Analyzing Human-Computer Interaction: Insights from Experiments in Decision-Making and Visual Perception

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Executive Summary

This report assesses my involvement in two Human-Computer Interaction (HCI) experiments that I completed for the Australian National University's COMP1710/6780 course. It focuses on the experiments' design and the insights they offer into HCI, specifically web design and development.

In Experiment One, participants worked in groups to solve a murder case in order to determine how unexpected information affected their ability to make decisions. It examined the impact of new information—a witness's color blindness—on team dynamics and decision-making, generating qualitative information on cooperative and affective reactions.

In order to investigate "intuition blindness," Experiment Two engaged visual tasks that required tracking shapes and noticing slight changes to focus on individual cognitive processes. Understanding attention and perception is important for developing user interfaces, and this experiment aims to explore that.

Comparative analysis brought to light the differences between individual cognitive assessments and structured group interactions. While the second experiment revealed individual perceptual attention and response to changes, the first experiment provided insights into collaborative behavior under pressure.

These studies highlight the value of cognitive comprehension and empirical user testing in creating user interfaces that are easy to use and effective. They emphasize the necessity of HCI procedures that take into account the dynamics of both individual and collective users, guaranteeing that web interfaces correspond with user expectations and behaviors.

In order to improve interface design and user experience in web development, this summary highlights the key takeaways from these HCI experiments.

Introduction

This report summarizes my experiences participating in two Human-Computer Interaction (HCI) experiments for the Australian National University's COMP1710/6780 course. Solving a murder case as a group exercise constituted the first experiment, which examined the effect of unexpected information on group decision-making. In the second task, which was an individual one, I tracked moving shapes in order to investigate intuition blindness and attentional bias in visual processing. This report will describe each experiment, go over my experiences, and assess how well the designs of the experiments worked. It will also contrast the two studies' approaches and provide conclusions on how well they apply to HCI principles in web design and development.

The First Experiment

Summary of the Experiment

This was an hour-long experiment that was divided into two stages. Participants first read in-depth books on a crime drama case on their own. Following that, they worked in groups to discuss and identify the killer, with a prize for accurate identification. This design sought to evaluate the dynamics of group decision-making as well as individual comprehension.

Description of Personal Experience

An initial survey was conducted as part of the experiment to measure feelings of strength, excitement, interest, and distress. A thirty-page murder case with three suspects and a variety of intricate details, including maps, was given to the participants to read in twenty-five minutes.

During this phase, notes were taken and subsequently utilized in a group discussion.The group discussion was scheduled to last for fifteen minutes, but at eight minutes, an unexpected clue that one of the witnesses was colorblind threw a twist in the evidence. Another emotional survey came next, and after that, the conversation went on for an additional seven minutes. A final emotional survey and the submission of a decision form with the final consensus and some participant personal information marked the end of the experiment.

Evaluation of the Experiment

Strengths:

- The experiment's well-planned stages made it possible to examine in-depth how decision-making and emotional states changed before and after the introduction of new information. (surprise clue).

- Utilizing real-time surveys to record emotional states at various points produced insightful information about the effects of group decision-making under extreme pressure.

Weaknesses:

- The disruption that occurred during the group discussion may have caused bias or interfered with the team's ability to make decisions, which would have affected the discussion's natural flow.

- The accuracy of the group's recollection and discussion points may have been hindered by the reliance on participant note-taking without access to the case material during discussions.

The Second Experiment

Summary of the Experiment

This computer-based experiment focused on the visual processing of stimuli that were presented briefly. The participants' job was to keep track of how frequently squares and diamonds, two geometric shapes, bounced off the edges of the screen. In order to test participants' awareness of unexpected changes, the study added a twist to "intuition blindness" by adding an additional diamond that moved across the screen without bouncing. A handedness inventory and demographic surveys were two more elements of the experiment.

