

Assignment 2

Reverse Engineering User Studies

Draft for peer due May 7, 2014, 6:00 AM

Peer review May 7–12, 2014

Final submission due May 14, 2014 6:00 AM

Use the same group as A01

Description

In this assignment, you will practice identifying important elements in experimental research studies. To let you practice the skill in experimental design, you will reconstruct and experimental protocol out of the description in the papers and attempt to fill implicit or missing information that are necessary for a rigorous experimental research.

Prerequisite

You have skimmed the reading assignment this week: [\(McGrath, 1995\) Methodology matters](#) before doing part 2 of this assignment. Appendix 1 indicates the paper that each group will use as the *main paper*.

Task

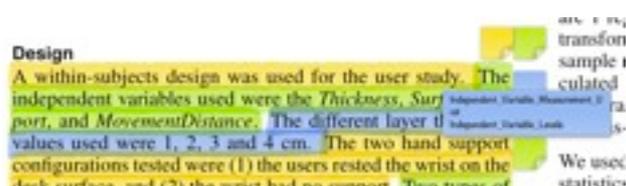
Part 1: Identifying elements of experimental research: You will extract main elements of experimental research from papers. (N members $\Rightarrow N$ papers $\Rightarrow N$ experiments)

1. For each group, make a copy of this Google Spreadsheet template goo.gl/SDITaw (Menu File » Make a copy). This spreadsheet provides an example discussed in previous lab. Review comments in the spreadsheet for data formatting instructions.
2. Acquire *experimental research* N papers that are *ancestor* of your main paper (i.e., the papers that are cited by your main paper or cited by any ancestor of you main paper). The selected paper must include at least one experiment.
3. Select *one* experiment out of each paper and identify the following elements:
 - a. *Research question:* a statement expressing the goal of the experiment, i.e., what knowledge that the experimenters expect to gain after the experiment.
 - b. *Independent variables:* variable name, measurement unit (e.g., cm), scale (nominal, ordinal, interval, ratio), factor type (within-subjects vs. between-subjects), levels (i.e., possible values that the variable can take)
 - c. *Dependent variables:* variable name, measurement unit, scale,
 - d. *Participants:* count (number of participants), background information (e.g., age and educational background)

For each element, quote the original paper to support your answer. Copy one or multiple sentences from the paper that you used to infer the answer from.

4. Highlights the quoted statements in the PDF and add notes with the field name like the example in the supplemented file (visible when you view PDF in computer).

Field	Value	Quoted text
Research_Question	Yes	This study aims to determine a suitable tool
Participant_Count	8	Eight right-handed volunteers (two females and
Participant_Background	No	The independent variables used were the Th
Independent_Variable_Name	Thickness	No
1 Independent_Variable_Measurement_Unit	cm	The different layer thickness values used we
1 Independent_Variable_Scale	ratio	No
1 Independent_Variable_Factor_Type	within-subjects	A within-subjects design was used for the ul
1 Independent_Variable_Levels	1,2,3,4	The independent variables used were the Th
2 Independent_Variable_Name	SurfaceSupport	No
2 Independent_Variable_Measurement_Unit	No	No



Part 2: Reconstructing user study protocol: You will create *two* user study protocols form your main paper. You will need to fill in more details beyond what described in the paper.

