Interacting with Technology

Lecture 7. Evaluating ‘in the wild:’ Laboratory versus Field

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Overview

Introduction & Lecture 1: Children, schools and technology

Lecture 2: Mobile technologies and sensors

Lecture 3: Mobile and tangible technologies for children

Lecture 4: Case study: Children and technology

Lecture 5. Exploring spatial cognition with novel technologies

Lecture 6: Aiding spatial cognition in children

Lecture 7: Evaluating 'in the wild'

Lectures 8-10: Student presentations (marks from Alison)

Lecture 11: Essay plans

Content

- Methodological – quantitative versus qualitative
- Practical constraints
- Changes in society

Many Methods…

- Experiments
- Think aloud studies
- Questionnaires
- Focus groups
- Interviews
- Observational work – coding
- Ethnographic work
- ……

QUANTITATIVE:
E.G. EXPERIMENTS

More typically lab-based

(but not always, e.g. spatial cognition studies on mobile devices)

Experiments: Aim

- To answer a question or test an hypothesis that predicts a relationship between two or more events, known as variables.

- E.g. Will spatial knowledge be superior following exploration of a VR simulation of a building or from exploring a model of a building?

Variables

- Such hypotheses are tested by manipulating one or more of the variables.
- The variable that is manipulated is called the independent variable (the conditions to test this variable are setup independently before the experiment starts). In the study mentioned media type (VR vs model) is the independent measure
- The dependent variable would be accuracy of spatial information (ie time to reach point a from point b) because the time to carry out the task depends on the media explored.

Variables and Conditions

- In order to test an hypothesis the experimenter sets up the experimental conditions e.g

- Condition 1 Pretest Explore model Post test
- Condition 2 Pretest Explore VR simulation Post test

- Control condition – against which to compare the results?

Participants

- Within participants

Counterbalancing required

- Between participants

Two drawbacks – no. of participants needed, individual differences

Advantage – no order effects

- Matched pairs on characteristics such as gender and expertise

Difficult to match across all variables

Data Collection and Analysis

- Data – performance measures are taken e.g response times, no. of errors
- Use graphs
- The data should be averaged across conditions to examine any differences
- Statistical tests such as t-tests and ANOVAs can reveal if the differences are significant
- Software packages such as SPSS are often used
- If there is no significant difference then the hypothesis is refuted.

Summary of Experimental Design

- State a causal hypothesis
- Manipulate independent variable
- Assign participants randomly to groups
- Use systematic procedures to test hypothesised causal relationships
- Use specific controls to ensure validity

QUALITATIVE:
OFTEN ETHNOGRAPHY IN HCI

Typically ‘in the wild’

Ethnography by date

- Anthropology (c. 1920s)
  - e.g. E. E. Evans Pritchard
- Workplaces (c. 1950s)
  - Chicago School
  - E. C. Hughes, Becker etc.
- Computer-Supported Cooperative Work (c. 1990s)
  - J. Hughes, C. Heath

Ethnography by issue

- Long history with its roots in anthropology

- Is ethnography a method?
  - eclectic group of techniques
  - does not predefine a theoretical or conceptual status
  - has been used in support of many methodological standpoints, e.g. distributed cognition etc…

What does an ethnographer do?

- assume human activities are socially organised
- commit to inquiring into patterns of interaction
- go into the field
- ‘learn the ropes’ (question, listen, watch, talk, etc., with practitioners)
- take their time
- write a report

Ethnography principles

- Ethnography is naturalistic
  - studies should be studies of real people and their activities, operating in their natural environment
  - doesn’t deal with artificial worlds & controlled versions of work
    - but what is ‘artificial’?
  - Mike Lynch: "Stop talking about science. Go to a laboratory - any laboratory will do - hang around a while, listen to conversations, watch the technicians at work, ask them to explain what they are doing, read their notes, observe what they say when they examine data, and watch how they move equipment around..."

Ethnography principles (2)

- Ethnography understands the world from the point of view of those who inhabit it
  - it is behavioural, i.e. interested in the detail of the behaviour to a greater or lesser extent
  - it is *not* behaviourist, i.e. it does not consider the behaviour itself as the appropriate level of analysis

Ethnographic data (1)

- Ethnographic data can include:
    - general descriptions of behaviours, descriptions of physical layouts, close descriptions of conversation, thoughts and feelings, work sequences, anecdotes, examples, common occurrences, hypotheses etc.

  – analysis is skilful (but not complex)
  – ethnographer usually provides 'examples'

Ethnographic data (2)

- Technologies mostly used for data collection – analysis is skilful!
- Questions, notebook, pen
- Tape recording
  - less intrusive than video but data is less detailed
  - awareness of being recorded not a problem
  - useful to record long explanations, especially highly technical or domain-specific kinds

Ethnographic data (3)

- Video
  - Data can be analysed repeatedly off-site
  - Time-consuming data collection and analysis
  - Difficulty setting up and using equipment in some domains
  - Missing visual actions that are peripheral to the video field-of-view
- Programs to support analysis
  - e.g. Ethnograph, NUDIST

Carrying out an ethnographic study (1)

