions of the participants the poorer the recall, (See appendix B and L), thus it does not support our hypothesis. In fact, it was the reverse of what we predicted in the beginning of the study. The participants would score better if they had negative emotions according to the results we found. However, the results of the recall test and positive emotions were significant with a p-value of 0.000658 (See appendix B and L). The r of correlation between crowdedness and negative emotion score: 0.1863. The calculated p-value based on the r is 0.2915, which is not significant at $p < 0.05$. The P-value of negative emotions and Raven test accuracy is significant, $0.009948 < 0.05$. The P-value of negative emotions and spatial test accuracy is insignificant (0.24247) at $p < 0.05$. The P-value of negative emotion and recall test accuracy is significant (0.01575), at $p < 0.05$. Our hypothesis of negative emotions affecting the perceived crowdedness was not supported. Also, both positive and negative emotions did not have an impact on the results of the participants Raven test scores. Participants' negative moods also did not have an impact on their Spatial test (See appendix C) scores as well as Recall tests (See appendix D). Thus, our proposed hypothesis that participants would have poorer cognitive functioning if they felt more negative moods was also not supported. However, in the spatial test, the results showed a positive correlation between participants' positive moods and the cognitive test (See appendix A and L), which partially supported our hypothesis (See Appendix A and L). However, there was not enough data to conclude that this result supports our hypothesis because this was only one out of three cognitive tests, showing the positive correlation between the cognitive tests and positive emotions.

Discussion

Our hypothesis was partially supported by the results on spatial testing being correlated with positive emotions. However, it did not support our hypothesis on lower negative emotion scores being correlated with spatial test accuracy scores. Further research is needed to find out what caused the difference between the spatial test and Raven or recall test. We encountered several limitations during the process of conducting the surveys. The majority of students present in the informal learning spaces were all busy studying or working on assignments and therefore people were reluctant to participate in doing our survey. A key reason for this situation was because completing the whole survey would take the participant up to about 30 minutes. Furthermore, another

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possible reason for the limited number of students participating in our research could be the reward. The reward that we were offering to attract and collect more participants might not have been appealing to them. Thus, it might not have been worth as much as the amount of time they would need to spend on the survey. As a result, our data is based on a relatively small sample size of N=34. One of the participants did not do the recall test and we still included this data in our calculation by assigning a zero on the accuracy of that test. Therefore, it might decrease our data's reliability.

This research partially suggests that emotion, perception of crowdedness, and cognitive function may play a role interchangeably. In order to make implications, more research needs to be conducted. Such as, whether improving the student's' emotion states could also improve their studying efficiency and how emotion enhancement can be achieved. Future studies could focus on rearranging the furniture in both locations, Neville Scarfe and Irving. The research can be on if a specific way of arranging furniture in the study areas could help enhance the students' studying experience. The study could have two control weeks and two experimental weeks. The control weeks would leave the furniture as usual and for the next two experimental weeks, researcher could rearrange the furniture to make the space into an optimized environment for studying. Finding the most appropriate furniture arrangements that could enhance studying performance can benefit students at UBC. In addition, this result can be applied to other study areas at UBC and eventually it would improve students' studying experience at UBC.

Recommendations for our UBC Client

There are several recommendations we would suggest to our UBC Client. First, a reduction in the length of the survey or more attractive compensation would be helpful in recruiting more participants. The length of the survey was lengthy, thus many participants may have lost interest and focus while answering the survey questions. Most of the participants were at the learning spaces to study and had work to finish so some may even had answered the survey questions quickly to get it out of their way. This may have compromised the validity of our data.

Moreover, there should be some proper incentives to motivate the participants to take the survey and answer the questions to the best of their ability. This research shows that fairly compensated participants are shown to be more compliant and focused (Groth, 2010). As it turns out, an unknown chance of winning a fifty dollar Starbuck's Gift card was not deemed as an appropriate or, motivating enough, incentive for the participants who were required to spend at least 10 minutes out of their study time to do the survey. Mduluzza et al. (2013) argues that participants and volunteers expect appropriate compensations for their time and the strength of incentives should be proportionate to the length and required effort of the survey. Furthermore, a monetary incentive is not necessary since the key to motivate a person to participate in a survey is by providing a sense of being adequately compensated. The forms of compensation can vary from being more tangible to less tangible, monetary to non-monetary (Singer, 2017). In order to determine the proper incentive and length of a survey, we suggest that client could conduct a simple survey or find some articles regarding students' preference on the length of the survey and what kind of incentive would motivate them to do surveys (may it be cookies, coupons or iPads, etc.).

