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Scientific Writing

Tips for writing a Bachelor-, Seminar- or Master thesis at the
chair of Prof. Dr. Christoph Spengel

Disclaimer:

This document is not a sample solution that automatically guarantees an excellent thesis grade. Rather, these tips are a structured selection of useful advice and techniques how to write scientific papers. Following these guidelines is not necessarily always optimal. The writing style and structure of any scientific assignment should always be appropriate for the addressed topic and the employed methodology. Within the area of business taxation the required writing styles still vary significantly. Hence, students should use these tips in dependence of the assigned topic, personal preferences and capabilities.

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1. Introduction

1.1. Characteristics of Scientific Papers

- A profound and verified basis of knowledge
- Processing knowledge to new findings
- Embedding statements in context and schemes
- Mastery of scientific and discursive structures
- Presentation of methods and results in a coherent text
- Development of an own point of view in the social field

1.2. Rules of Scientific Presentation

Prove

- By referring to sources, empirical data or claims of other authors
 - Paraphrasing = indirect quotation, in chosen language
 - Direct quotation, marked by using apostrophes
- No need for proof: trivial statements, explanations, own considerations

Justify

- Claims that cannot be proven must be justified by good arguments
- Need for justification: employed methods, amount of used literature and sources, questions, conclusions

Creating references and relations

- Scientific statements must be put in relation to scientific literature
- Differentiated view: Aside from the own opinion, one must state the most important antitheses as well

Definitions and specifications

- Key Words: explain how they are used; match them to certain theories or discussions

Systematic approach

- Any scientific work is based on a clear system that is explained and justified in the introduction
- For example, proven by arguments, used methodology or the structure of the topic

1.3. Scientific Language

- High density of information
- Comments on the guidance of the reader: The reader should be allowed to follow the strain of thought easily
- Logical connections, by using words such as “nevertheless”, “although”, “but”, “therefore”, “instead of”, “whereas”
- Hedging: declaring results as preliminary, open to critique and later corrections. (“Additional tests are needed to verify the results”)
- Characteristics of scientific language: abstract, objective, well chosen, precise, differentiated, factual, terminology, definitions, argumentational relations, Cause-Effect Relationship, varied evidence

1.4. Elements of a Scientific Text

Questions

- What is the main question?
- What relevance does this question have?

Method

- What kind of material is analyzed?
- What theory is employed?
- What is the approach?

Literature

- What research opinions are there?
- What publications should be cited from?
- What contributions can be made by oneself?

Hypotheses

- What answers are there to the questions asked?
- How can the questions be answered?

Evidence

- What sources, texts, data and examples can be listed?
- Which research results favor the own hypothesis?

Argumentation

- What shall be proven?
- Do the arguments correlate and are they free from contradiction?

Strain of Thought

- What question does this paragraph answer? What precedes it? What follows?

Critical Rating

- Is the presentation objective and factual?
- Are the information and conclusion separated?

1.5. Scientific Writing Process

1. Preparation
 - Personal ritual, remind oneself of the readers
 - Avoid inner and outer distractions
2. Developing Ideas
 - Gather raw ideas
 - Note down every idea
 - Find key message
3. Wide spectrum of literature
 - Research and a lot of reading
 - Structured documentation of findings (ex. Excel-List, Mindmap)
4. Structuring
 - Plan the structure of the text
 - Structure the literature
5. Raw text
 - Keep writing within the flow of thought without getting stuck on details
6. Reflect
 - Ask for early feedback before the text is completed
7. Review
 - Use half of the time to review and rework the text
 - Edit in regard to overall impression, content and structure
 - Print out the text and read it at another location
8. Publish/Hand-in

1.6. Guiding the Reader

- Helpful service for the reader, but not required
- If reader guidance is used it must be used consistently
- Especially helpful in the introduction
- Should be short and free of redundancy
- Complete structure of arguments should be clear in the text and especially in the introduction.

Negative examples:

Having presented in the preceding paragraph that..., this next paragraph will explain why...