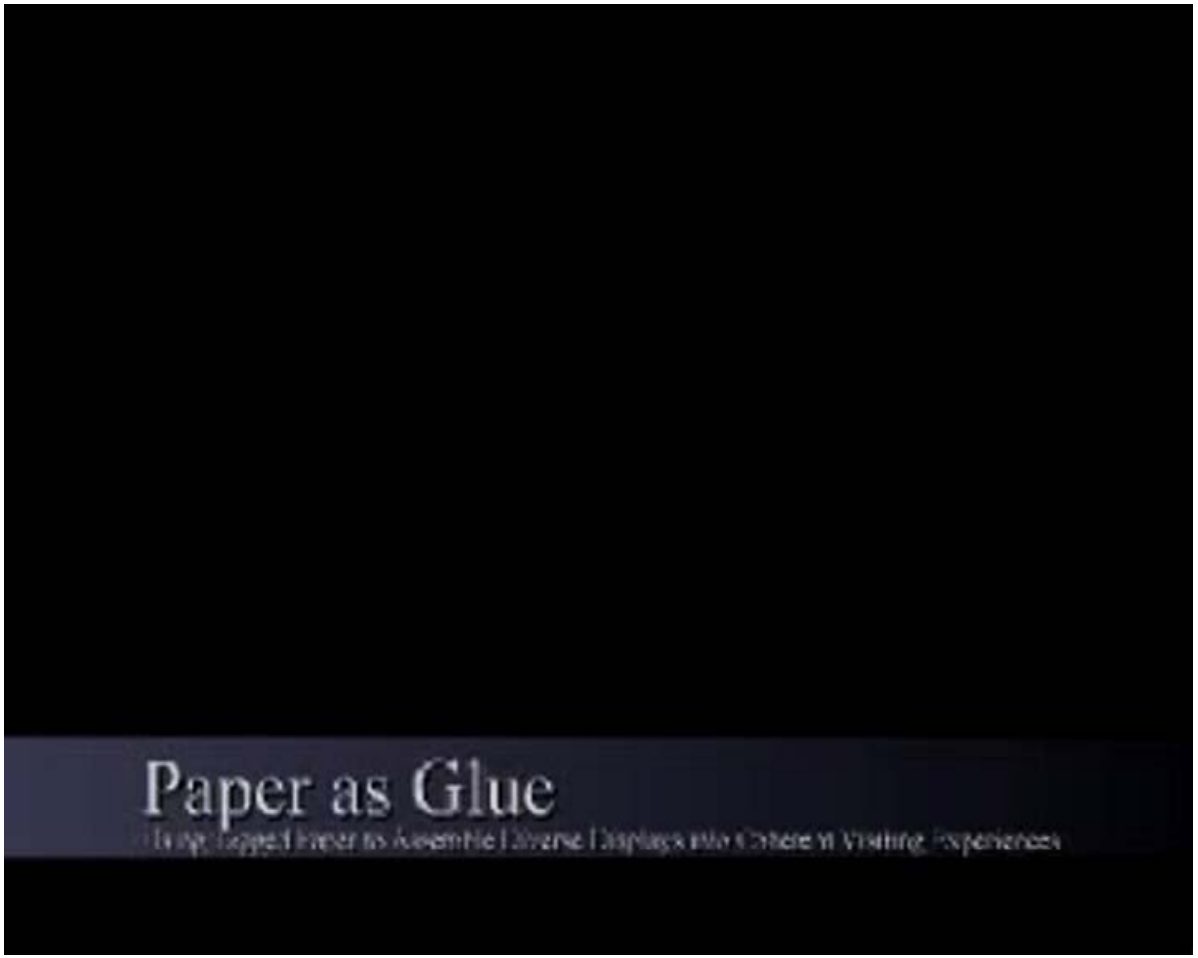
- individuals and organisations have ideas, expectations and fears about ethnography
- Gaining access and an ability to be simultaneously likeable and anonymous will help
- Gaining acceptance may include working shifts, sharing conditions, a non-intrusive demeanour, sharing dress codes, but not sharing opinions unless absolutely necessary

Practical Constraints

- An example: The Living Exhibition
  - Imagine you have been asked to study a museum exhibition
  - You are working with both schools and designers who have certain goals for the project
    - Curriculum and Pedagogical aims
    - Technical innovation
  - You need to study the exhibition in such a way as to achieve interesting and coherent results taking into account the other stakeholders' aims
  - What do you test and how do you test it?

- Variables
- A Control – Books?
- Data collection – participants dispersed over space and time simultaneously
- Unstable software – performance and appearance may change at any time

The living exhibition



- Clear ability to design experiment in *this very* situation is impaired by practical constraints
- Experiments could not cover the whole picture, only one or more selected constituent features
- Other methods of data collection and analysis are possible (e.g. ethnography), but do not specifically provide a thesis for understanding the data, unlike an experiment
- Any results are skilfully produced to inform stakeholders, and aren’t available according to a given procedure

Societal change (1)

- Evolving technological standards, e.g. large-scale systems development
- Evolving technological approaches, e.g. ubiquitous computing – moving away from the desktop

Societal change (2)

- Changing face on human-human interaction, e.g. internet, mobile phones (often only able to see one side of conversation)

- Interdisciplinary research – a push towards disciplines collaborating e.g. psychology and computer science – necessitating a mix of methods/approaches

Conclusions

- Are traditional psychological methods appropriate?
- Are traditional psychological methods sufficiently adaptable?
- Should we be developing new methods in line with technological change?
- Can exploratory qualitative research lead into hypotheses for more controlled experimentation?

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