The Exploration of Visual Attention and E-therapy

Yizhou Tian

Research School of Computer Science and Information Technology

The Australian National University

u7244193@anu.edu.au

Abstract

This report compares two experiments related to HCI. The first study investigates how users allocate their visual attention to the screen. The second experiment explores how to perform a result in e-therapy. This report shares my experience of participating in two experiments, showing the similarity and differences between them and discussing their advantage and disadvantage. Both experiments can bring improvements to the HCI in different aspects.

Introduction

Two experiments are conducted to understand the spatial allocation of visual attention and the effect of E-therapy. The first experiment is carried out in person and the second one is online. This report will describe my experiences in participating in these two experiments, compare the two experiments, and show the relationship between the experiments and Human-Computer Interaction (HCI).

Background and Experiment Objectives

The spatial deployment of attention is an important topic in the study of visual recognition. Spatial attention is a vital process to daily functioning, for example, reading. The visual attention experiment designed by Nicholas Wyche (2023) aims to investigate how users allocate their attention and distractibility of users over time. The measurement of the spatial deployment of attention is based on eye movement, which has never been applied in previous studies. This is an exploratory method as the measurement of attention.

The second experiment on E-therapy is designed by Georgina Lee (2022). E-therapy is a process of interacting with an online therapist in ongoing conversations when the client and the therapist are in remote locations and utilize electronic means to communicate with each other. E-therapy is increasingly popular and shows the tendency of replacing traditional therapy. This experiment intends to figure out the key features to make e-therapy successful.

Experiment Participation

The experiment on visual attention was conducted in the Psychology Building. The experiment consists of three parts. The first part is letter recognition. A series of graphics was presented on the screen. All pictures were a number of letters (either E, F, H or T) combined into a big letter. I was asked to find the H or T from the pattern. At the same time, the eye movement was recorded from the camera. The second part was picture memorization. The participant was required to remember a group of pictures of trees. Then, the screen presented pictures two by two and the participant needed to choose which one of the two pictures had been shown previously. The number of pictures to be memorized was increasing gradually. Similarly, this part also had eye tracking. The third task was a combination of simple arithmetic questions and letter memorization. Easy calculations and letters were displayed in turn. The attendee was required to do the calculation accurately and fast, meanwhile, trying to remember all letters appearing on the screen sequentially. The first task was relatively easy and the second and third ones were more difficult. With the experiment going on, I can feel myself gradually losing attention, and the error rate increased.

The experiment on the features of E-therapy was held online. First, the therapist had an online conversation with me for approximately 10 minutes. The therapist was very professional. Topics of the conversation include the study, the mood, live perspectives, and most importantly, teamwork. Then, I was assigned to a team and asked to collaborate with my teammates online and finish some tasks. The tasks include puzzles and numbers memorization. All tasks were extremely difficult. It required four people to cooperate to complete the tasks. All team members in my group were friendly and polite. We all focused on the questions and performed a good collaboration. The guidance from the therapist previously was on cooperation, communication, setting goals, different views on the question, and how to create a sense of belonging in the group, and it was helpful in completing the missions though no details of tasks were provided before the experiment. The advice from the e-therapist improved the efficiency of the collaboration. Finally, the researcher provide a questionnaire to complete. The questions include the content of the e-therapy session, whether the e-therapist provided helpful advice on teamwork, feelings on teamwork, and perspectives towards the e-therapy. The questionnaire is more important than the result of the teamwork. The e-therapy requires substantial human interaction, so the opinion of the subject towards the whole trial is more valuable. In my assumption, there might also be a control group in the experiment. The control group did not have the e-therapy or had a face-to-face before the puzzles. Then, the performance of the e-therapy group and the control group and the feelings of the participants from the two groups are compared to determine whether the e-therapy is helpful.