This paragraph will explain xy more deeply to demonstrate how...

2. Content of Paragraphs

2.1. General

The writing of scientific papers is an intellectual effort. As a result, the reader is presented a text product that is completely thought through in its structure and content. The structure and content of the text are produced by the author with a clear purpose.

The structure serves the purpose of clarity, comprehensibility and support of the main thought.

The content should include all personal scientific findings regarding the topic, relate to other scientific papers and refrain from redundancy.

To produce such a text it is helpful to work in multiple steps. The following steps may prove as helpful:

1. Planning 2. Detailed Structuring 3. First Draft 4. Finalization 5. Review

2.2. Work Steps for Writing Paragraphs

2.2.1 Planning

The main body of the text is roughly outlined. Titles are preliminarily determined and key words for the content of single paragraphs are prepared. This step can be seen as basic structure of the text.

2.2.2 Detailed Structuring

- This step between planning and writing serves as orientation for the following writing of the text.
- Planning text segments by using elements of structure (Introduction/conclusion, arguments, examples)
- Example for an argumentative structure
 - Sequence: Introduction, 1. Argument, 2. Argument, Conclusion
 - Logical chain: Introduction, 1. Argument leading to the 2. Argument leading to the conclusion
 - compromise: introduction, 1. Argument, 2. Argument, compromise, conclusion

2.2.3 First Draft

In this step the prepared content should fill the rough outline created in the planning step. During this writing phase one should continue writing with as little as possible interruptions or breaks in order to sustain the important flow of thought. It is helpful to write a complete paragraph in one short burst (sprint), then take a break to correct the paragraph and iteratively continue this approach until the text is completed.

2.2.4 Finalization

This step serves to fine-tune the written text body. For example, one should focus on eliminating redundancies, complete footnotes, improve sentence and grammatical structure etc.

2.2.5 Review

See chapter 4

2.3. “Paragraphing”

To ensure a consistent style of writing it has proven useful to work on a paragraph level, meaning to correct each paragraph as its own unit. Each paragraph on its own must have a clear purpose and structure that contributes to the superordinate goal of the paper.

The ideal structure of a paragraph looks like this:

Topic Sentence

Support Sentence 1

Support Sentence 2-x

Concluding Sentence

The concluding sentence is optional. This writing style is observed especially in scientific journals and published articles. It helps keeping texts short and yet complete in its content.

Furthermore, a scientific paper is focused on minimizing redundant text segments. Regarding individual paragraphs, one can check the following:

1. Is this paragraph necessary? Does it contribute to the superordinate thought of this paper? If not, it can be removed or significantly shortened
2. Is every sentence within the paragraph necessary or has the information already been presented in another sentence?

3. Style

3.1. Comprehensibility of the Text

3.1.1. Criteria

It is never the goal of a scientific paper to create texts that are complex and hard to understand in order to appear scientifically sophisticated. Rather, the ability of the author to explain complex content and relations in such a way that they are understandable, almost trivial, is a key characteristic of a good scientific paper.

As a result, the text should be understandable for readers unfamiliar with the topic discussed. However, terminology commonly used in the field of research must not be explicitly defined

Scientific papers should be written in plain language. The following checklist helps to ensure a simple language.

3.1.2. Checklist “Plain Writing”

Step 1: The following elements should be considered when writing:

- Relevance (content should be relevant for the readers)
- Specific
- Logic (clear headlines and structures)
- Appropriate (language)
- Engaging (prefer active over passive sentence structure)
- Concise (short sentences, no repetition)
- Real
- Well-Selected (abbreviations only if they facilitate understanding)
- consistent (consistent structure)
- Accurate (no contradiction)

Step 2: Proof-reading by someone who has knowledge of the topic.

