

# CS3724 Human-computer Interaction

## Formative Evaluation of User Interaction: During Evaluation Session

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### Topics

- Generating and collecting data
- Quantitative techniques
- Qualitative techniques
- Observational techniques
- Forms, variations, attitudes, tools

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### Generating and Collecting Data

- Preliminaries with participants
  - Explain protocol to participant, including any compensation
  - Show participant the lab and experimental set-up if they are interested
  - Have participant sign informed consent form and NDA

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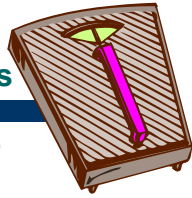
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## Quantitative Techniques



- Collecting quantitative data (to assess usability levels)
  - Benchmark tasks
    - Measuring time on task, number of errors, etc.
    - Quantitative measures such as timing can be valuable even with paper prototype, though not very precise
  - User satisfaction scores

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## Qualitative Techniques

- Collecting qualitative data (to identify usability problems)
  - Verbal protocol taking
    - Participants think aloud, talking while performing tasks
      - Can be intrusive, but effective
      - Some participants not good at talking
      - Evaluator/facilitator sits in room with participant to collect this kind of data
    - Can be used for both time and un-timed tasks
      - Studies show it can be done with minimal effect on performance time

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## Qualitative Techniques

- Collecting qualitative data (to identify usability problems)
  - Verbal protocol taking
    - Facilitator may need to prod participant who stops talking, but don't get into discussion during timed tasks
    - Answer questions about what to do with a hint, not a direct answer

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## Qualitative Techniques

- Collecting qualitative data (to identify usability problems)
  - Critical incident taking
    - *Critical incident*: something that happens while participant is working that has significant effect on task performance or user satisfaction
    - Although participant may indicate a critical incident, it is *responsibility of evaluator* to identify and record critical incidents

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## Qualitative Techniques

- Collecting qualitative data (to identify usability problems)
  - Critical incident taking
    - Arguably single most important kind of formative evaluation data
    - Critical incidents are *indicators* of usability problems
    - Later analyze the problem and cause within the interaction design

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## Qualitative Techniques

- Collecting qualitative data (to identify usability problems)
  - Critical incident taking
    - Pay attention to detailed participant behavior – **IMPORTANT!**
      - It's easy to miss them! It's a skill; takes experience
    - Example: user wasn't sure what the alarm clock icon meant
      - Could have had to do with time of day. Solution: show it "ringing" to emphasize alarm part
    - Example: user confused by word "cancel" on button in dialogue box showing appointments
      - Subtle: Normally understand Cancel, but with appointment in calendar domain cancel has meaning of removing appointment

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## Observational Techniques

- Some observational data collection techniques
  - Structured interviews
    - Post-session questioning
    - Typically obtain general information
  - Co-discovery
    - More than one participant, using system together, thinking aloud together
    - Can lead to rich verbal protocol from conversations among participants



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## Observational Techniques

- Some observational data collection techniques
  - Software tools for critical incident recording
  - Note taking – the primary technique
    - Most important: Real-time notes (e.g., pencil and paper, on-line)
    - Nothing beats this for effective data gathering

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## Observational Techniques

- Some observational data collection techniques
  - Audio recording can be useful



- Effective if used selectively for note taking, if not too distracting
- Can be used to capture continuous dialogue with participant (more agile than video taping)

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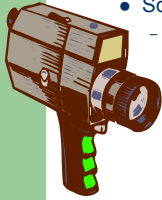
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## Observational Techniques



- Some observational data collection techniques
  - Video taping
    - Used primarily as backup
    - Captures every detail, but tedious to analyze
    - Generally one camera on hands/keyboard/mouse/screen; if a second camera, on user's face

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## Observational Techniques

- Some observational data collection techniques
  - The role of video taping today
    - Screen capture software gives high resolution screen images (e.g., Camtasia)
    - Typically not use video camera (unless important - e.g., VR)
  - Video can be used with paper prototypes, too

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Camtasia demo

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## Data Collection Forms

- Form for collecting both quantitative and qualitative data during session

### DATA COLLECTION FORM

<b>TASK NAME:</b>	<b>PARTICIPANT ID:</b> Date: No. of errors:	Task start time: Task end time: Time to perform task:
Critical Incident Description	Tape Counter	Evaluator's Comments
1.		
2.		
3.		

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## Adopt the Right Attitude

- Evolution of developers' attitude as they watch user evaluating a product

"Stupid user!"

"Let me at him/her!"

"It's his/her (another developer's) fault!"

"I'm mad!"

"Let's fix it!"

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## Variations

- Variations on the theme
  - Major point: No rules; do what works best in your situation
  - Evaluator sitting with participant (cf. in separate room)
  - Abandon verbal protocol if it doesn't work for a participant
  - Try co-discovery with two participants

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## Team Exercise – Formative Usability Evaluation

- Goal: To perform the data collection part of a very simple formative usability evaluation
- Activities:
  - Assemble in teams

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## Team Exercise – Formative Usability Evaluation

- Decide roles for team members:
  - Prototype *executor*, to move transparencies, provide feedback (person who knows design best and who can “play computer”)
  - Evaluation *facilitator*, to keep experiment moving, to interact with participants, and to record critical incidents (qualitative data)
  - User performance *timer*, to time participants performing tasks and/or count errors (quantitative data)
  - Two *participants*, to trade to another team
  - Anyone else can help record critical incidents



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## Team Exercise – Formative Usability Evaluation

- Now make the switch:
  - Trade your two participants to another team, getting two new participants from a different team (we'll help make this work in a “cycle” among the teams).
  - Your new participants are now permanently on your team (for this exercise).
  - Newly formed teams sit together in groups now.
  - We will now pass out and explain the forms you will use

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## Team Exercise – Formative Usability Evaluation

- Getting ready:
  - Have your new participants leave the room temporarily.
  - Get your prototype “booted up” .
  - Bring first participant into “lab”, greet them, and explain evaluation session to them .

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## Team Exercise – Formative Usability Evaluation

- Cautions and restrictions
  - Team members **must not coach** participants as they perform tasks.
  - Person playing computer **must not anticipate user actions**, especially do not give the correct computer response for a wrong user action! Respond only to what user actually does!
  - Person playing computer may not speak, make gestures, etc.
  - You may not change the design on the fly!

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## Team Exercise – Formative Usability Evaluation

- Run the experiment:
  - Have first participant use your prototype to perform the benchmark tasks for your objective usability specifications. That is, have participant read first task aloud, then perform that task while thinking aloud.
  - As executor moves transparencies in response to participant actions, the *timer* records times and/or counts errors as user performs task. *Evaluation facilitator* records critical incidents.
  - Don't count reading of task in task timing.



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## Team Exercise – Formative Usability Evaluation

- Run the experiment:
  - Next have participant read second task aloud and perform it while thinking aloud.
  - Have this participant complete questionnaire, and then give them their "reward".
  - Now have the second participant perform the tasks and complete the questionnaire. The first participant should stay and help with observations.

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