



Guidelines for the Preparation of Final Theses

(Cognitive Modelling & Decision Neuroscience Lab, Department of Psychology)

These guidelines are based on the APA (American Psychological Association) rules for manuscript preparation. Strictly speaking, these only apply to the writing of manuscripts intended for submission to international journals. In the case of theses, there may be deviations, which are indicated accordingly.

The guidelines are intended to assist in the preparation of final theses and to provide information on the criteria used to evaluate final theses. Specific adaptations can (and sometimes even must) be made depending on the topic or context of the thesis, always in agreement with your supervisor.

Make sure to compare **your work** with the design guidelines before submitting it to us!

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1. General Aspects

1.1 Preparations

1.1.1 Legal Basis

Make sure you are familiar with the [exam and study regulations](#) from your degree program regarding the final thesis.

1.1.2 Planning

Set up a time plan for the period you will be working on your thesis. If your supervisor asks you to hand in an exposé, make sure to include your time plan there. For a more detailed schedule, see [Appendix B](#) (in German).

Example:

- I want to be done by the end of July, so I have 4 months (~16 weeks) left.
- I know that data collection will take place in May and the first half of June (and that I need to present my project in mid-May), so I should have my research questions and hypotheses set by the end of April.
- I can write certain parts of the paper before I have collected the data; I can also prepare the analysis
- I know that I will be on vacation for 1 week in mid-July.

Task	Weeks / Months
Read most important literature	Weeks 1-3, April
Research question & hypotheses	Week 4, April
Write introduction	Weeks 1-2, May
Write methods section	Weeks 3-4, May
Prepare data analysis (use preliminary data)	Weeks 1-2, June
„Real“ data analysis	Weeks 3-4, June
Write results and discussion	Weeks 1-2, July
Holidays	Week 3, July
Finalize thesis	Week 4, July

1.1.3 Language

Bachelor and Master Theses are typically written in English at the Cognitive Modelling & Decision Neuroscience Lab. If the supervisor agrees with it, theses may also be written in German. Make sure to discuss this with your supervisor before starting to work on your thesis.

1.2 While Working on the Thesis

1.2.1 Proposal/Exposé

Depending on your supervisor, you might be asked to write an exposé. It serves as a guideline and orientation during the preparation of the thesis. It therefore requires a first familiarization with the literature, definition of research questions and an idea about the experimental design and evaluation strategies. After writing the proposal, it should be clear which questions will be addressed, how and why. The details of the proposal can be discussed with your supervisor.

1.2.2 Presentation in the Final Colloquium

You are required to present the goal of your thesis, research questions, as well as ideas with regards to methods and statistical analyses in the final colloquium. Some supervisors take this presentation into account when evaluating your thesis and determining a grade. You should discuss this before your presentation with your supervisor.

1.3 Follow-up

1.3.1 Thesis Evaluation

The evaluation criteria can be found in the standardized thesis report in Appendix A. Because the Academic Office may not send the thesis report to you when informing you about your grade, you can ask your supervisor to send them to you, once you know your grade.

2. Writing the Thesis

2.1 Outline of the Thesis

Here we briefly describe how the thesis should be structured and go into detail about the individual parts of the thesis.

2.1.1 General Information

- Length of thesis: Bachelor Thesis 20 to 30 pages; Master Thesis 30 to 50 pages
- The page numbers do not include the appendix.
- Needs to include a bibliography; the bibliography starts on the last page number of the thesis **the latest** (i.e. 30 in case of BSc., 50 in case of MSc.)
- The text should be written with 1.5 times line spacing.
- Paragraphs are indented approximately 5 characters (tab once). This applies to each new paragraph, including the first paragraph in each section of the manuscript.
- Font size: 12-point font; use easily readable fonts (e.g., Garamond, Times New Roman, Palatino).
- Each page should have 2 cm margins (on both edges).
- Page numbers do not appear on title page, but page numbering begins with title page. Page numbers need to be included in the manuscript.
- The header may also contain a keyword-like short title (e.g., ATTENTION AND VALUE-BASED CHOICE) (does not appear on title page).
- Do not bold or underline anything in the text itself; emphasize by italicizing (except headings).
- Each heading must be followed by a short paragraph before the next heading is added
- **Be consistent!** (consistent in numbering chapters, the use of references and citations, citing statistics, using numbers, naming things, the use of abbreviations, etc.)
- Remember to make a comprehensive **backup**. Save your work regularly to multiple media and to a secure location on the Internet.