Description of Personal Experience

I used my peripheral vision to track moving green squares and purple diamonds as they bounced off screen borders while focusing on a small blue dot in the center of the screen during the experiment. I didn't realize at first that there was an additional diamond that didn't bounce starting with the fifth task. This oversight brought "intuition blindness" to light. Two surveys were conducted at the conclusion of the experiment: one questioned my presumptions regarding the goals of the study, and the other gathered demographic and linguistic information.

Evaluation of the Experiment

Strengths:

- The experiment was cleverly designed to demonstrate the idea of intuition blindness by gently testing participants' awareness of unexpected changes through the task of counting bounces.

- Surveys on language and demographics were included to provide thorough data that could be used to examine the potential effects of various backgrounds on attention and visual processing.

Weaknesses:

- The experiment's generalizability may be impacted by its reliance on peripheral vision and its subtle introduction of changes, which could result in a range of results depending on individual differences in visual perception and attention.

- Since such intense focus is uncommon in everyday visual processing, the experiment's high concentration requirements may not accurately reflect everyday visual processing.

Comparison and Conclusion

A number of significant distinctions in terms of design, data collection, and insights obtained become apparent when contrasting the more psychologically nuanced testing of the second experiment with the structured methodology of the first. Every strategy has its own benefits and difficulties, offering insightful design lessons for human-computer interaction (HCI).

Structured vs. Subtle Psychological Testing

1. Design Approach:

- First Experiment: There were distinct tasks, phases, and goals in this extremely structured process. The approach comprised activities for both individuals and teams, and it was intended to track changes in group dynamics and decision-making by introducing a surprise element. Controlled observations of particular behaviors, such as teamwork and emotional reactions to unexpected information, are made possible by this kind of structured design.

- Second Experiment: This took a more nuanced psychological tack, emphasizing individual cognitive functions as opposed to group dynamics. To investigate "intuition blindness," the experiment gradually altered test subjects' perceptual awareness without requiring prior knowledge. To accurately assess participants' intuitive and perceptual responses, this approach depends on their ignorance of the experiment's objectives.

2. Type of Data Collected:

- First Experiment: Data were gathered on individual reactions to new information, team decision-making processes, and emotional responses at various phases. This offers rich qualitative data on people's responses and adaptations to new challenges in collaborative settings.

- Second Experiment: concentrated on each participant's unique cognitive reactions to visual stimuli, collecting quantitative information on the frequency with which changes were noticed and qualitative information from surveys about participants' assumptions about the aim of the experiment. This combination of information aids in understanding how each person's sensory processing and attention vary.

3. Insights Gained:

- First Experiment: Understanding how people interact, adjust their perspectives, and come to agreements in groups are examples of insights. It also clarifies how feelings like astonishment or puzzlement affect collective decision-making.

- Second Experiment: gives information about cognitive and perceptual processes, particularly how people can fail to notice changes in their surroundings. This phenomenon has significant implications for the design of user interfaces that demand awareness and attention from users.

Relevance to HCI

In HCI, it is essential to comprehend both individual cognitive processes and group dynamics. A thorough understanding of users' perceptions, interpretations, and interactions with technology is essential for designing interfaces:

- Visual Attention and Perception: The second experiment's emphasis on vision has a direct bearing on HCI interface design. User attention must be efficiently captured and directed to pertinent areas by interface designers without being overly intrusive. This is particularly crucial in settings where efficiency or safety are paramount, like in software for medical or automotive applications.

- Intuitive Design: The necessity of intuitive design that conforms to user expectations and cognitive patterns is demonstrated by both experiments. For instance, improving usability and user satisfaction can be achieved with a user interface that gently leads users through its features without demanding their full attention.

- Accommodating Diverse User Experiences: We are reminded of the value of designing for diverse user bases with a range of visual processing capabilities, cultural backgrounds, and cognitive styles by the demographic surveys from the second experiment. In order to create inclusive and accessible technologies, HCI practitioners need to take these factors into account.

All things considered, these experiments' lessons highlight the value of empirical user testing and the necessity of striking a balance between structured evaluations and knowledge of subtle cognitive behaviors. Maintaining this balance facilitates the design of user-centric interfaces that are effective and intuitive for a variety of user groups.