

Abstract

This lecture delivers an A-to-Z tutorial on conducting an empirical experiment (aka user study) in human-computer interaction and writing a research paper. Although the core topics are general in nature, eye tracking examples are used to frame the discussions. Attendees participate in an experiment conducted during the first session. Working in pairs, attendees take turns acting both as investigator (i.e., instructing the participant, observing and recording data) and as participant (i.e., performing tasks as instructed). The data collected are analyzed during the break and the results are presented in the second session. The data are illustrated using charts, and summarized using tables of means and standard deviations, ANOVA (analysis of variance) tests, correlation analyses, linear regression, etc. The second session also includes a demonstration on how to write a successful research paper, including pitfalls to avoid.

Attendees require no specific background other than a general knowledge of human-computer interaction as conveyed, for example, through an undergraduate course in HCI or user interfaces or attendance at HCI conferences. Knowledge of advanced statistics, such as the analysis of variance, is NOT required.

The lecture will introduce the following topics:

- What is empirical research and what is the scientific method?
- Discovering and refining topics suitable for research in HCI
- Formulating “testable” research questions
- How to design an experiment (broadly speaking) to answer research questions
- Parts of an experiment (independent variables, dependent variables, counterbalancing, etc.)
- Group participation in a real experiment
- Experiment results and discussion (Note: Presenting the results of an experiment in which attendees have just participated affords a strong opportunity to revisit and expand on the elements of empirical research.)
- Experiment design issues (choosing between within subjects vs. between subjects factors, internal validity, external validity, counterbalancing test conditions, etc.)
- Data analyses (main effects and interaction effects, requirements to establish cause and effect relationships, etc.)

How to organize and write a successful research paper (including suggestions for style and approach, as per typical conference submissions)

Hands-on Session

In the hands-on session, students will work with software that implements the ISO9241-9 testing protocol for non-keyboard input devices. An eye tracker is used as the testing apparatus. The software implements a typical Fitts’ law target selection task, modified to receive input from the eye tracker. Data are collected, summarized, analysed, and presented in charts as typically found in research papers.