2.1.2 Structuring the Thesis

Structure of the manuscript

Theses should typically have the following structure:

- Cover page
- Table of contents

- List of tables, figures, and abbreviations (optional, recommended especially for a larger number of tables/figures/abbreviations)
- Summary, Abstract
- Introduction
- Theoretical and empirical background
- Overview own study
- Methods
- Results
- Discussion
- Bibliography
- Appendix
- Statement of plagiarism

Each section should consist of subsections with subheadings to facilitate readability.

Notes on the cover page

The cover page contains the title of the manuscript/thesis as well as information about the university and the department above the title. The title of the thesis is then centered as well as the name of the author, the matriculation number, the submission date and the two reviewers. Templates can be downloaded from the [UHH webpage on final theses](#).

Table of Contents

The thesis should be structured with a table of contents. A numerical outline is only used if there is more than one bullet point and should be used for a maximum of three levels. Indicate different headings with indents, e.g.

1. Introduction
 - 1.1 Brunswik's Lens Model
 - 1.1.1 Basic Assumptions of the Lens Model

Notes on footnotes, figures, and tables

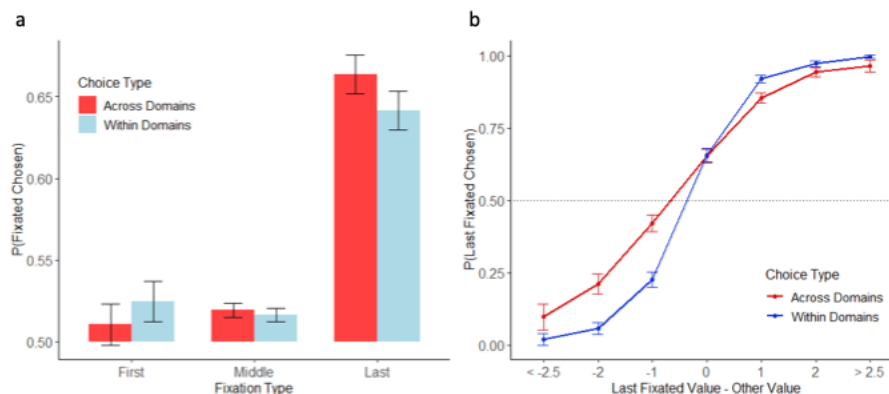
Footnotes, figures, and tables are sensibly integrated into the text and not placed at the end of the paper. The reference to a figure or a table is indicated in parentheses or in-text.

About Tables and Figures

- Tables and figures can present and explain results economically and are inserted in the running text in theses. Make sure that the formatting is sensible and in accordance with the APA guidelines!
- The results presented in the tables are explained in the text (summarizing); however, the concrete numbers are only repeated again for central values in the text.
- Only report tables and figures that are referred to in the text.
- Tables and figures are numbered according to the order in which they are mentioned in the text, but separately, e.g. Table 1 or Figure 1.
- Each table and figure are also given short headings; this should indicate the main content of the table/figure.
- Notes regarding the table/figure can be added under the illustration
 - Abbreviations and symbols should be explained in the notes
 - Comments on the significance level are also made here
 - It has become common practice to mark different alpha levels with different numbers of asterisks; these are to be used consistently!
- See below for an example

Figure 12

Choice Proportions for the Last Fixation



Note. (a) Proportions with which the fixated option was chosen for first, middle and final fixations of a trial. (b) Proportions with which the last fixated option was chosen for the value difference between the fixated and the non-fixated option. Error bars represent 95% confidence intervals.

Graphic Design of Tables

- Table lines are only set to increase readability
 - To separate the table heading from the table captions; a bold line is often used here

- To separate the table captions from the table body or to separate the body from the notes
- See below for an example:

Table 1

Attribute Values

Attribute	M	SD	Range		Unit
			Min	Max	
Smartphones					
Screen size	14.9	1.2	12.2	17	cm
Battery capacity	3302.7	624.7	1800	5000	mAh
Weight	165.6	14.1	138	191	g
Hotels					
Room size	20.7	5.6	15	45	m ²
Stars	3.6	0.8	2	5	-
Distance	2.4	2.2	0.4	9.2	km

Note. n = 30 options for each hotels and smartphones.

