Experiments

Seminar presentation
Katharina Sachmann & Lisa Ulmer
14. May 2014
What are experiments?

• Strategy that investigates cause and effect relationships
• Base: hypothesis
• Prove or disapprove a casual link

→ Experimental Research Strategy: Research based on experiments
Terminology

• Hypothesis
• Participant
• Independent variable
• Dependent variable
• Internal and external validity
Types of experiments

- True experiments
- Quasi-experiments
- Single-subject experiments
- Non-experiments
Types of experiments

True experiments

• There need to be at least three things:
  – Two comparison groups (simplest case: an experimental and a control group)
  – Variation in the independent variable before assessment of change in the dependent variable
  – Random assignment to the two (or more) comparison groups
Types of experiments

Quasi-experiments

• The comparison group is predetermined
• Social context
Schiavo, Gianluca, et al. “Overt or subtlefi: supporting group conversations with automatically targeted directives”
Types of experiments

Single-subject experiments
• Long period of time
• One individual or situation is exposed to the varying levels of the independent variable

Non-experiments
• No attempt to conform with experimental concerns such as randomized selection of participants or use of control groups
Design of experiments

- Underlying hypothesis
- Independent and dependent variables
- Measurements
- Design aspects/ type of experiment/ methodology
Conduct and analysis of experiments

• Recruit participants
• Conducting the experiment according to the design
• Study protocol
• Evaluate results
• Report results
Criteria for “good” Research and Experiments

• Internal and external validity
• Measurement Validity
• Generalizability
• Causal Validity
• Authenticity
Experimental IS Research

• Often conflicting results due to methodological problems
  – Problems of reliability and internal validity

• Problems
  – Lack of underlying theory
  – Proliferation of measuring instruments
  – Inappropriate research designs
  – Diversity of experimental tasks
Experimental IS Research - Problems

Lack of underlying theory

• Lack of common ground for developing experimental hypotheses and interpreting results

• Independent studies not built upon other work

→ Goal: Building of a framework that defines the boundary for research to be conducted.
Experimental IS Research - Problems

Proliferation of measuring instruments

• Great number of differing measuring instruments, many of which may have problems with reliability and validity

→ Goal: A set of measuring instruments, applicable and easily adaptable to a large number of experiments.
Experimental IS Research - Problems

Inappropriate research designs

• Many experiments include irrelevant dependent variables and are highly simplistic and include only one kind of independent variable
Experimental IS Research - Problems

Diversity of experimental tasks

• Tasks pertain not only to what the participant actually does, but also to the context or surrounding environment in which the activity occurs

→ Internal validity problems
Advantages of experiments

• Well-established
• Can prove causal relationships
• Permit high levels of precisions
• Allows researchers to remain at their normal place of work
• Elimination of interference factors
Disadvantages of experiments

• Create artificial situations
• Difficult or impossible to control all the relevant variables
• Difficult to recruit a representative sample of participants
• Ethics
Conclusion

- Good strategy to support research but consider the disadvantages
- Results of experiments should always be interpreted in relation to the experiment
- Important:
  - Do not base your opinion/ work/ research on the outcome of one single experiment
  - Always consider related work
Discussion
Discussion

• Ethical limits
• Advantages/ disadvantages true experiments vs. quasi-experiments vs. single-subject experiments vs. non-experiments
Sources

- http://psychology.ucdavis.edu/faculty_sites/sommerb/sommerdemo/experiment/types.htm
- http://changingminds.org/explanations/research/design/experiment_types.htm
- http://www.methoden-psychologie.de/buch_fazit.html
- https://www.soc.umn.edu/soc3801w/Lecture%20Slides/lecture_11_sp06.pdf