Current Topics in Media Computing and HCI

S02 Experimental Research

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http://hci.rwth-aachen.de/cthci
• **Hypothesis** “Young participants will have significantly better memories than older participants”

• How could we study this?

• Variables?

• Operationalization?
Operationalization

• Hypothesis “Participants aged between 16 - 30 will recall significantly more nouns from a list if twenty than participants aged between 55 - 70”
Basic Elements of Experimental Study

Validity:
- Internal
- External

Scales:
- Nominal
- Categorical
- Interval
- Ratio

Validity:
- Internal
- External

Controls

Manipulate

Measure

Compare

Extraneous variables

Confounding variables

- Hold constant
- Matching
- Random assignment
User Study Protocol*

• A document that explicitly states why a research project is being conducted and how

• Purpose:
  • Clearly state the research question and hypotheses
  • Plan the research procedure in details
  • A guide for all involved personal
  • Monitor research progress

*(O’Brien and Wright, 2002) How to write a protocol
Protocol Structure: The Research Problem

• Title - “Evaluating the performance of a new keyboard layout”

• Research problem - “We intend to find if our new keyboard layout performs faster and with less errors than the QWERTY keyboard. The new layout would lead to smaller form factors.”

• Context - “There have been many new layouts that appear to perform faster than QWERTY but lead to fatigue [X, Y, Z]”

• Aim (derived from context)

• Hypotheses - “There is no difference in typing speed between the new layout and QWERTY”
Protocol Structure:
The Research Method 1/2

- Independent variables & dependent variables (levels, operational definition, measurement scale and unit)

- Task - “The user will perform a composition task using statements from MacKenzie et al. (CHI 2003). The participant will do the following activities to complete the task…”

- Subjects/Participants (number, main characteristics, criteria to include or exclude them)

- Experimental design (within or between groups and how the conditions will be assigned)
Protocol Structure: The Research Method 2/2

- Experiment setup and/or apparatus (such as hardware or special features in the testing space)
- Experiment procedure (what the experimenter will do to setup the testing space)
- Data analysis methods
- References
- Include images or sketches if informative
- Write this section in future tense
Extraneous Variables

• Situational
  • Control
• Participants
  • Counterbalance
• Experimenter bias
  • Clear procedure