Notes on the summary/abstract

The abstract directly follows the table of content as well as possible lists of tables/figures/abbreviations. It is titled "Abstract" and is approximately 1/2 page long. The abstract gives a brief overview of the content of the thesis (research question, methods, results, conclusion). It should be well comprehensible, complete and accurate. The summary should be written in such a way that the central messages of the thesis can be understood even without having read the manuscript.

Notes on the introduction

The thesis should begin with a brief introduction to the research question to avoid that the literature overview is presented to the reader without a transition. It should illustrate the relevance of the topic and raise interest in the research questions of the thesis at a *generally understandable and concise (i.e., 1-2 pages) level*. The introduction can also be the first subchapter of the theory part.

Notes on the theoretical and empirical background

This section of the paper summarizes key concepts, theories, and empirical findings relevant to the author's own research question. The existing literature on the topic should be described and discussed as fairly and objectively as possible. This part of the thesis does not have the function of providing a broad

literature review. Under no circumstances is the subject matter to be presented here in the style of a textbook. A concise derivation of the question(s)/hypothesis(es) from the original scientific literature is desirable. This section should be logically structured by subheadings.

Notes on the overview over own study

The theory section is followed by the research questions and hypotheses. The research questions should be derived directly from the findings of the theory section. For all research questions hypotheses are formulated, each of which should be theoretically justified with a short paragraph. A close connection to the literature section should be ensured. Coordinate the form of the presentation of the hypotheses (conceptual, operationalized, statistical) with your supervisor. At this point in the text, only conceptual hypotheses should be formulated; the operationalized and statistical hypotheses can become part of the methods section after the operationalizations and the statistical procedure have been presented.

Notes on the methods section

The methods section describes the sample/participants, the design/procedures of the study, the relevant variables including the measurement instruments used, and a description of how the data has been analyzed. It should enable others to judge whether the methods used were appropriate and whether the findings from the empirical study are valid.

Rule of thumb: The methods section should always be written in such a way that other people could conduct the study themselves.

The method section could be structured as follows:

1. Sample or participants (Sample/Participants):

The section Sample or Participants provides a description of the participants studied. The number of participants, broad demographic characteristics (especially age and gender), and reasons for exclusion of participants (statistical reasons can be mentioned at the beginning of the Results), if any, should be presented. In addition, it should be stated how the participants were recruited and how they were reimbursed. Finally, the approval of the study by the ethics committee should be mentioned and a justification of the sample size must be given (ideally in form of a formal power analysis).

2. Test procedure (Procedures):

In the section Experimental Procedure all steps of the experiment are described. This includes, for example, the presentation of instructions, experimental manipulations and the (randomized) assignment to experimental conditions, presentation conditions of experimental materials, procedures of situations, questions, tests, etc. Standardized procedures or procedures commonly used in the literature should not be described in concrete terms, but only mentioned and the corresponding sources referred to. New own procedures, on the other hand, should be described as precisely as possible.

3. Design:

For experimental studies, it is often useful to have a separate Design section in which the design (= experimental plan) of the study, i.e., the independent variables and their levels are mentioned or described. Do not forget to mention whether the study used a within- und between-subject design (or some combination thereof).

4. Measures:

The Measures section contains a description of the variables relevant to the study (including their calculation). This section is structured according to these variables (e.g., subheadings such as "personality," "cues," "interpersonal perceptions"). For each variable, the specific instruments used to measure the variable should be named and described.

Standardized instruments and materials or those commonly used in the literature should not be described in concrete terms, but only named and the corresponding sources referred to. New instruments and materials should be described as precisely as possible. If the calculation of variables is more complex, a separate section on this within the methods section may be useful. Information on the reliability of the measures and references to descriptive statistics of all measures usually already belong in this section.