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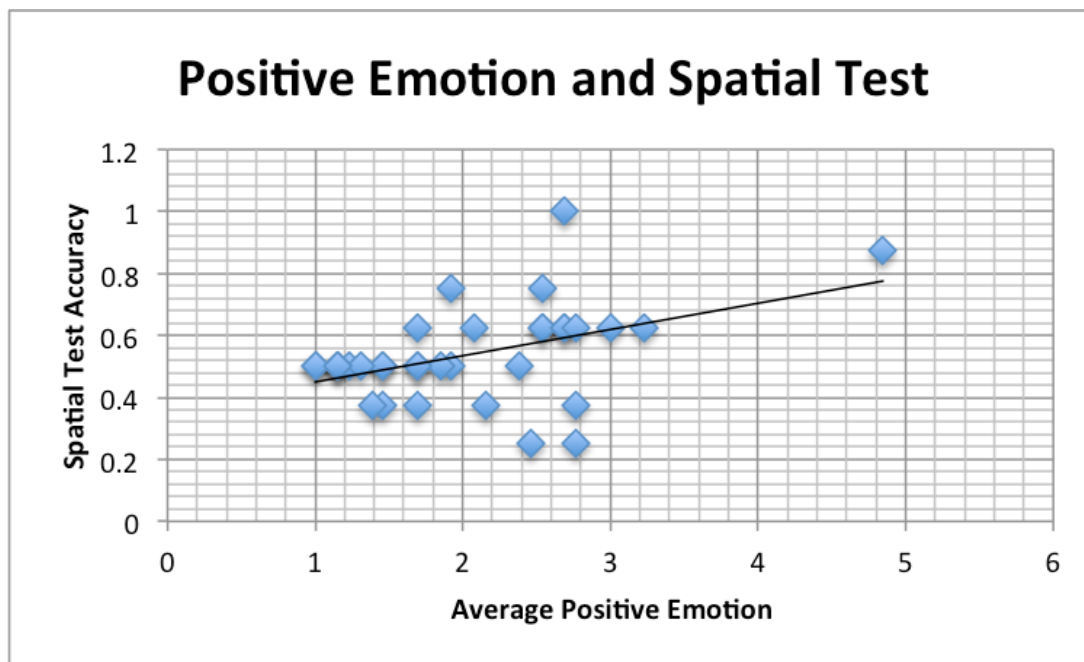
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Appendix A

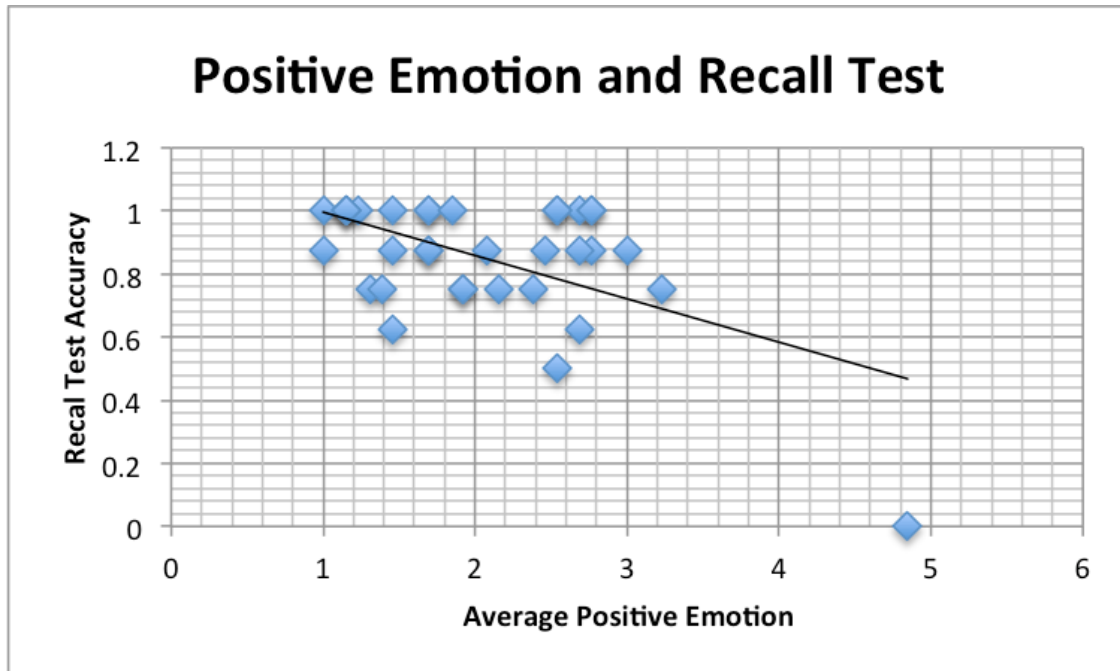
(Correlation between Positive Emotions and Spatial Test)



