Writing your Thesis at HCI Bremen

Tips and tricks for your thesis in the HCI Group. Will guide you through all the important steps of your thesis.

- Organisation and Procedure
- Finding Literature
- Writing and Formatting
- Tools / Software
- Evaluating your Prototype / App / Idea
- Which statistical test to use?
- Colloquium Tips

Organisation and Procedure

Basic information every thesis student should be aware of.

Duration

- BA DM: 4 months
- BA CS: 3 months
- MA DM/CS: 6 months
- A hard deadline boosts productivity

Language (German or English)

- Depends on sources
- Depends on doing a publication afterwards → English

General Procedure

If you have questions or need help with any of the following steps, please first talk to your supervisor.

1. Talk to your supervisor about your ideas
2. Write an exposé about your thesis and send it to your supervisor
3. Rework your exposé with the comments of your supervisor
4. Send the revised exposé to Johannes Schöning
5. Personal meeting with Johannes and your supervisor about your thesis plan and to get the "good-to-go" for your thesis
6. Prepare study design in consultation with your supervisor
7. After more than 70% of the study preparation is ready, second personal meeting with Johannes and your supervisor to get the "good-to-go" for the study
8. Conduct and analyse your study (if you do one)
9. If you do a second study, repeat the last three steps
10. Register your thesis with Prüfungsamt
11. write your thesis, get a great mark :-)

Recommended Reading

Rainer's Hinweise für gelungene Abschlussarbeiten

Informationen des Prüfungsamtes zu Abschlussarbeiten

Finding Literature

Sources

- ACM Digital Library
  - CHI conference is a good starting point. All papers of each year are bundled in the "proceedings", e.g. Proceedings of CHI 2020
- IEEE Digital Library
- Google Scholar (for citation export: check ACM DL or journal/publisher website first)
  - "Cited By" feature
  - set filter for recent years (on the left side)
- Sci-hub (URL might change, check Wikipedia)
- Connected Papers
  - Great for literature exploration
  - Graph with related papers, that are clustered together
  - Works based on Co-citation and Bibliographic Coupling

Remember to connect to the university VPN to get institutional access to many publishers.

To find related and connected papers you can use tools like Citation Gecko.

Keeping Track of your sources

Use a proper citation manager

- Zotero:
  - free and Open Source
  - with Word plugin
- Citavi: Word plugin
- Endnote
  - Youtube Tutorial
  - free at Uni Bremen, including cloud-based collaborative web client
- Mendeley
  - free

Writing and Formatting

Most students write their thesis either in LaTeX or Word. Most of us are somewhat familiar with Word and find it easy to get started with writing. However, often you will spend significant time - especially when finalising your thesis - in getting the formatting right, e.g. aligning your captions, producing consistent headings and a correct reference list. That's where LaTeX comes in: It is more like writing code, so it takes some time to learn the basics, but thesis templates and strict separation of text and formatting might save you headache in the long run - if you are willing to invest some learning time in the beginning.

LaTeX

- Free
- Code instead of GUI
- Produces a clean layout, easy typesetting
- very few layout adjustments needed
- Auto-generated reference list
- Takes some effort to learn, but time savings in the long run
- Overleaf
    - Web-based Latex Editor
    - No setup needed
    - Limited collaboration possible
- Good Thesis Templates:
    - Hagenberg Thesis Template
    - Cambridge University Engineering Department - PhD Thesis Template
- TexMaker (Multi Platform)
- Sublime Text Plugin for Latex
- How to use BibTex for references: https://www.youtube.com/watch?v=KS9GvK7cvmo
- Templates are cool, but creativity wins

Word / Open Office

- Use the Document Styles like "Heading1"
    - Right click on format template to change these

- Use Table of Content/Images etc. only from *references - table of contents*
  - Formatting headings and Table of Contents:

    https://www.youtube.com/watch?v=2G7lr_7qqkc
- Some general formatting shortcuts: https://www.youtube.com/watch?v=Ss2lPz7m0GY

Referencing LaTeX in Word

1. Install BibTeX for Word: http://www.ee.ic.ac.uk/hp/staff/dmb/perl/index.html
   It only works on PC and not MAC. The website also provides a wiki on how to use the plugin and the offered reference styles
2. Install a reference manager, which will store your citation details in BibTeX format. I used JabRef and did not run into issues so far.

