

Writing and presenting Mathematical and statistical contents

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General remarks

Unlike mathematics there is no exact *right* or *wrong* in writing and presenting

The more you write/present – the better you get!

This lecture is about the "package" – not the mathematical content

The "package" is equally important for reaching out!

The lecture is **not** about software (LaTeX or similar)

Before starting to write

Procedure: Preparation – writing – revision

Things to consider when preparing:

- Who is the typical reader?
- What are the main messages? (Not too few or worse, too many) Write them down!
- What is good notation to be used?

The "decreasing rule"

Keep in mind the decreasing or "half-time" rule:

Out of all people that read the title

- 50% read the abstract
- 25% read the introduction
- Half of readership is lost with each section
- < 1% read the appendices

I think these numbers are **very optimistic** ...

Consequences

The title is very important: to deliver the main message AND to attract the reader

The abstract is very important: should contain the main messages and a bit about methodology

The introduction is very important: I think it should contain a very short background, a statement of the problem(s) treated, a presentation of the results and description of the rest of the paper

Have the "decreasing rule" in mind: someone who reads 1-2 pages should benefit from the paper!

More things before getting started

Who should be author?

Who/what should be acknowledged?? Supervisor (if not an author), others who have contributed, financial support, ...

Getting started

The first thing to do: write a **skeleton** (\approx list of contents)

The skeleton should contain the different (sub-)sections

The skeleton should also contain a description of what parts come in the different (sub-)sections (relating to the "main messages")

A common structure of a mathematical paper

- Title, authors and abstract
- Introduction (possibly also containing main results)
- The model/problem (+ what have others done – references)
- one or more sections of theory
- illustration/application/numerics
- Discussion/conclusion: What has been done, possible alternative routes and extensions, why are the results interesting and how could they be improved even more
- Acknowledgements
- Reference list
- Appendix (sometimes placed before references)

Writing the main text

It's ok to leave out some technical bits at first to keep *logical line* in writing procedure

Minor comments

- Don't use complicated/specialised language
- Equations are part of sentences
- Use, but don't over-use, bold face and italics
- Don't start sentence with mathematical symbol
- Avoid abbreviations
- Number only equations that are referred to
- Try to make the text "flow": leave less relevant technicalities to appendices (or technical sections)
- Admit or give reference where logical steps are left out
- Don't use phrases like: "it easily follows that ..." better with: "standard but tedious calculations reveal that ..."

More minor comments

- Avoid too **much** mathematical notation
- Mathematical notation should be logic and easy to remember
- Use words rather than math-symbols in running text: "Pick an element x in X " rather than "Pick $x \in X$ "
- Lemma – Theorem – Corollary (Proposition?)
- Use "I" or "we" in text? I prefer "we" even if only one author:
We = I and the reader
- Use figures, tables etcetera – it makes the text look more varying (beside explaining/illustrating something)
- All figures/tables and similar must be referred to in text

More minor comments

- Use capital letters when referring to figures, theorems, and similar: "... as shown in Figure 3 ..."
- Use spell- and grammar-check
- Use active (not passive) form in sentences

Specific remarks: Title and abstract

- Should be written "afterwards"
- **Title**: spend time deciding this! It is very important
- **Title**: should be informative, "catchy" and short (hard ...)
- **Abstract**: should both give the main result and attract the reader
- The abstract is not part of the paper: something defined in the abstract must also be defined in the main text

Specific remarks: Citations and references

- There are different ways of referring and writing reference list. Be consistent
- Better with too many than too few references
- All items in reference list must be cited in text
- Direct the unfamiliar reader to some background text covering "your" area
- Avoid citing unpublished work (in particular your own!)
- Give page reference when citing books
- Don't quote/copy (e.g. from web) without citing. This is criminal!

Specific remarks: Discussion/Conclusion section

- Should summarize main results (repeat the important!)
- Mention the strength of the results
- Mention also what can be done better, extensions and open questions

Specific remarks: Appendix (and technical sections)

- Here you can be more technical/advanced
- Should contain material that is not central and would stop the "flow" in the main text
- Each appendix should start with what it is about
- Each appendix should end with the result that is referred to in main text

After the first draft written

- Leave the manuscript for a few days (otherwise you are "blind")
- Then go through it:
 - First look at the general structure: is everything there?, adequate level of detail?, easy to follow the logical line?, can something be removed? **The shorter the better!**
 - Then go through the manuscript in detail
 - Pretend you are a typical reader of the journal in question
 - Change whole paragraphs rather than sentences
 - Focus more on removing than adding things!
- If several authors: read and comment each others' contributions
- Repeat everything above (at least) once more. **Date versions!**

After the second and third drafts are written

- Have someone else read and comment the manuscript (supervisor, student colleague, ...).
- Preferably someone being the intended "typical reader"
- Adjust according to suggestions: other reader will react similarly.
Possibly also: Send to **proof-reader** and/or language check
- Reconsider journal choice: aim fairly high, check reference list for candidate journals
- Once this has been done: **Submit!**: there is nothing like a perfect paper
- Many (potentially) good scientists fail due to never being completely satisfied with a manuscript
- One author will have contacts with journal: **corresponding author**

Advice when giving feedback

- Be positive – give constructive suggestions
- Which parts are best and which can be improved and how?

The structure

- Is the logical order good? Could it be improved?
- Is the introduction good? Does it catch interest?
- Is the last section good? Does it "wrap it all up"?

More advice when giving feedback

Language and style

- Is it well-written in terms of language? Possible improvements?
- Is the language varied and "lively"?
- Are the figures, tables and references adequate?