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Appendix B

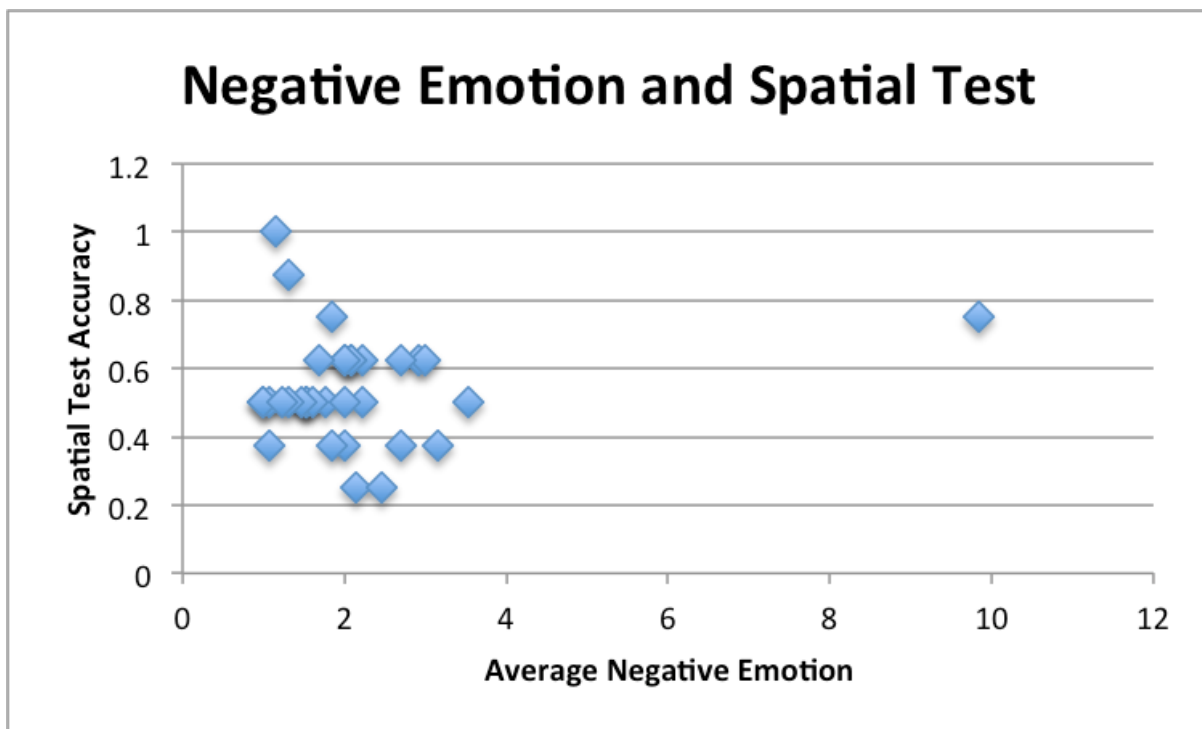
(Correlation between Positive Emotions and Recall Test)



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Appendix C

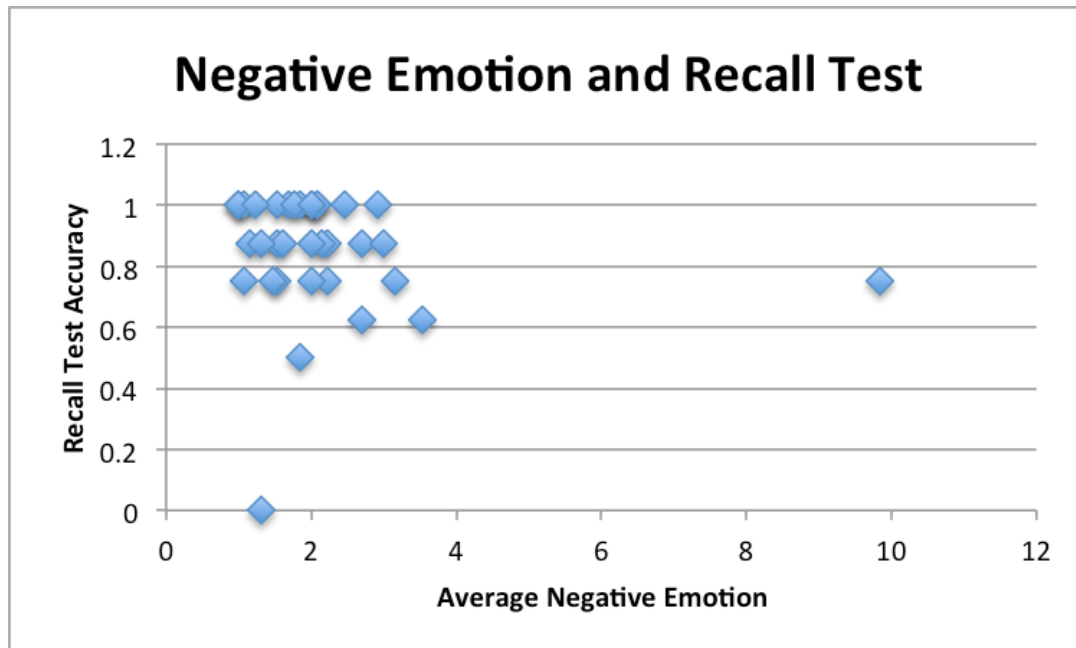
(Correlation between Negative Emotions and Spatial Test)