5 Data analysis:

Here, you should describe which statistical tests have been used to test the hypotheses (e.g., a linear regression analysis was used to regress dependent variable Y on the independent variables X1 and X2). Tests of the distributional prerequisite for certain statistical analyses are presented very briefly; if necessary, reference is made to appendices with a more detailed presentation. In this section, all software programs used for statistical analysis (for example, for R, the version, and all packages) should also be named.

Notes on the results section

In the results section, all major findings of the paper are presented, but not yet interpreted in terms of the research question. First, preprocessing steps that might lead to exclusion of trials, or participants should be described. Then, the most important descriptive measures should be presented followed by all inferential statistical procedures and their results. Pay attention to completeness of all relevant measures; you should orientate yourself on the current edition of the APA and DGPs recommendations. The reader should be given all the information that will allow him/her to judge the accuracy of the data analyses made.

See the “Style” section for guidelines on using statistical symbols and the presentation of statistical results.

Notes on the discussion section

The discussion serves to evaluate and interpret the results. The results should be related to the questions and hypotheses of the thesis and should be placed in the general state of research. The first section of the discussion should be a (short) summary of the (main) research question(s) and the results. Limitations of one's own work should be reflected upon. Theoretical/practical implications of the work should be explained, and open questions for future research should be addressed. A conclusion on a generally understandable level should round off the work.

Notes on the bibliography

The bibliography lists the sources cited in the text. The bibliography should contain all and only those references that are cited in the text. The form of the bibliography must be strictly adhered to and is based on the latest APA guidelines. Use of reference managers (e.g., Zotero, Mendeley) is highly recommended, but should be double-checked.

Notes on the statement of plagiarism

In the case of theses, the author must add a written assurance that he/she has written the thesis independently and has not used any sources and aids other than those indicated, and that he/she has marked citations; the assurance also refers to tables, sketches, drawings, pictorial representations, etc. This statement can be found on the [university's website](#). The thesis is checked for plagiarism.

2.2 Style

The thesis should be written in good and factual language and phrasing. The use of colloquialisms, exclamations, rhetorical questions, etc. is often inappropriate

and should be avoided. Own reasoning should be clearly distinguishable from cited publications.

2.2.1 Gender-specific language

The Cognitive Modelling & Decision Neuroscience Lab encourages you to pay attention to gender-specific language rules. This is, however, not a requirement and will not affect your grade (neither in a positive nor negative way).

*Example: Sometimes you might want to say something like "The decision agent first collects information, and then XXX makes a decision." → XXX could be: she/he, s/he, **they** (where 'they' is preferred)*

2.2.2 References

A full reference, like the one in the following example, would look like this in a bibliography. Depending on the type of source (article, book, book chapter), the form varies slightly. The example shown here is for a journal article. The general form is:

Author, A. A., Author, B. B. & Author, C. C. (2000). Title of article. Title of journal, volume of journal (issue), page - page. doi:xx.xxxx/xxxxxx.

Example:

Wimmer, H. & Perner, J. (1983). Beliefs about beliefs: representation and con-straining function of false beliefs in young children's understanding of deception. *Cognition*, 13(1), 103-128. [https://doi.org/10.1016/0010-0277\(83\)90004-5](https://doi.org/10.1016/0010-0277(83)90004-5).

2.2.3 Statistics

In the Cognitive Modelling & Decision Neuroscience research group, R, MATLAB, and Python are used for statistics while R is the standard. SPSS is rarely used. Of course, you should carefully consider which statistical tests are best suited to answer your research question. You should discuss this with your advisor.

Statistical symbols

- The usual international abbreviations are to be used, i.e., *M* for mean, *SD* for standard deviation, *SE* for standard error, *df* for number of degrees of freedom, *r* for correlation, etc.
- All statistical symbols are **italicized**, with the exception of statistics that are denoted by Greek letters (e.g., χ^2 - test).
- In the body text itself, statistical terms are written out in full.

