CSM49: Lab and Field Work

Experimental Design

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Good Lab Experiments

- starts with a hypothesis
- two or more conditions (treatments or IVs)
- one or more quantitative measurements (DVs)
- stats are used to analyse the DVs in respect to the IVs
- should be designed to remove as much bias as possible
- should be *replicable* by others

Study Structure

- Within groups vs Between groups vs split plot design
- depends on a number of things, including number of variables (you cant do a split plot on only 1 IV)
- we'll talk about these, and how to assign people to groups

Between groups

(or 'between-subject design')

- Participants only see 1 of the IV conditions (or treatments)

- 3 variations of the IV = 3 equally sized groups
  4 variations of the IV = 4 equally sized groups... etc

- + No repetition of tasks needed
  + No learning effect
  + Less time and less fatigue etc

- - have to balance the skill of the groups
  - more people needed
  - more likely to get type II error

Within Groups

(or 'within-subject design')

- Each participant takes part in all IV conditions

- 3 variations of the IV = 1 group doing all 3
  4 variations of the IV = 1 group doing all 4... etc

- + less people required
  + same people, so no variation in skill between groups
  + cheaper and easier to run

- -- subject to learning effects (which can be controlled)
  - fatigue as participants take part for longer

How to choose...

- can be determined by hypothesis, where IV is user group
  - e.g. comparing novices and experts

- if open to individual differences -> choose **within**
  - hard to balance groups otherwise

- if tasks involve serious learning -> choose **between**
  - comparing 2 representations of website structure
  - by the 2nd task you know the structure

- if fatigue is likely - choose **between**

Controls in each case

- If between - must counterbalance the groups
  - if have a young skilled CS student in one, make sure a paired participant in the other group too
  - have a matching person, as best as possible, in each group

- If within - must counterbalance the order of IV conditions
  - so half get touch-screen then mouse, and other half get mouse then touch-screen

Factorial Design

When you have 2+ IVs

These is no difference between the target selection speed when using a mouse, a joystick, or a trackball to select icons of different size (small, medium, and large)

- two IVs of 3 conditions

- this creates 3x3 conditions = 9 conditions

- it is reasonable to have a mix of between and within-groups
  - this is called a **split-plot** design

- 3 groups (for mouse/joystick/trackball) doing a mix of small, medium, and large targets.

Factorial Issues: Interaction Effects

- Its possible that experience is a factor that influences both the type of input (mouse etc) and target acquisition

- so experts might be better across all conditions.

Other biases: instrument bias

- instruments might give us a consistently fault reading
- or maybe simply inaccurate. such as timing tasks by hand. similarly an overloaded computer might measure time inaccurately

Other biases: study design

- your instructions might bias people

- through leading language
  - can influence actions and responses via the question

- or the stress you apply to participants
  - one study asked people to hurry, to take time
  - the take-your-time group were faster

- **THIS IS WHAT PILOT STUDIES ARE FOR!!!!!!!!!!!!!!!**

Other biases: participants

- their prior experience may (secretly) effect results
- if you run a study with nokias, nokia users may do really well
- if we study cs students, we are going to get technically minded people

Other biases: experimenter

- people want to help the experimenter
- if you tell them you designed one thing. they will like it more
- if you say ‘sorry it sometimes takes a while to load’ it skews their perspective of it as a slow system

Standard procedure for designing

1. identify a hypothesis
2. specify a study design
3. build/make any forms/docs/materials/instruments
4. submit the study design forms to ethics procedures
5. **run a pilot**
6. recruit participants
7. run the study
8. analyse the data
9. write a paper (or dissertations etc)

During a study

1. choose their group/task assignments etc
2. welcome participants
3. introduce purpose/design
4. get them to sign consent
5. provide training if necessary
6. take part in condition(s) in pre-determined order
7. perform a debriefing interview
8. provide voucher (if any) as thanks

The first coursework

- You are to replicate a Collaborative Information Seeking user study - as closely as possible.

- You are to do this in groups
  - identify the structure of the study
  - create ethics documents for the study
  - prepare all details needed
  - perform study and analyse results as a group

- Alone: write up an individual CHI paper (but 8 pages)