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Appendix D

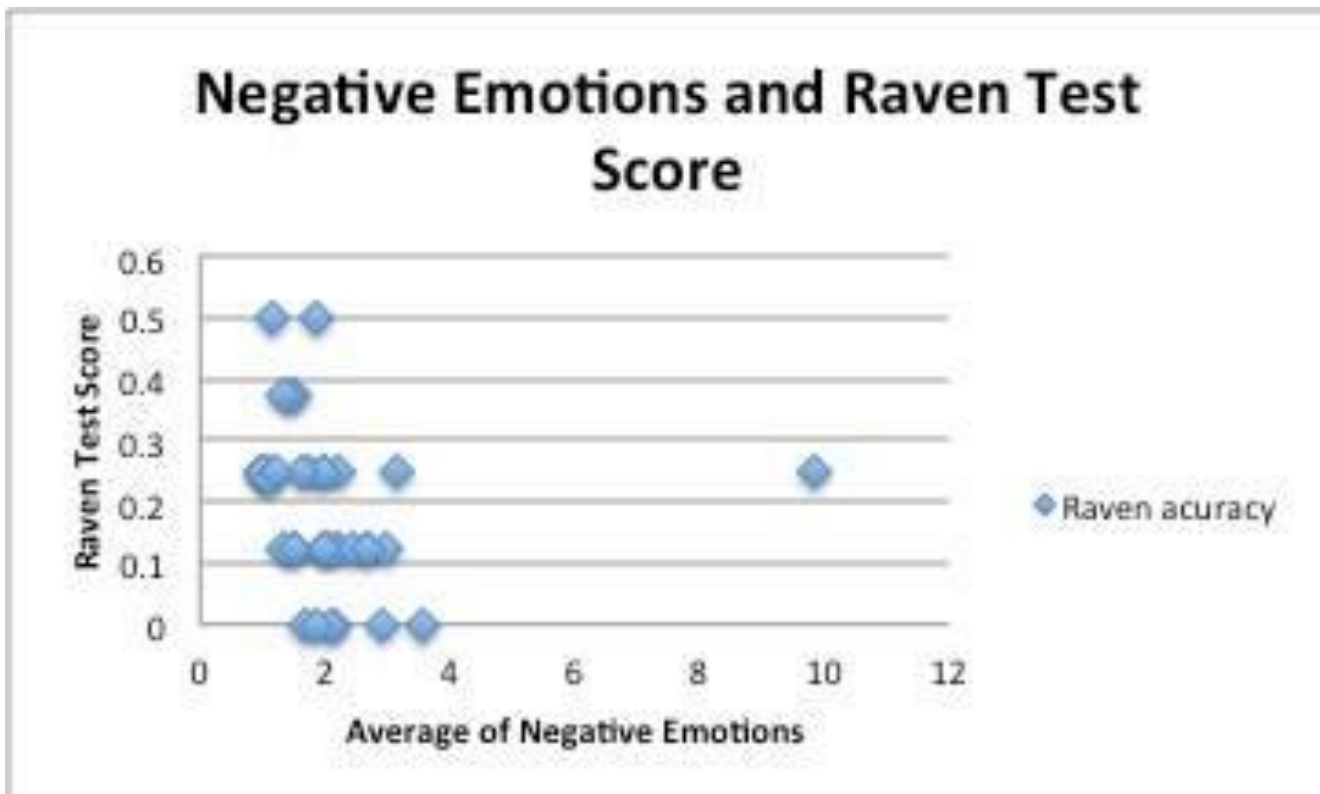
(Correlation between Negative Emotions and Recall Test)



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Appendix E

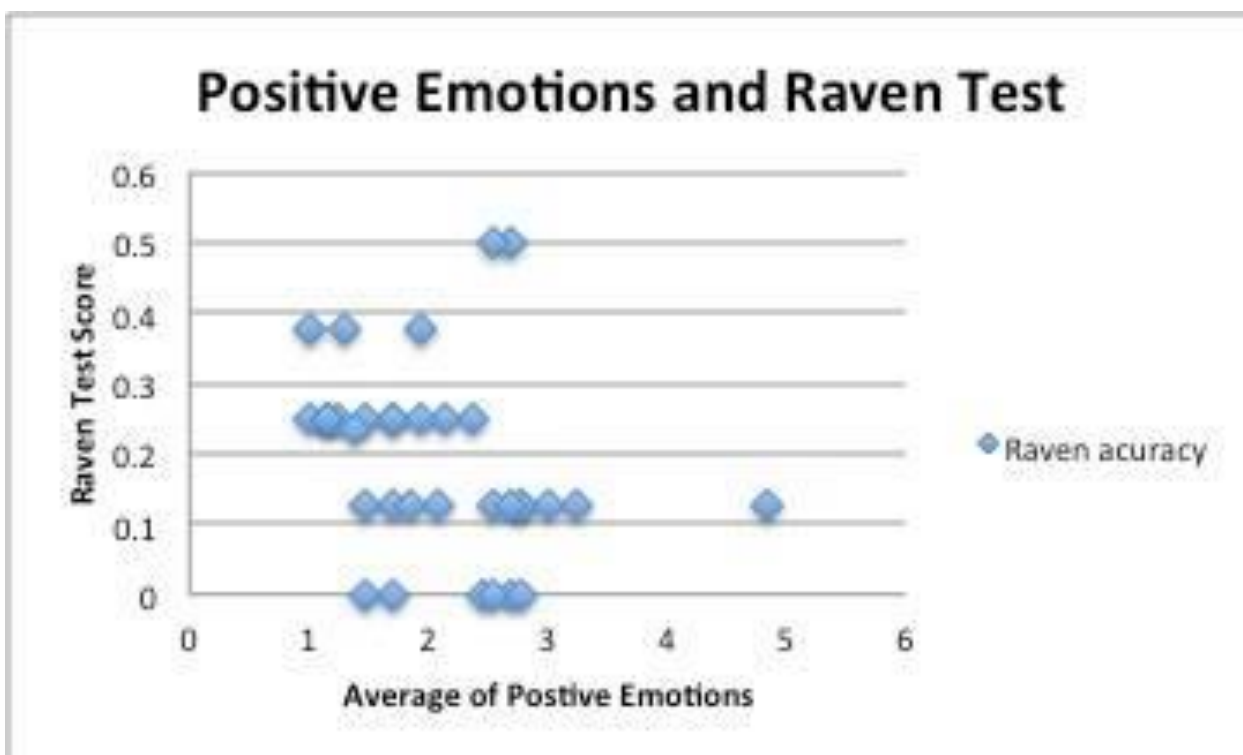
(Correlation between Positive Emotions and Raven Test)