1. The protocol comprises the following sections:

- a. *Context:* Describe background of the research that lead up to this experiment and how the result of this experiment will be a part of further research. This part must stand alone and allow the reader to grasp the importance of this experiment. (100–150 words)
- b. *Aim:* Ordered list of statements describing research questions that this experiment aim to address. Each statement should be simple and specific. Order this list according to their respective priorities.
- c. *Hypotheses:* Ordered list of statements corresponding to the research questions described in the aim. One research question may be decomposed to multiple hypotheses. Each hypothesis must be falsifiable. (See McGrath: Comparison Techniques: Assessing Associations and Differences)
- d. *Independent Variables:* The description of each independent variable must clearly indicate scale, measurement units (e.g., cm), manipulation technique (See McGrath: Techniques for manipulating variables), and possible levels (e.g., the four layer thicknesses in the example protocol).
- e. *Dependent Variables:* Clearly indicate scale, measurement units, possible levels, and operational definition that specify unambiguously how to measure each variable.
- f. *Task:* Describe in steps, the task that the participant needs to perform. Add illustrations to clarify the provided stimuli and expected responses from the participants. (You may use figures from the paper and create additional figures here. Should you use any figures from the paper, add proper citations.) The Task section focuses on what generates data for the dependent variables.
- g. *Participants:* Describe characteristics of target participants (e.g., age group, handedness, educational background, gender). Also describe sampling method that will ensure that the recruited participants match the desired characteristics. In this section, you do not need to match what described in the paper. Aim for ideal group of participants that represent the target research questions.
- h. *Experimental design:* Describe experimental design that you used for each of the independent variable, the number of repetitions, matching, randomization, and counterbalancing strategies. This section must include a summary of the total number of trials, e.g., 4 Thickness × 2 repetitions = 8 trials.
- i. *Apparatus:* Describe the hardware and software that you plan to use in your user study as concrete as possible.
- j. *Experiment Procedure:* Describe what the participant will experience from the point that the participant arrive in your lab until she leave. A part of the Experiment Procedure is that the participant perform what described in the Task section.
- k. (Not needed in this assignment) *Data Analysis:* Describe process to clean, summarize, and analyze the data. Ideally, there should be a rough structure of tables and graphs that you aim to create in the analysis process.
- l. *References:* Provide numbered reference to any research articles or other resource in standard ACM reference format.

You may order Task, Hypotheses, and Variables sections differently to minimize redundancy and improve readability of the protocol. Keep the protocol of each study to be within five A4 pages.

2. Indicate parts that the paper did not provide clear indications and you specify the part by yourself by **highlighting** them.

3. Describe how you attempt to establish internal, construct, and external validity in your experiment protocol. (See: McGrath: Validity of Findings) (1 A4 page overall)

Submission

Draft for peer review: Prepare one Google Document containing *only part 2* of your submission and set the permission to allow anyone who has the link to comment. Do not include the name of members in this document. Send the link to chat@cs.rwth-aachen.de with the subject "A02 Part 2 Draft". See the due date above.

Peer review: You will receive links to the submissions. Give feedback to them by adding comments in the document. In the final submission, your peer will be able to rate the feedback quality. This will influence the pairing for peer feedback in the next assignment. If you give high quality feedback in this assignment, we will pair you with the team that give high quality feedback for the next round of peer feedback. See Grading section for criteria to give feedback.

Final submission: Send one PDF file (paper size: A4) containing the following parts to chat@cs.rwth-aachen.de with the subject "A02 Final Submission".

1. Submission for part 1 (Spreadsheet from N experiments identified from N papers)
2. URL to the Google Spreadsheet of part 1 (Share for public view with the URL)
3. Submission for part 2 (Two protocols, max 6 pages each)
4. Peer feedback rating: Rate the quality of peer feedback from 1 (worst) to 5 (best). You may, optionally, add free-text feedback for the peer feedback here as well. Give one section per group that give you peer feedback.
5. Names and matriculation numbers of team members

Grading:

Part 1 will be evaluated based on your inference of each of the experimental design elements from the paper. Under each research question, the elements you identified must constitute an experiment that allows the research question to be falsifiable.

Part 2 will be evaluated based on the following criteria:

- Unambiguous: Each element in the protocol allows only one clear one interpretation.
- Logical: The described elements are logical consequence from the research question and the described context.

Appendix 1: Main papers (from CHI 2014)

<i>Authors</i>	<i>Title</i>	<i>Group</i>
Olafsdottir et al.	Prospective Motor Control on Tabletops: Planning Grasp for Multitouch Interaction	D2, M1
Luo and Vogel	Crossing-Based Selection with Direct Touch Input	T2, M3
Gilliot et al.	Impact of Form Factors and Input Conditions on Absolute Indirect-Touch Pointing Tasks	D1, (T1 + M2)

Appendix 2: Digital resources

- Template for part 1: goo.gl/SDITaw
- Example of annotated PDF for part 1: [highlight_example.pdf](#)