Presentation of statistical results

- Results of statistical tests are indicated by reporting the magnitude of the value of the test statistic, the number of degrees of freedom (often in parentheses), and the probability of the value of the test statistic.
- Round to third decimal.
- Do not use “0” before the “.” for statistics that cannot be larger than 1 and smaller than 0 (e.g., p values)
- We highly recommend to report not only test statistics (i.e., *t*-values, *F*-values etc.) and *p*-values but also effect sizes (e.g., Cohen’s *d*, partial eta-squared) and possibly confidence intervals
- Two examples: $t(54) = 3.753, p < .001, d = 0.4$; $F(1, 197) = 6.271, p = .013, \eta^2 = 0.07$ (please report the exact p-values - unless the p-values are less than .001)
- The symbols of the test statistic and the probability are abbreviated and italicized as usual
- **Even in the case of non-significant test statistics, all results should be reported in full**

2.2.4 Stylistic highlighting in continuous text

Highlighting is a formal element used according to certain rules. Below are some examples.

- **Italics** are used for:
 - The first mention of key terms in the body text, often followed by a definition.
Example: The term *negative reinforcement* describes (...)
 - For Latin letters as statistical indicators
Example: The result is a mean value of $M=2.71$.
 - Response options for rating scales
Example: The scale ranged from the answer options *strongly agree* (1) to *strongly disagree* (6).
- **Quotation marks** “” are used for/as:
 - Literal quotes (note that literal quotes are very uncommon in academic writing and should be kept to a minimum)
 - The use of letters, words, phrases, or sentences as linguistic examples.
Example: the letter “b” here stands for....
 - Mention of test items
Example: The first question of the questionnaire “How tall are you?” was directed at (...)

Bold and underline are not used to emphasize the content of certain words in the continuous text. This should be done through the wording.

2.2.5 Written description of numbers

Numbers up to ten are written out as words, ten and numbers above as numerals (five cats, 25 cats). Numbers with units of measurement (15cm) and statistical values ($M=3$) are always written as numbers.

2.3 Analysis Code

When analyzing the data, you will produce data analyses scripts. You do not need to put your code into the appendix of your thesis. However, some supervisors would like you to hand in the code via email with your thesis. Make sure to discuss this with your supervisor. In any case, comment your scripts as much as possible so that you and others can understand your code.

Appendix A: Evaluation Criteria



Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

FAKULTÄT
FÜR PSYCHOLOGIE UND
BEWEGUNGSWISSENSCHAFT

Institute of Psychology
Name of Department

To the Prüfungsamt des Instituts für Psychologie Review of *Bachelor Thesis / Master Thesis*

Topic: *Title of Thesis*

Submitted by: *Forename Surname*

First reviewer: *Degree Forename Surname*

Second reviewer: *Degree Forename Surname*

		Subrating					
A	General aspects of presentation	1	2	3	4	5	NA ¹
1	Structure and outline						
2	Clarity and comprehensibility						
3	Correctness of general visual layout						
4	Appearance of tables and figures						
5	Correctness of citations and reference list						

B	Previous literature and theory	1	2	3	4	5	NA
1	Structure						
2	Precision of presentation						
3	Extent and appropriateness of considered literature						
4	Integration of presented theories						

C	Specification of research question	1	2	3	4	5	NA
1	Justification of theoretical research question						

¹ NA = not applicable

2	Deduction of hypotheses (content-related, statistical)						
3	Operationalization of theoretical into empirical research question						
4	Complete consideration of relevant variables						
5	Appropriateness of research plan						

D	Data acquisition and analysis	1	2	3	4	5	NA
1	Sample size and its selection and description						
2	Appropriateness of stimulus material and experimental design (setup)						
3	Appropriateness experimental design (procedures)						
4	Documentation of procedures and data acquisition						

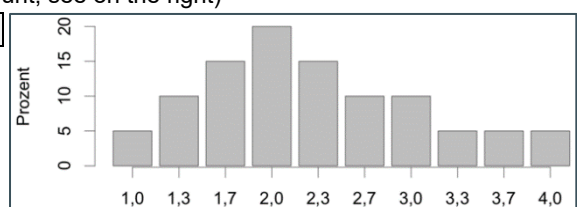
E	Statistical work and presentation of results	1	2	3	4	5	NA
1	Justification of statistical measures						
2	Appropriateness of statistical measures						
3	Correctness of application of statistical measures						
4	Structure and system of presentation						
5	Precision of presentation						
6	Adequacy of answering the research question						