Appendix F

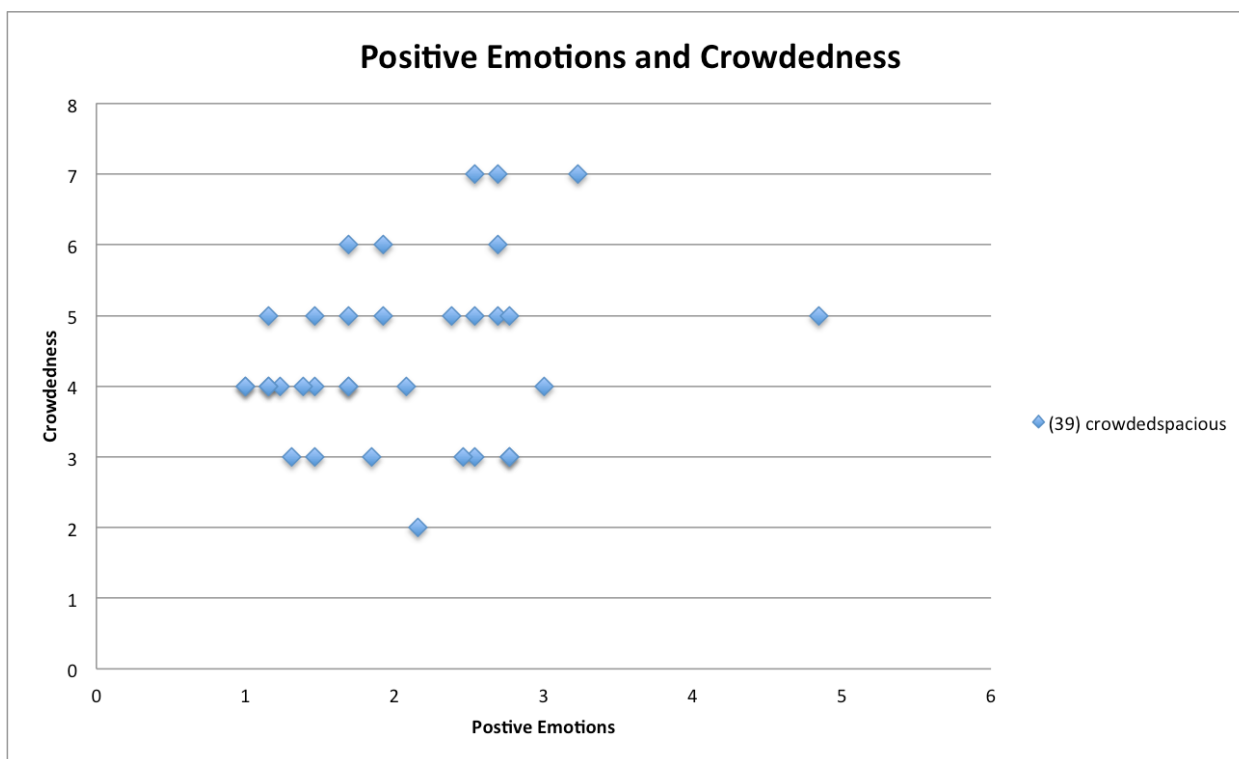
THE EFFECTS OF EMOTIONS ON COGNITIVE FUNCTIONING, PERCEIVED CROWDEDNESS

(Correlation between Positive Emotions and Raven Test)