Mathematical contents and level

- What readership is it suited for?
- Which mathematical parts are most interesting?
- Could more be done to interest/motivate the reader?
- Is the mathematical level fairly constant?
- Other suggestions for improvement, anything unclear?

The job of a referee

- Two duties:** help editor make decision AND help authors improve manuscript
- Now often webbased
 - Common decision choices: accept, accept with minor corrections, encourage resubmission, reject
 - Give short explanation for your decision in "author blind" text to editors (refer mainly to text to authors)
 - Other web-questions: how knowledgeable are you about contents, is text well wrtten, mathematical "level" adequate, length of paper ok, ...

The main referee job: writing text to authors

- Unless you say differently you are anonymous
- Write honestly and politely: your main job is to detect errors/unclear things AND to suggest how to change them
- My suggested structure:
 - 2-4 sentences describing contents of ms (to show authors you read and understood)
 - General comments: General comment of your opinion about strength and weaknesses of ms, 0-10 most important points for improving ms: mistakes, changes in structure of ms, new additions, removal of paragraphs/sections ...
 - Minor comments: page and line reference to suggested minor changes: typos, bad notation, insufficient explanation, removal of smaller parts, ...

Resubmission

- After some time you will get response from the journal
 - Different decisions: Accept, accept subject to minor revision, revision, resubmission encouraged, rejection, ...
 - Text from editor indicates what really needs to be revised
- Important to remember:** (nearly) all editors and referees are kind, competent and spend time on your ms "for free"
- They want to help improve manuscript
 - If they don't understand or request something, it is for the sake of future readers!

Resubmission cont'd

- **Revising is boring** (but important)
- **Revise quickly**: appreciated by journal and it will get even more boring if you wait
- **If rejected**: revise manuscript according to suggestions and submit elsewhere.
- Never submit to new journal without any changes!

Resubmission cont'd

- **If conditionally accepted or resubmission encouraged**
 - Respond/adjust to **all** comments raised by editors and referees
 - Follow their advice as much as possible. One exception: if reviewers suggest big extension write: “.. beyond scope of paper” and insert the suggestion in discussion for future work
 - Even if they are wrong: “The text is now changed to better explain what we mean”
 - Response letter should contain letter from journal with short “highlighted” response after each comment
 - Short comments (with page ref) – explanations in manuscript. E.g. “This important point now addressed on p xx”
 - Avoid changing things not requested (except typos)
 - Thank editor and referees in response letter (in acknowledgements only if they were important)

Oral presentation degree project

- Many similarities with writing
- **Main difference:** Impossible to cover everything. Be simple!!
- Who are you talking to? This should affect presentation
- Remember: audience is typically not specialist and have not read the paper
- Try to catch the listeners interest
- Be very simple in beginning and possible a bit more technical towards the end
- Consider how much time you have when preparing talk
- Give the talk loud for yourself when preparing – takes longer time
- **Never** talk too long. Shorter is fine
- Some slides towards the end should be possible to skip

Oral presentation: details

- Don't use complete sentences in slides
- At most one slide per minute
- Try to catch eye contact with people in the audience – not always the same person(s)!
- Speak loud!
- Talk only about the important parts of the work
- Only important references at end (if any)
- Most important that listeners understand the problem you are addressing

Oral presentation: details

Each slide

- Informative title/heading
- use symbol ".", "-", ... to visualize list
- not too much information one one slide
- leave out details
- should only contain information you talk about
- large enough font

Oral presentation: details

- Talk about a special case rather than most general situation
- You may have notes on the side for your memory
- Unexperienced speakers are recommended to learn 1-2 sentences at the start by heart
- Don't speak too fast
- Make a slightly longer stop after saying important result
- Avoid repetitive "hang-ups"

After talk: try to get feedback from supervisor/student colleagues
– learning to give talks is a process

Financial support

To obtain financial support is evermore important (in academia and elsewhere): enables project to be carried out AND gives recognition

Plan in advance: What sources available? What is needed to apply (collaboration, preliminary results, ...)

Start with project-idea – then look for donors: not opposite (= prostitution and usually unsuccessful)

Read **intended areas** of grants carefully: look also at previous supported grants including applications if possible

Writing applications takes time: apply only if you have a chance (however, most mathematicians apply too rarely!)

If you find grant: maybe "adjust" project to better fit intended area ↻ 🔍 ↺

Writing research application

Find out who evaluates (which type of persons): most often 1-2 specialists and 5-10 from other areas

Specialists spend 2-4 hours reading application, others 1-15 minutes

- Have this in mind when you write application
- There are usually instructions how application should "look": length of project plan, structure of other parts: budget, CV, popular text, ... **Don't write too long!**
- Usually two things are weighed together: your previous achievements and relevance/potential of project
- Previous achievements: your CV and list of publications is **VERY** important – write them carefully (this is usually all that non-specialists read)

Writing project plan

Start with **Executive summary**

- There and in main text: Motivate why questions you plan to study are important/interesting
- Outline a few ideas you have for solving problems of interest
- Good if you have already made a bit of progress in at least one of them
- Include some central references + possibly 1 or 2 of your own relating to area
- State **expected output**: x papers in which type of journals, talks at conferences, software, ...
- Mention planned collaboration, planned visits to collaborators

Budget

- Check carefully what you can apply for
- Include all costs but moderate prices: time for research (include salary increase), publication costs (open access publications - nowadays often requested), travel (flight, local transport, lodging, subsistence, conf-fee), inviting guests, ...