What You Get (Example):

This is a test reference [1]. Now I would like to add another reference here [2].

[1] Vonne Polanen and Marco Davare. Sensorimotor memory biases weight perception during object lifting. Frontiers in Human Neuroscience, 9, 12 2015. doi: 10.3389/fnhum.2015.00700.
[2] Bernhard Treutwein and Hans Strasburger. Fitting the psychometric function. Perception & Psychophysics, 61: 87–106, 1999.

Wording / Phrases

Need some inspiration for fancy phrases? Academic Phrasebank

Recommended Reading

APA Publication Manual [Book in Uni Library | PDF]: Ebook with a collection of sample structures, descriptions of what needs to go where in your thesis and much more...

- Thesis Structure
- Grammar
- Writing Style
- Footnotes

The Elements of Style

Handy Dandy Writing tips (as generically as it gets but still super helpful!):

1. sentence length: should not exceed 20words

2. consistency:
   2.1 core terms: write yourself a list with core terms that you use, then stick to those throughout your whole thesis. Yes, it feels redundant sometimes, but it often helps the reader when you do not use several terms for the same stuff, e.g. always use "interface" and not "system", "surface", "App" ; use "participants" and not also "people", "humans", "users" etc.
   2.2 visuals: use the same size, colour, font, structure of captions etc. throughout the whole thesis
3. no filler words: Fillers are words that add no meaning to a sentence and merely "fill the space". Often, we write as we speak (which is not scientific). To give you some examples of common fillers: "maybe", "also", "actually", "perhaps". To read up more on how to replace fillers: Filler Words
4. no evaluations: do not write "this is interesting" / "this is valuable" / "we need to think about" without giving a concrete reason as to _why_ and for _whom_ it is interesting/valuable or without giving a source (if someone else says it is important for HCI to think about this and you cite this, it is okay). Or just rewrite it completely so that your personal opinion is not included.
5. stay as specific as possible: try not to generalise, assume that your readers know about this topic or that they are forced to read the source by themselves. E.g: instead of writing "There are several ways of evaluating those [Schmidt et al, 2021]" write: "Schmidt et al. [Schmidt et al, 2021] found several ways of evaluating, such as measuring brain activity, skin conductance and pupil dilation."
6. broad to detailed: each chapter and each paragraph within the chapter should be structured from introducing broader topics then giving more details. E.g.: many related works use questionnaires as evaluation method --> this is done because... --> the ones most often used are a, b and c --> a measures the following, b does something else and c is used for this.
7. abbreviations: the first time you mention a term (in your introduction) that you want to abbreviate, you need to write it as follows: e.g. Virtual Reality (VR). Afterwards, only use the abbreviation (here: VR).
8. paragraph length: each paragraph MUST contain at least two sentences. Each chapter needs to have at least one paragraph, also the "big" chapters!
   E.g.: 2. Related Works
   [sentence 1] This chapter will summarise the core findings towards xxx. [sentence 2] It is structured in title_a, title_b and title_c.
   2.1 title_a [only now we can start with the actual sub-chapter]

   o "Use the active voice."
   o "Revise and rewrite."

Human-Computer Interaction: An Empirical Research Perspective

Tools / Software

Statistics

- R-Studio (or plain R in any Text Editor)
  - R is made specifically for stats
- Jupyter Notebooks (Python)
  - interactive Python environment: developing, documenting, execution and reporting the results in one document
  - Google Colab for a collaborative web-based notebooks
- SPSS
- Google Sheets
  - Advantage: Google Docs ecosystem with Google Forms, Google Sheets, Google Slides etc.
- Microsoft Excel
- Apple Numbers
- Visualising statistics
  - GGPlot2 for R: Create Elegant Data Visualisations Using the Grammar of Graphics
  - Plotly for Python: Plotly Python Graphing Library | Python
  - matplotlib for Python: matplotlib

Prototyping

- Figma
  - Design of interactive prototypes
  - free professional account for university members
  - easy handling and the prototype can be shared well (via link for an evaluation)
- Sketch
- InVision
- Proto.io
- Adobe XD
- Marvel

User testing

- Marvel
- Maze

- Wizard

Evaluating your Prototype / App / Idea

You will most likely conduct some sort of evaluation to test what you developed. This Study Design Document helps you asking the right questions.