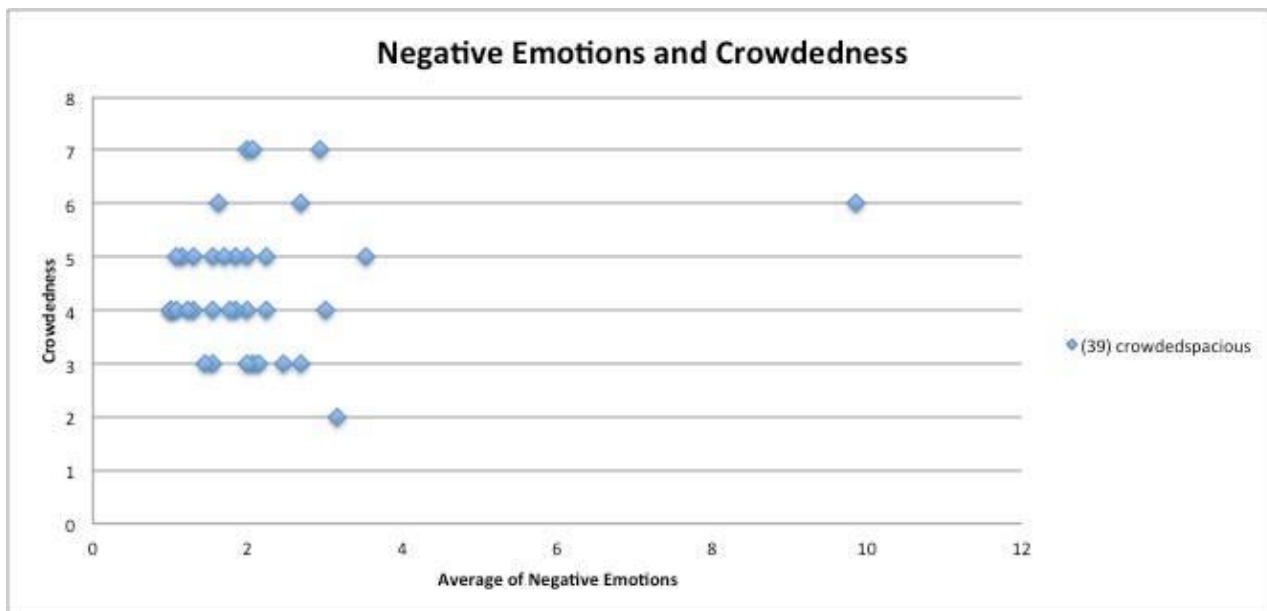
THE EFFECTS OF EMOTIONS ON COGNITIVE FUNCTIONING, PERCEIVED CROWDEDNESS

(Correlation between Positive Emotions and Crowdedness)



THE EFFECTS OF EMOTIONS ON COGNITIVE FUNCTIONING, PERCEIVED CROWDEDNESS

(Correlation between Negative Emotions and Crowdedness)



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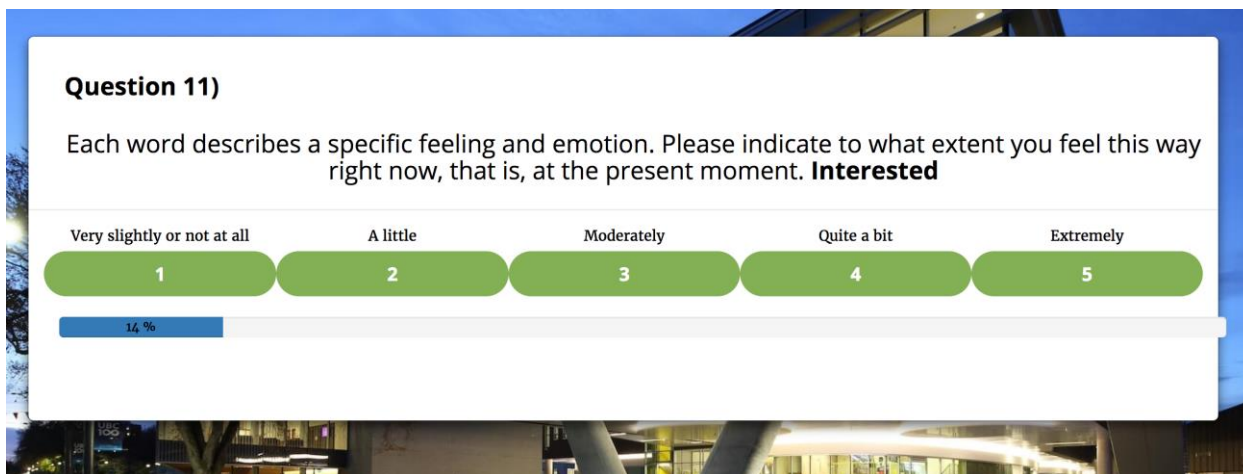
Appendix I (Example of affective states test)

Question 11)

Each word describes a specific feeling and emotion. Please indicate to what extent you feel this way right now, that is, at the present moment. **Interested**

Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
1	2	3	4	5

14 %

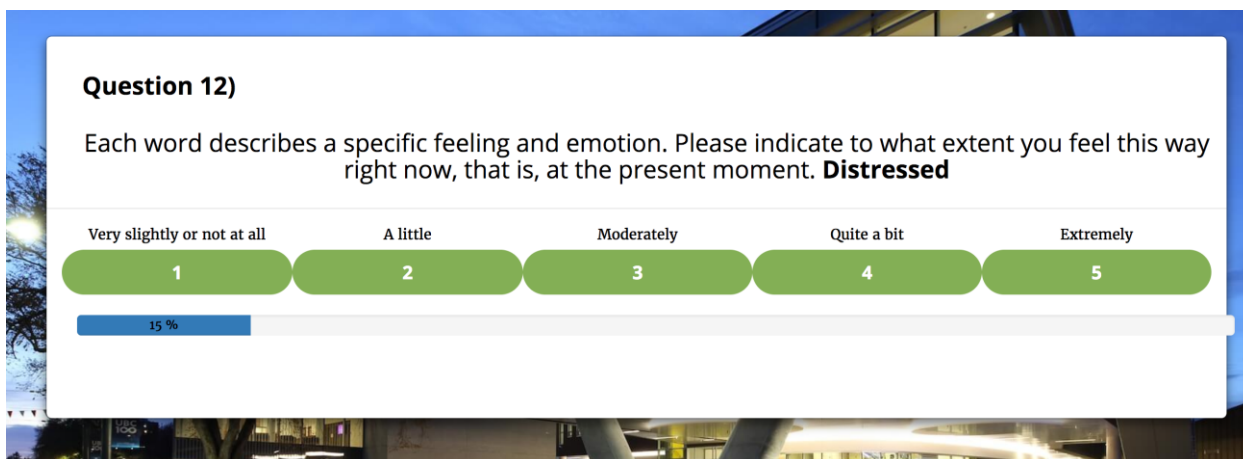


Question 12)

Each word describes a specific feeling and emotion. Please indicate to what extent you feel this way right now, that is, at the present moment. **Distressed**

Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
1	2	3	4	5

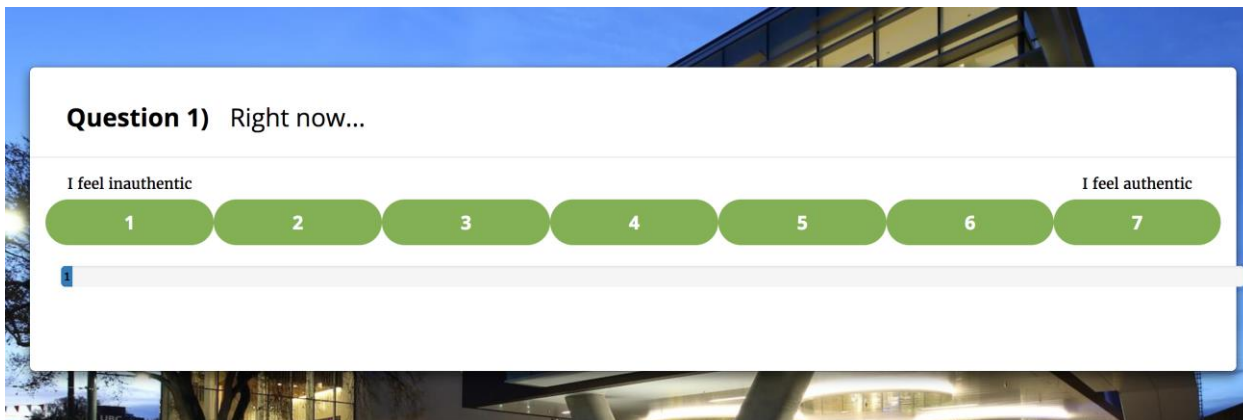
15 %



Appendix J

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(Example of self-authenticity questions)

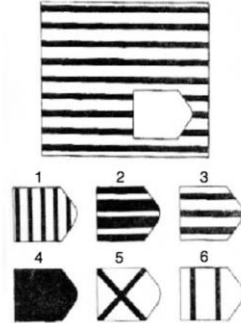


The image shows a digital interface for a survey question. At the top, it says "Question 1) Right now...". Below this, there is a horizontal scale with seven green buttons numbered 1 to 7. The scale is labeled "I feel inauthentic" on the left and "I feel authentic" on the right. A blue vertical bar on the left side of the scale indicates the current selection, which is at position 1. Below the scale is a text input field with a small blue icon on the left.

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(Example of Cognitive function tests)

You will see a picture at the center of the screen. The bottom right corner of the picture is missing. Please look at the pattern and think what piece is needed to complete to picture. Then find the right piece out of a few candidates. Only one piece is correct. Please type on the keyboard the number of the piece that you think is correct.

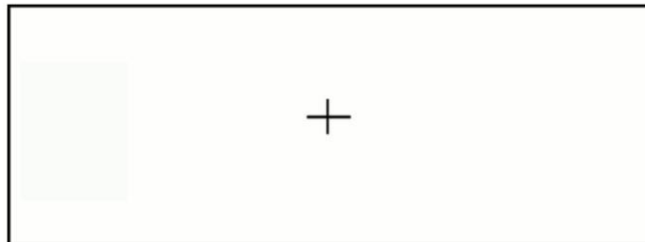


(Raven test)

First please fixate on the cross "+". An image will appear either to the left or the right side of the cross. Every time you see the image, press with you finger on the SAME side as the image.