Strengths and Weaknesses

In general, the experiment on visual attention is more well-designed and productive. The structure of the whole experiment is logical. Every part is related to each other, and the difficulty of the tasks increased incrementally. Every task is easy for participants to understand and before each part, a practice round is provided to avoid confusion. The tasks are programmed with MATLAB. Several advanced equipment including the eye track camera are used in the process of the experiment. Also, the experiment is highly relevant to Human-Computer Interaction, studying the distribution of users' visual attention on the computer screen.

The only disadvantage of the experiment is that the consumption of the participants' energy is too high. It requires the subject to stare at the screen and accomplish tasks for almost an hour. My eyes felt exhausted after the experiment finished. However, this issue can not be solved since the entire experiment is exploring how users' attention to the screen decreased slowly.

In the second experiment, the participant can have a pleasant experience. It created a mock e-therapy environment. The participant did not have much pressure from the tasks, and it was enjoyable to cooperate with friendly group members.

Nevertheless, despite these strengths, there are several weaknesses in this experiment. First, the result of the experiment is too objective, depending on the attendees' opinions and their opinions are not absolutely accurate when filling out the questionnaire. Second, the result is between quantitative and qualitative, which is difficult to draw conclusions. Third, the experiment requires a considerable number of samples to generate the conclusion. It also needs the researcher to put a significant amount of energy into it if every participant should take a 10-minute e-therapy. Last, since the experiment is conducted online, there are many problems in the operation. For example, participants need to solve puzzles while communicating with group members, but the system is not well-designed so it is inconvenient to do these things at the same time. Overall, this experiment still has substantial scope for improvement.

Experiment Comparison

The two experiments have a few similarities. They all require participants to finish a series of tasks on the computer. In the first experiment, the participant needs to finish it independently, and the other one demands collaboration. Additionally, both experiments have a strong connection with the computer. The experiment about eye tracking and attention studies with part of the screen user will watch on and how long the user can stay focused on the computer. The second experiment stimulate an e-therapy environment, where the subject talked to the e-therapist online, instead of face-to-face.

There is a significant difference between the two experiences. First, the environment of the two experiments is totally different. One is conducted in a laboratory and the other is online. Second, the key of the first experiment is completing the task, while the key of the second experiment is communication and tasks are one of the measurements of the success of communication. Third, the topics of the two experiments are totally different. The first experiment studies the user's attention. The second research studies the features of e-therapy. Last, the two experiments use different methodologies. The first experiment uses the quantitative method. It analyses the correctness of participants completing the tasks and how their eyes move when different images are shown. The second experiment is more likely to use a mixed method. It will ask how participants feel about e-therapy and teamwork (qualitative). It will also check the efficiency of the cooperation and requires participants to rate each topic of the conversation (quantitative).

Relationship between Experiments and the Human-Computer Interaction

The first experiment takes an important role in human-computer interaction (HCI) and web design. This experiment is investigating how users will allocate their attention and which part of the screen users will pay more attention to. The result of this experiment can be significantly beneficial to web designers. Web designers can place important information in the area users will spend more time on. Similarly, the complexity of the website should be considered so users will not lose their attention.

The second experiment also has a connection to HCI development. After COVID-19, the online class is proven to be feasible. This experiment explores if e-therapy can replace traditional psychological therapy. It focuses more on the success of online human communication, including the talk between the participant and the therapist, and the conversation between group members. There are human interaction functions on the website, for example, the bulletin board and the feedback form. The result of this study can inspire web designers on how to improve these functions, so users will spend more time on the website.

Conclusion

To conclude, I have participated in two experiments related to the HCI development process. The first experiment studies visual attention and eye tracking and the second one focuses on the features of e-therapy. The first experiment is more productive than the second one. In this report, my experience of participating in two experiments was discussed. Both experiments could be applied in the HCI. Future research will be conducted after the results of the experiments are released.

Reference List

Lee, G. E., Platow, M. J., & Cruwys, T. (2022). Group-based processes as a framework for understanding the working alliance in therapy. *Counselling and Psychotherapy Research*, *23*(1), 222–234. https://doi.org/10.1002/capr.12585

Wyche, N. (2023). Comparing Measurements of the Spatial Deployment of Attention. Experiment Brief, The Australian National University.