F	Discussion	1	2	3	4	5	NA
1	Summary of results						
2	Reference to research question / topic						
3	Embedding in current state of research						
4	Evaluation of results in light of the research question						
5	Appropriateness of generalization of the results						
6	Critical discussion of strengths and weaknesses of the own work						

G	Overarching evaluation criteria	1	2	3	4	5	NA
1	Independence, initiative and competence w.r.t. planning the study						
2	Independence, initiative and competence w.r.t. conducting the study						
3	Independence, initiative and competence w.r.t. data analysis						
4	Independence from advice by the supervisor						
5	General problem awareness and critical reflection						
6	Open science criteria (transparent, replicable research)						

Final grade (while taking the ideal distribution of grades into account; see on the right)

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1,0	1,3	1,7	2,0	2,3	2,7	3,0	3,3	3,7	4,0	5,0
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1,0 – 1,3 = very good

1,7 – 2,3 = good

2,7 – 3,3 = satisfactory

3,7 – 4,0 = sufficient

5,0 = insufficient / failed

The final grade does not necessarily reflect the arithmetic mean of the subratings, as the subratings may be differently weighted depending on thesis-specific requirements.

Justification of final grade:

Hamburg, XX.XX.20XX

Name and signature of reviewer

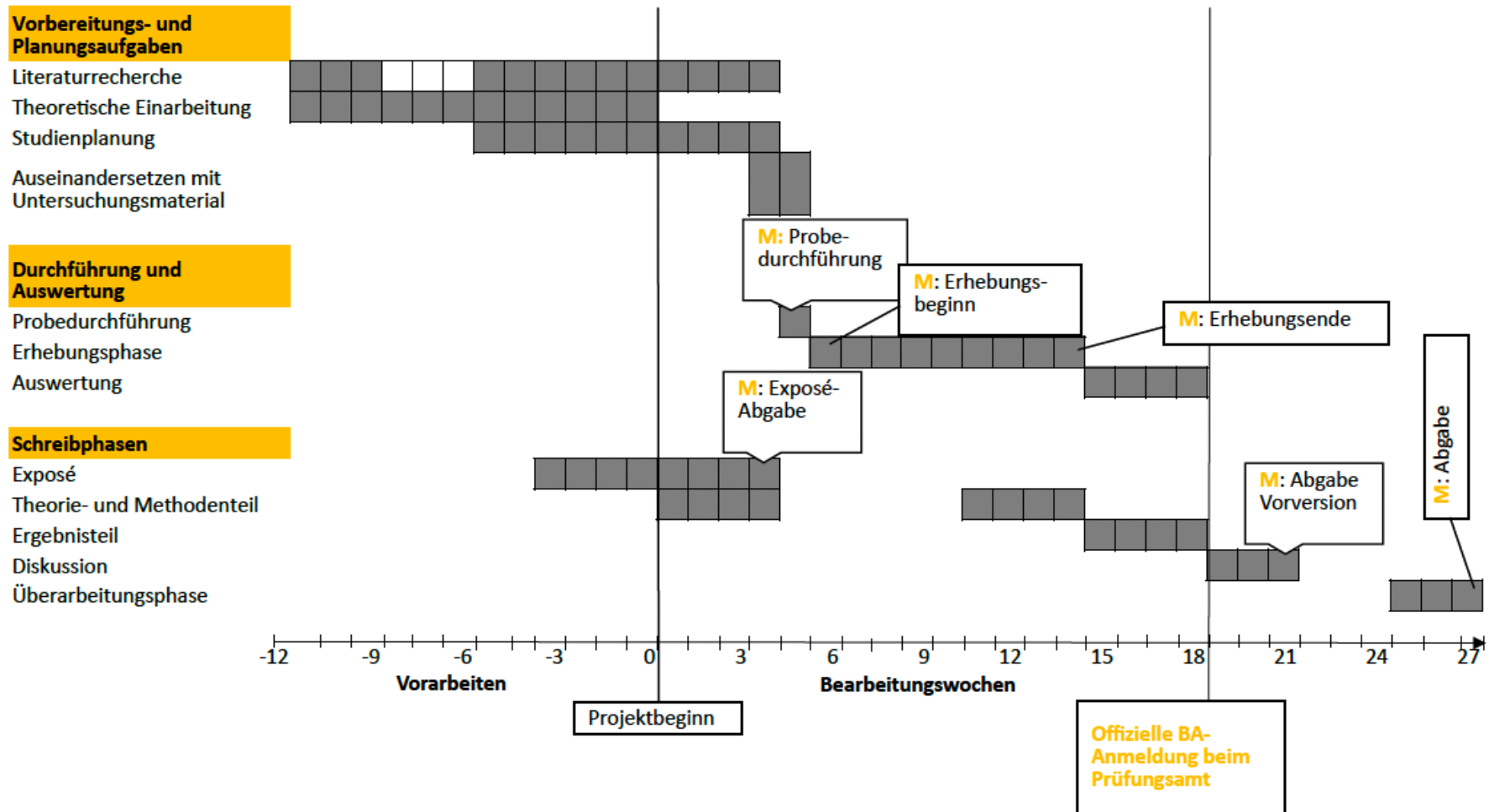
Appendix B: Example Detailed Schedule (in German)