Step 3: Proof-reading by someone who has no prior knowledge of the topic

Checklist:

- Is the paper written in a way that a reader with background knowledge can understand it?
- Is the paper structured so that it can answer the questions of the readers?
- Have lists, bullet-points or tables been used to illustrate complex content?
- Are sentences written in active form?
- Was the text written in the easiest tense to understand?
- Are the used definitions consistent?
- Have redundant words been eliminated?
- Have complex sentence structures and technical terms been avoided?
- Have abbreviations been avoided?
- Is the paper free of ambivalence?
- Have verbs been used instead of nouns?
- Are the sentences short and precise?

3.2. Argumentation

3.2.1. Definition

Argument: A statement that justifies a claim, an opinion or a request; is created when two statements are brought into dependence of each other.

Two statements can be connected to each other with these elements:

- Thesis/claim (=what is to be proven)
- Argument (=the evidence that proves it): must be connected to the thesis in a supporting relationship
- Argumentative relation, followed by a final conclusion or agreement (therefore...)

Argumentation: Process in which something disputed should become undisputed

For a good argumentation the relationship between the thesis and the argument must be valid.

3.2.2. Types of Argument

From hard to easily refutable:

- Facts
- Agreements
- Shared experience
- Norms and values
- Authorities
- Examples
- Assumptions

How can they be refuted?

- Declared as insignificant
- Call for changed circumstances
- To challenge the factual basis
- To question the entire paper
- Doubting the reliability
- Opposite examples
- Demand proof

Argumentations can be deductive or inductive. Inductive means that the thesis can be inferred from the argument and therefore follows the argument at the end of the sentence. Deductive means that the thesis comes first and is followed by its arguments.

3.3. Words for Argumentations

Connecting function	Argumentative words
Enumeration	First – Second – Third; On the one hand – on the other hand; first of all – then – finally, this does not just mean x – but means y as well
Reinforcement	Actually, all things considered, in total
Comparison	similar, in comparison to, compared to, in juxtaposition to
Summary	To sum up, overall, in total, finally
Consequences	For this reason, as a consequence, hence, therefore

Conclusion	Therefore, ergo, that is why, finally, as a result
Illustration	For example, metaphorically speaking, for instance
Repetition	In other words
Opposite	although, on the one hand – on the other hand, instead of
Addition	Additionally, in addition to, furthermore
Purpose	So that, in order that
Admit	Although, nevertheless, anyway, even if
Condition	Before, if, in case, provided that, given that
Time dependency	After, before, if, until
Reasoning, Cause	Because, since
Possibilities	Or, or rather, for one thing, either – or, partly

3.4. Further Formulation Advice

Introduction	<i>This work examines, presents, investigates.... At the center of this paper stands</i>
Justify topic selection	<i>The question of x is of superior interest because</i>
Presenting the structure	<i>The first part will explain... Then... Furthermore, It shall be illustrated...</i>
Formulating goals	<i>This work serves to answer the question/explain... In this paper I critically analyze ...</i>
Explain and define terminology	<i>X shall be defined as: Müller (2008, S. 3) defines ... as</i>
State a thesis	<i>The author presents the thesis that ... (vgl. Mainz 2006, S. 34). Frank states that ... (Frank 2008, S. 77)</i>
Justify a thesis	<i>The author explains the thesis with the fact that ... Weyert lists the following arguments: The basis for this argument is</i>
Examples to support a thesis	<i>Meyer shows this by using the example of/that This is shown by the example.</i>
Citing other authors	<i>Müller proves in his study that... (Müller 2008, S. 57) Hinz observes that ... (Hinz 2004, S. 338) This claim supported by further work by ... (vgl. u. a. Lutz 2006, Xaver 2007, Vopel 2002)</i>
Comment, Interpret	<i>Xaver points out correctly that The data evidences that ...</i>
Direct quotations	<i>Leibig comments in his own words: "...” (Leibig 2008, S. 29) Hinz writes in his article: "...” (Hinz 1998, S. 22)</i>
Presenting one’s opinion	<i>In consideration of the listed arguments, I am convinced that... Regarding the arguments it is clear to me that</i>

