CSE 291 I: Usability of Programming Languages ("Programmers Are People Too")

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Today

• Discuss "Language Wars" paper

• Designing and conducting qualitative studies (part 1; part 2 next time)
  • Brief overview of running studies
  • Then focus on usability studies
Language Wars

• Overall impressions

• What constitutes evidence?
  • "Further, Boo allows the programmer to turn off the static type system (so-called Duck Typing), a decision not supported by the literature on type systems."

• How many languages do we need?

• Which RQs should we focus on?
Research Methods
Or: How We Can Obtain Evidence
Key Takeaway: Methods Answer Specific Questions
EXAMPLE RESEARCH QUESTIONS AND METHODS

- How can I understand this situation better? (ethnography, contextual inquiry)
- I think P is a problem. What fraction of people in a population want it fixed? (survey)
- I designed a tool. What challenges do people face when doing task X with my tool? (usability study)
- Can most people use my tool successfully to do task T? (usability study + quantitative analysis)
- Is my tool better than an existing one for task T? (quantitative study: randomized controlled trial)
CATEGORIES OF METHODS

• Qualitative methods
  • Focus is on depth of data
  • Does not imply no quantities

• Quantitative methods
  • Focus is on statistical analysis of data
STAGES

• I don't know what I'm doing.
  • What problems are there to solve?
  • What hypotheses are worth testing?

• I have a tool. Let's make it better.

• I have a tool. Can people use it?

• I have a tool. Let's try to show that it IS better.
GENERATING HYPOTHESES
NOT JUST ANY HYPOTHESES…

• Want to only test hypotheses that are probably true.
• You can publish a paper even if all you have is a hypothesis!
  • (if it is well-justified)
• And what if your brain is empty?
QUALITATIVE STUDIES

• Want to understand something we don't understand yet.
  • What problems do factory workers have?
  • What is it like to write code for Indy 500 cars?
  • What usability problems do people have when they use my "awesome" system?
# KINDS OF QUALITATIVE STUDIES

<table>
<thead>
<tr>
<th>Study</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews</td>
<td>Learn from experts independently</td>
</tr>
<tr>
<td>Focus groups</td>
<td>Learn from experts, stimulating conversation</td>
</tr>
<tr>
<td>Surveys</td>
<td>Generalize experiences</td>
</tr>
<tr>
<td>Usability studies (think-aloud)</td>
<td>Identify challenges</td>
</tr>
<tr>
<td>Corpus study</td>
<td>Learn from existing data</td>
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If you want to argue your results generalize to $X$, then ideally you should sample from $X$.

Plan B: argue $X$ is similar to the population you sampled from.

Examples?
RECRUITMENT

- Flyers
- Emails
- Social network
- Buy ads
- The street

INCENTIVES

• $$$ (in person, MTurk)
• Desire to contribute to science / help you out
• Food
• Fame (leaderboard)

• Rare experience
• Learning opportunity
• Distraction from work
• Credit
TARGETS

• Programmers
• Architects
• Code reviewers
• Testers
• Security teams

• Designers
• Domain experts
• Tool creators
• Users
• Requirements engineers
USABILITY STUDIES

• Give people tasks and observe what happens.
• NOT experiments
• NOT controlled
• NOT comparative
• Just want to see what problems people encounter.
USABILITY STUDIES CAN SHOW

- X% of my participants completed the task in 30 minutes.
- Participants encountered the following problems...
- Only participants who knew X were able to do the task.
USABILITY STUDIES CANNOT SHOW

- My system is better than an existing system.
YOUR TURN

• Identify a usability question YOU have about a COMMON PL.
  • With a partner.
  • Share afterward.

"The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."