

# **Inspiration from User-evaluated Experiments of HCI and Web Design**

The Australian National University  
COMP6780 - Web Development and Design  
Author: Zeyuan Cheng  
Student ID: u7148404

## **Abstract**

This structured report covers two experiments I participated in in the course of Web Development and Design in the first semester of 2021 at Australian National University, including a detailed explanation of the purpose and methods of these experiments, my personal experience, and its relevance to the field of human-computer interaction (HCI). This report will focus on the link between the experiment and the web design branch of HCI, its purpose, communication and usability enhancement techniques.

## **Introduction**

Human-computer interaction (HCI) is a multidisciplinary course, focusing on computer design and user experience. It brings together expertise in computer science, cognitive psychology, behavioral science, and design to understand and facilitate better interaction between users and machines. Human-computer interaction (HCI) has four main components: user, task, tool/interface, and context (Kaptelinin and Nardi, 2012). HCI research requires that the observation results obtained be evaluated when users perform certain tasks and user habits together (Long and Whitefield, 1989). Nowadays, with the increase in the number of computer users, the popularization of key technology applications, and the deep understanding of human behavior and psychological process, human-computer interaction research is becoming more and more important.

In this report, I will provide knowledge and practical suggestions on human-computer interaction and web design. Through the direct experience and reflection of the two experiments, and the comparison of the two experiments, this paper analyzes and discusses the correlation between user participation in the experiment and network design and development. The two experiments were inspired by the Institute of computer science and psychology at the Australian National University. The experiment includes:

- Experiment 1: Visual Search and Cognitive Failures
- Experiment 2: Visual and Verbal Learning with Trivia

Human computer interaction (HCI) covers a wide range of computer science fields, including web design and user evaluation experiments, which are very important in the development of HCI.

## **Background**

### **Experiment 1: Visual Search and Cognitive Failures**

This project aims to study the dynamic rescaling mechanism of visual attention focus. This kind of change is very important for the implementation of the mission, but so far the mission knows little about the process of these changes. Using an innovative cognitive psychological approach, combined with individual differences, experiments, and training frameworks, the project is expected to generate new theoretical knowledge about attention rescaling and insights on how to improve it. The method presents images of visual stimuli, including guns, on computer screens and requires participants to respond to them.

This experiment is an online visual search task to examine individual differences in task performance. Participating in this study will involve performing an online visual search task, in which I will be asked to look at images of an array of objects and determine if the array contains guns. I was also asked to complete some brief surveys asking about their cognitive function, such as how I focused and how much I experienced common cognitive errors or mistakes.

The researchers provided a series of images similar to the X-ray images of security check when arriving at the station by plane or subway. The pictures include clothes, trousers, shoes, socks, books, musical instruments, tools, dolls and other daily necessities, as well as some pictures of guns. The experiment required that pictures with guns be selected. At the beginning of the experiment, I could easily distinguish the pictures with guns. The pictures of some tools and musical instruments were easily confused with the pictures of guns. With the progress of the experiment, about 20 minutes, I had obvious sleepiness. I can distinguish some obvious guns, but it's hard for me to distinguish them when they are overlapped with clothes or instruments of similar colors.

### **Experiment 2: Visual and Verbal Learning with Trivia**

This project aims to explore the cognitive mechanism of visual and language learning. Participants will see trivia claims and make ratings. Participants will answer short questions about claims and will also be asked demographic questions.

In this online learning, I completed a short survey. In the experiment, I read some trivia claim lists and answered some short questions. The questionnaire asked me how I felt about these trifles and how I evaluated them. Then I was asked to choose a series of opinions about the degree of agreement on trivial matters, from never agree to strongly agree. Then I was asked demographic questions about age, nationality, religious belief and political affiliation. This study helps researchers to better understand the intrinsic mechanism of visual and language learning.

The researchers refer to the participants' cognition and rating of some trivial matters, and through the presentation of claim list and some related questionnaires, they have a deep understanding of the internal mechanism of visual and language learning. But there are also some problems, such as some trivial things that we don't meet in our daily life need to be introduced in detail, instead of presenting the list and questionnaire directly.

## **Comparison of the two experiments**

The first experiment about visual search and cognitive failures is a Type A experiment, which is participants only need to make a simple judgment on the images provided by the researchers. In other words, participants passively provide information, which is why, in the eyes of participants, the experiment brings problems, that is, participants are easy to lose their attention when making choices. After doing the same question for about 20 minutes, I found myself in a hurry to finish the question instead of thinking carefully and providing useful data.

The second experiment about visual and verbal learning with trivia is a Type B experiment. Participants' final rating of the trivia list was based on their own experience and their understanding of the most important determinants of the experiment. Researchers refer to the subjects' cognition and evaluation of some trivial matters, but some people who do not understand the meaning of some trivial matters may have bias in their evaluation of some trivial matters.

## **Relevance of user-participation experiments to web design and development**

### **Experiment 1:**

Regarding the first experiment, the subject of this experiment is to study the dynamic rescaling mechanism of attention focus. When participants complete visual search tasks,

such as looking for guns in pictures, they need to specify the criteria of search time and accuracy. Such a standard can be fed back to the participants in the web page to restrict or increase interest. For example, limit the search time, that is, identify ten images in 20 seconds. In addition, increase the reward mechanism, such as identifying 30 pictures, if the correct rate reaches 90%, there will be a certain reward. This feedback mechanism can greatly improve the interest and concentration of participants in this experiment, so that the experimental results are more reliable.

Several interesting interactive elements can be set as rewards, which can be a special welcome page or animation. The ultimate goal is to increase user interest and focus. This is reflected in one of the design principles of human-computer interaction, that is, interactive feedback (Krepki, 2007). Interactive works should give users immediate and appropriate feedback.

## **Experiment 2:**

For the second experiment, the interpretation of user requirements plays a vital role in the design. However, some people who are not clear or too clear about some trivial matters will bring bias to the experimental results. Therefore, a clear explanation or some norm or premise can make all participants have a clear cognition of a specific event, so that the experimental results are more accurate.

In the field of human-computer interaction or web design, it is one of the most important tasks to clearly describe the requirements (Reimer and Douglas, 2003). A detailed and clear requirement will increase the efficiency of web design and make human-computer interaction more convenient.

## **Conclusion**

The two experiments in this paper are typical examples of user evaluation experiments, which have great inspiration for human-computer interaction and web design. The first experiment shows the importance of interactive feedback. The second experiment shows that explaining requirements and understanding requirements are important steps in design. When we design our own website, we can apply the inspiration from the experiment. In addition, these rules can be applied to human-computer interaction and web design, which is the framework of our design process, so that our design is more practical and humanized.

## References

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