Agree	<i>From my point of view Hunzelmann is right when he says that ... Following Müller I assume that</i>
Refute	<i>It remains problematic that This hypothesis must be challenged Important aspects are left unanswered such as</i>
compare	<i>While Bernd interprets the data mainly negatively, (whereas) Kaiser, (on the other hand), tries to explain ...</i>
Present results	<i>This exemplifies that Roth concludes that The results are similar to</i>
Boundaries of the paper	<i>X cannot be explained by this paper A question that remains unanswered is...</i>

3.5. Style and Grammar

3.5.1 Redundant Phrasing

- Avoid “it” as placeholder
“It can be inferred from this example,…” → “This example shows…”
- Eliminate words
 - Fillers lengthen the text unnecessarily: “actually, like, usually”
 - Redundancies
In the month of August → in August
With the help of interviews → with Interviews
This requires a high degree of flexibility. → This requires flexibility
- Avoid technical terms (“big words”) or Latin expressions

3.5.2 Verbs

Prefer the use of verbs to the use of nouns. Too many nouns (in English) create a complex sentence and confuse the reader.

- Verbs and adjectives instead of nouns
Justification → justify
Agreement → agree
- Avoid long phrases
To take into consideration → consider
- Avoid supporting verbs (could, should, would)
This text should show that → This text shows

3.5.3 Nouns

- Repeat nouns on purpose
Trying to avoid the same noun leads to using synonyms that might have a slightly different meaning
Company → Corporation
- Use abbreviations wisely
Only if they are common in the field of research or are only used in short form by the public (UN, EU)

3.5.4 Adjectives

- Avoid clichés and catch phrases
- Avoid Pleonasms (double expression)
“managing executive”

- “rich millionaire”
- Avoid assurance, “diligent audit”

3.5.5 Sentence Structure

- Shorten sentences
 - 20-25 Words understandable
 - 26-34 Words difficult to understand
 - Ab 35 Words very difficult to understand
- Eliminate introducing formulations
 - “In this paragraph we will explain...” → eliminate
 - “There is no doubt that...” → undoubtful
- Avoid long and complex sentence structures with too many commas
 - Change sentences with more than one subordinate clause.
 - Place subordinate clause at the end of the of the sentence
 - Bring two different parts of the verb closer together in each sentence
 example:
 1. We are, because of the unexpectedly slowly arriving answers, planning to end the evaluation phase by 31 March. → We are planning to end the evaluation phase by 31 March because of the slowly arriving answers
- Noun and verb must be closer together
 - The circumstance that many employees feel underpaid causes a bad work ethic. → Many employees feel underpaid. This leads to a bad work ethic.
- Avoid monotony and occasionally change the sentence structure
- Formulate citation of authors in active sentence structure
 - In this chapter the poor situation will be described → The author describes the poor situation.
- Positive formulations
 - Not bad → good
 - No acceptance → denial
- Do not switch tenses
 - Either Present or Past Tense. Both is correct. It is incorrect to switch between tenses
 - Preferably present tense: “The study by Müller (2016) explains,...”

4. Review

4.1. Review Process

4 step process in which the different steps are clearly separated. One must review everything from the overall impression to the smallest details.

Print out the text and go to a place that is not the writing place.

Step 1 Read the text at an appropriate speed and mark odd parts. Do not read on a monitor and do not work in detail. Answer these questions: What impression does the text give? What call for change do I feel? How is the reader addressed?

Step 2 Review content and structure. Which parts are indecisive? Question each paragraph and its contribution to the superordinate topic.

Add the results of step 1 and 2 to the text.

Step 3 Edit phrasing and expressions. Focus on length of sentences. Shorten long segments if necessary. Check the comprehensibility.

Step 4 Correct orthography and punctuation on the print out.