Grobe Zeitplanung für die Bachelorarbeit zum Thema Effekt von Hunger auf Entscheidungsprozesse

Woche	Projektphase/ Aufgabe	Fortschritt
Woche 12 vor Projektbeginn (11.07.-17.07.2022)	Fokussierung eines Themas	100 %
Woche 11 vor Projektbeginn (18.07.-24.07.2022)	Erste Einarbeitung ins Thema (Literaturrecherche, Beschäftigung mit Fragestellung) Verfassen eines Motivationsschreibens	100 %
Woche 10 vor Projektbeginn (25.07.-31.07.2022)	Themenübernahme	100 %
Woche 7 vor Projektbeginn (15.08.-21.08.2022)	Grobe Zeitplanerstellung für Bachelorarbeit	100 %
Woche 6 bis 0 vor Projektbeginn (22.08.-02.10.2022)	Beginn der Exposé-Erstellung (inkl. intensiver Literaturrecherche, -sichtung und -analyse) und Ausarbeitung des Studienplans Finden einer möglichen Fragestellung Planung der vorläufigen Gliederung Ab Woche 5 vor Projektbeginn: Anmeldung für ein Abschlusskolloquium	
Woche 0 (01.10.2022)	Start des Wintersemesters Projektbeginn	
1.– 2. Woche (03.10.-16.10.2022)	Schreiben des Exposés	
3.- 4. Woche (17.10.-30.10.2022)	Übergabe des Exposés an Betreuerin Besprechung des Exposés mit Betreuerin Parallel: Auseinandersetzung mit Studienbestandteilen und sich Vertraut machen mit konkreten Untersuchungsmaterialien Probedurchführung des Experiments	

(Theoretische) Vorarbeiten

5.- 13. Woche (31.10-08.01.2023)	Ggf. Überarbeitung des Exposés Finalisierung des Studienplans Durchführung des Experiments Parallel: Dateneingabe und Umschreiben des Exposés zu Theorie- und Methodenteil	Durchführung gs-phase
14.- 17. Woche (09.01.– 05.02.2023)	Auswertung der Daten Besprechung der Ergebnisse mit Betreuerin Parallel: Ergebnisteil schreiben	Auswertung und finale Schreibphase
18. Woche (06.02.-12.02.2023)	Offizielle Anmeldung der BA beim Prüfungsamt Start der offiziellen Schreibphase	
18.- 20. Woche (06.02.– 26.02.2023)	Schreiben der Diskussion (schließt ggf. Suche nach und Einbeziehung weiterer Literatur mit ein)	
21. Woche (27.02.2023)	Abgabe der Vorversion an Betreuerin (vorherige Absprache der Abgabe und der benötigten Bearbeitungszeit von Betreuerin)	
22. – 24. Woche (06.03.– 26.03.2023)	Rückgabe der Vorversion durch Betreuerin Einarbeiten der Änderungsvorschläge und letzte Korrekturen Überprüfen des Layouts	
25.-27. Woche (27.03.-16.04.2023)	Puffer für Unvorhergesehenes	
28. Woche (17.04.-23.04.2023)	Ausdrucken der Arbeit, Binden im Copyshop Abgabe der Arbeit beim Prüfungsamt	



Legende:
M: Meilenstein