Use this template for study Information, data handling and consent.

Standardized Questionnaires

Here is a (German) overview of several HCI methods and questionnaires. There are many standardized questionnaires for various items to measure. Look at related works to find out which ones are used most frequently in your field of work. Some examples are:

- the System-Usability Scale (SUS) to measure the usability of a system
- the NASA Task Load Index (TLX) to measure the perceived workload of a task
- the User Experience Questionnaire (UEQ) to measure the subjective impression of a user regarding the system
- the IPQ to measure presence in VR

Conducting Interviews and Analysing Qualitative Feedback

Interviews are often used to gather qualitative feedback. Here is a guide what to bear in mind when conducting interviews and with further links attached.

To analyse qualitative feedback, HCI most often uses a Thematic Analysis by Braun and Clarke (how'to and actual paper) or a qualitative content analysis, e.g. by Mayring.

Recruitment of Participants

- Mailing list FB3: Contact Sabine Kuske
- Questionnaire Exchange Platforms: SurveySwap, SurveyCircle
- Reddit: r/samplesize

Recommended Reading

- How to Design and Report Experiments

Which statistical test to use?

To find out which test to use, make sure you know your data

- independent variables (groups or conditions; what you **manipulate**)
- dependent variables (what you **measure**)
- paired/unpaired data (do the same people go through all the conditions or not?; check within vs. between-subjects design)
- level of measurement (categorial, metrical)

Recommended Reading

- Discovering statistics using R

- Choosing The Correct Statistical Test In Sas, Stata, Spss And R

- Statistical Methods for HCI Research (wiki)

Colloquium Tips

Handy Dandy Presentation Tips

Here are some useful tips for your presentation:

- If something is important, it should be both said and seen (i.e. both the spoken and visual channels should be used as redundant indicators)
- Information should be presented such that its importance corresponds with the amount of time spent presenting the information and the visual/spoken emphasis it is given.
- Animation can be a useful tool for emphasis (and thus signaling importance of the animated information), but should usually only be used for that purpose.
- One useful general heuristic: design your presentation so as to minimize cognitive effort by the audience
- If you show a graph, you must explain slowly what's on the x-axis and what is on the y-axis, and then explain the trend you want the audience to see
- Corollary: if you show a non-trivial table, explain what the rows are, then the columns, then discuss the trend
- Humor is great and usually required, but should not take away from the message. In fact, it should support the message.
- Grad students should never use self-detrimental humor. Try to think of alternatives, but worst comes to worst, make fun of your advisor instead. We're easy targets.
- Try to weave a single or small number of examples throughout the presentation
- If you present text more than a few words long as data, it should be read outloud verbatim
- People can't read and listen at the same time

- Use low-fidelity prototyping
- Prior to making a single slide, I generally put together a very detailed outline of the presentation – including what slides should look like – entirely in text.
- As is typical in low-fidelity prototyping, this allows you to make large changes with very limited cost, which is not the case when you start by making slides.

- Do at least one practice talk, and expect to substantially alter your talk afterwards
- Practice like crazy
- It is easy to distinguish a well-practiced presentation from a poorly-practiced one
- Going through your full presentation more than 15 times is not unreasonable
- Well-practiced presentations are much more fun to give: you get to walk around the stage, etc., instead of being glued to your slide notes

- Make back-up slides for questions
- Try to think of tough questions you'll be asked and make slides to answer them

- Google Slides seems to result in more run-time errors than other presentation software, at least as of 1/19
- And minor bugs like offset problems
- Never use any text color that remotely resembles yellow
- If you prefer to script out the talk, you need to be prepared in case you can't look at the script
- Try to make sure there's at least one graphic that communicates the basic idea of the presentation in a single slide. This is important for social media success during slide sharing and with the audience sharing info when they see it.

Source: Mattermost #thesis