05. Robust and Ethical Experiments

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Today’s class

• Overview of (some) HCI methods
• Designing robust & ethical studies
HCI Experimental Methods
Human-Computer Interaction (HCI)

• You are not the user! You know too much!
• Think about the user throughout design
• Involve the user
What is usable?

• Intuitive / obvious
• Efficient
• Learnable
• Memorable
• Few errors
• Not annoying
• Status transparent
Determine use cases and goals

• What are the concrete tasks users should be able to accomplish?
  – Based on understanding of users!

• Set realistic metrics
Example: paper prototypes

• Don’t overthink. Just make it.
• Draw a frame on a piece of paper
• Sketch anything that appears on a card
• Make all menus, etc.
• Redesign based on feedback
• “Think aloud”
Iterative prototyping is crucial!

High-fidelity, "Wizard of Oz," low-fidelity
Example: low-fidelity paper prototype

SCENARIO 1: "I want to listen to alternative music"
Example: paper prototype
Example: think aloud

• Download and install software that lets you encrypt your email
  – “Think aloud” of whatever’s on your mind
  – Give them an example

• Additional things you can ask:
  – What are you thinking now?
  – What do you expect to happen if you do X?
  – How did you decide to do that?
Research Studies and Methods
Research studies: purpose and goals

• What are you hoping to learn?
• What are your hypotheses?
  – Often listed explicitly in a paper
• What are your metrics for success?
  – More secure, quicker to use, more fun, etc.
• What are you comparing to?
• What data might be helpful?
Broad types of studies

• Descriptive study
• Relational study
• Experimental study
• Formative (initial) vs. summative (validate)
Quantitative vs. Qualitative

• Quantitative: you have numbers (timing data, ratings of awesomeness)

• Qualitative: you have non-numerical data (thoughts, opinions, types of errors)
Types of studies (1)

• What people want/think/do overall:
  – Surveys
  – Interviews
  – Focus groups

• What people want/think in context:
  – Contextual inquiry (interviews)
  – Diary study (prompt people)
  – Observations in the field
Types of studies (2)

• Expert evaluation of usability:
  – Cognitive walkthrough
  – Heuristic evaluation

• Usability test:
  – Laboratory ("think aloud")
  – Online study
  – Log analysis
Types of studies (3)

• Controlled experiments to test causation
• Varying different conditions
  – Full-factorial design or not
  – Independent and dependent variables
• Many methods apply (e.g., surveys can be designed to test causation)
  – Role-playing studies
  – Field studies
Study designs

• Within subjects
  – Every participant tests everything
  – Crucial to randomize order! (learning effect)
  – Fewer participants

• Between subjects
  – Each participant tests 1 version of the system
  – You compare these groups
  – Groups should be similar (verify!)
  – Still randomize!
Data to collect during experiments

• Actions and decisions
• Performance (time, success rate, errors)
• Opinions and attitudes (self-reported)
• Audio recording, screen capture, video, mouse movements, keystrokes
Even more data to collect

• Demographics
  – Age, gender, technical background, income, education, occupation, location, ability, first language, privacy attitudes, etc.

• Open-ended questions

• Preferences and attitudes (Likert scale)

Please respond to the following statements:

*This user interface was difficult to understand
1- Strongly disagree 2- Disagree 3- Neutral 4- Agree 5- Strongly agree

*This tool was fun to use
1- Strongly disagree 2- Disagree 3- Neutral 4- Agree 5- Strongly agree