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.

Qualitative studies

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 🧠 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

Study	Purpose
Interviews	Learn from experts independently
Focus groups	Learn from experts, stimulating conversation
Surveys	Generalize experiences
Usability studies (think-aloud)	Identify challenges
Corpus study	Learn from existing data

GENERALIZABILITY

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?

Sample from here

Population of interest

RECRUITMENT

- Flyers

- Emails

- Social network

- Buy ads

- The street

See: Report from Dagstuhl Seminar 19231
Empirical Evaluation of Secure Development
Processes

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*."