4.2. Advice

- Impression
 - What impression does the text give the reader?
 - Do I feel addressed as reader? What addressed me?
 - Which parts catch my attention?
 - Which parts cause boredom? Why?
 - Advice for further improvements?
- Structure and content
 - How is the overall structure? Are the sub-structures clear? Is the content understandable?
- Check comprehensibility using 4 criteria (on a scale ++ to --)
 - Simplicity
 - Structure
 - Preciseness
 - Other additions
- Style (see chapter 3.5)

4.3. Checklist

The Paper

- Matches superordinate question
- Follows a clear argumentation
- Explains necessary background information
- Transitions well from one idea to another
- Acknowledges different points view
- Addresses a certain audience and uses adequate language

Structure

The introduction

- Gains the reader's attention
- Introduces the question that is subject of the paper
- Clarifies the purpose of the paper
- Explains the approach to fulfill the purpose
- Outlines the structure of the paper
- includes original problem, purpose and method of research

The thesis (usually in chapter 2)

- States the main idea
- Outlines the scope of the chosen topic
- Is clear and precise

Each paragraph

- Contains only one idea
- Supports the thesis

The conclusion

- Summarizes the main findings
- Explains the relevance of the findings
- Contains no new information

Structure of the paragraphs

The introduction sentence

- Explains the main idea of the paragraph
- Relates to the thesis
- Is clear and precise
- Can be used as connection between two paragraphs

Details

- Are logical and rational
- Are objective and neither emotional nor judging
- Support the introduction sentence
- Follows a logical structure
- Contain an own analysis of the topic

De closing sentence

- Repeats the main idea
- Connects the details

Sentences

Each sentence

- Is clear and not too complex
- Is relevant
- Is complete and logical in itself

- Is as precise as possible

The paragraph

- Is long enough to explain the main idea
- But not too long or else reader will lose focus
- Uses specific details to support the arguments
- Uses changing sentence structure, avoids monotony

General

- The author and the computer have checked the text for mistakes
- All citations are correct
- The format is correct
- The paper has been read out loud to identify last mistakes
- Enough feedback has been gathered before turning in the paper

5. Excursus: Writing Papers (PhD level) (Quelle: Crochane 2006)

1) Before writing the paper

Preparation: figure out the one central and novel contribution of your paper and explain what the central results are

“Newspaper style” – make sure the most important contribution and findings appear right at the beginning of your paper

Organization

Abstract

- 100-150 words - state what you find, NOT what you look for

Introduction

- Major contribution: what do you do in this paper?
- Max. three pages, “roadmap” paragraph optional

Literature Review

- Make sure readers understand what YOU do before reviewing other literature
- Set off your work against approx. three closest current papers (credit other authors)

Body of the paper

- Get to the central result as fast as possible
- Rule: “There should be nothing before the main result that a reader does not need to know in order to understand the main result.”
- Theory limited to what’s required for the reader to understand your results
- Empirical work: start with the main result
- Conclusion required for most referees, but should not restate all facts of the paper – “short and sweet”
- Appendices: insert what is not of enough relevance for the body of the paper in the appendix (some robustness results may not be necessary even in the appendix)

2) Writing the paper

- Keep it short (max. 40 pages), do not repeat things, simpler is better
- Rule: “First describe what you do, then explain it, compare it to alternatives, and compare it to others’ procedures”
- Tables should include a self-contained caption, no regression equations
- “If it’s not worth writing about it in the text, don’t put it in the table”
- Use active tense, present tense most common (structure subject, verb, object)
- Avoid adjectives when describing your work, “this” always be followed by noun
- Ensure all (greek) letters are defined, “where” for place vs. “in which” for models
- No over usage of italics, insert thank you footnote but not excessively

3) Tips for empirical work

- Identification: describe your identification strategy (causal effects) clearly!
- Describe what economic mechanisms caused the effect and constitute the error term, explain why error term and right hand variables are uncorrelated in economic terms
- Describe the source of variation in the data that drives your estimates (underlying facts)
- Watch out for “reverse-causality stories”, consider carefully what controls should and shouldn’t be used in the regression
- Explain the economic significance of your results and the magnitude of the central numbers in the statistical results and include a standard error in every important number

Reference:

https://faculty.chicagobooth.edu/john.cochrane/research/papers/phd_paper_writing.pdf