For example, if a circle appears on the left side, press the number 1 key with your left hand. If the circle appears on the right, press the number 8 key with your right hand.

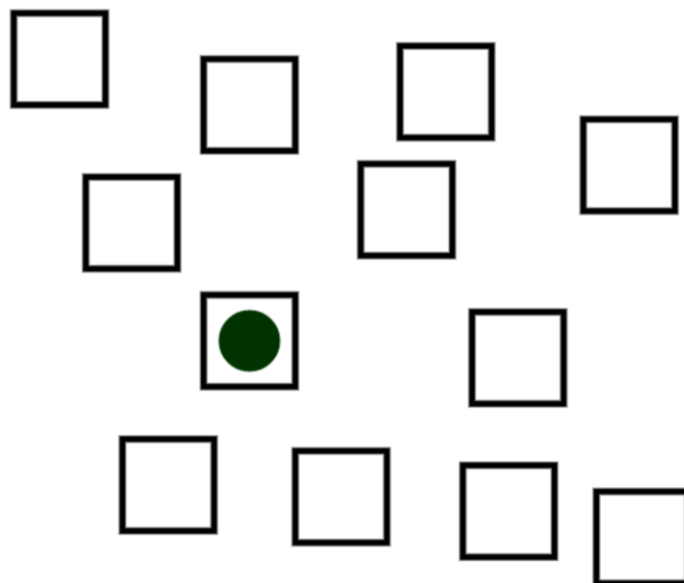
You can practice on the image below. When you feel like you have got the idea, you can click on "Continue" below to proceed.



(Special test)

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Question 56)



(Cognitive control test)

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Appendix L

(Chart: Scores of each participants' averages of Positive/Negative Emotions and accuracy score of each cognitive function tests-Raven, Spatial, and Recall tests)

DR	DS	DT	DV	DW	DX	DY
Avrg of Positive Emotions	Avrg. of Neg. Emotions	(39) crowdedspac	Raven accuracy	Spatial	Spatial accuracy	recall test(Accuracy)
2.153846154	3.153846154	2	0.25	3	0.375	0.75
2.076923077	2.230769231	4	0.125	5	0.625	0.875
1.461538462	3.538461538	5	0	4	0.5	0.625
1.923076923	9.846153846	6	0.25	6	0.75	0.75
2.384615385	2.230769231	5	0.25	4	0.5	0.75
3.230769231	2	7	0.125	5	0.625	0.75
2.769230769	2.692307692	3	0.125	3	0.375	0.875
2.692307692	2.923076923	7	0	5	0.625	1
2.538461538	2.076923077	3	0.125	5	0.625	1
2.461538462	2.153846154	3	0	2	0.25	0.875
2.538461538	2.076923077	7	0	5	0.625	1
2.769230769	2.461538462	3	0.125	2	0.25	1
1.692307692	1.538461538	4	0.125	4	0.5	0.875
1.461538462	2	4	0.125	3	0.375	0.875
1.692307692	2	5	0.25	5	0.625	1
2.692307692	1.153846154	5	0.5	8	1	0.875
1.923076923	1.538461538	5	0.375	4	0.5	0.75
4.846153846	1.307692308	5	0.125	7	0.875	0
2.538461538	1.846153846	5	0.5	6	0.75	0.5
3	3	4	0.125	5	0.625	0.875
2.692307692	2.692307692	6	0.125	5	0.625	0.625
2.769230769	1.692307692	5	0	5	0.625	1
1.692307692	1.846153846	4	0	3	0.375	1
1.846153846	1.538461538	3	0.125	4	0.5	1
1.230769231	1.769230769	4	0.25	4	0.5	1
1.461538462	2	3	0.25	4	0.5	1
1	1	4	0.25	4	0.5	1
1.153846154	1.076923077	5	0.25	4	0.5	1
1.692307692	1.615384615	6	0.25	4	0.5	0.875
1.307692308	1.461538462	3	0.375	4	0.5	0.75
1.153846154	1	4	0.25	4	0.5	1
1	1.307692308	4	0.375	4	0.5	0.875
1.384615385	1.076923077	4	0.235	3	0.375	0.75
1.153846154	1.230769231	4	0.25	4	0.5	1

(Chart: r and P-values for each correlation)

	negative emotion and crowdedness	and crowdedness	Raven & Positive	Raven&Negative	Spatial & Positive	patial & Negative	Recall & Positive	recall&Negative
R	0.203700854	0.264771919	-0.285471578	-0.133817785	0.440936553	0.144545146	-0.554991708	-0.108970984
P-value	0.247885	0.130167	0.102312	0.449926	*0.009038	0.414873	*0.000658	0.539458
					*The blue ones are significant			