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Introduction to Scientific Writing

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What is Scientific Writing?

Scientific writing is the process of describing scientific ideas and experimental results in a written format

Scientific writing is technical writing; the language used in scientific texts should thus be precise and to the point

Due to its technical nature, which puts several constraints on how and what to write, it is not entirely trivial to do scientific writing right

Scientific texts are usually written for a smaller technical audience

Who Does Scientific Writing?

- *Researchers*: proposals, conference papers, journal papers, progress reports...
- *Students in the sciences*: even if it is just writing up assignments and small project reports
- *Scientific journalists*

Why Should You Care About Scientific Writing?

As part of your studies, you will have to at least write an R&D report and a master's thesis; **both written reports contribute heavily towards your grades**

Those of you who want an academic career will have to continue writing way beyond your studies

Becoming good at writing scientific texts is thus important both for successful completion of your studies and for your future careers

1. What is Scientific Writing and Why Should You Care About It?

2. Types of Scientific Texts

3. Writing Tips

4. Writer's Block and How to Counteract It

Types of Scientific Texts

- Project proposals
- Project reports
- Theses/dissertations
- Conference/workshop publications
- Journal publications
- Other types of scientific texts

Project Proposals

A project proposal describes the plan for conducting a project in significant detail

Just as project proposals in other disciplines, scientific project proposals have to convince the reader that the proposer is qualified enough to complete the project

The project's **feasibility** and **relevance** are however particularly important in scientific proposals

You will have to write proposals for both your R&D project and your master's thesis

Project Reports

A project report summarises the work done in the context of a certain project

Depending on the project's nature, the report's focus might need to be more theoretical or more experimental

Regardless of the nature, such a report should:

- demonstrate that you have learned enough about your project
- fully describe your results and any relevant findings
- show that your work goes in line with the expectations specified in the proposal or makes it clear why those expectations could not be achieved

You will need to write at least one report during your studies: an R&D project report

Theses/Dissertations

Theses and dissertations are special types of project reports that are written in the context of a master's thesis and a PhD respectively

The scientific aspects of the work are particularly important in theses and dissertations (e.g. the relation of the work to the existing literature and any improvements over the existing work)

In principle, theses and dissertations are longer than a conventional project report

Conference/Workshop Publications

A conference publication describes the results of some work in a short and concise way (e.g. ICRA and IROS - six to eight pages)

Such publications give an overview of the work and are excellent for **communicating ideas to fellow researchers**

Conference/workshop publications are always accompanied by formal gatherings and oral presentations and are thus great for **networking**

Not all conferences and workshops are of equal quality!

Publishing at high-quality conferences can be seen as a demonstration of one's research worth

Journal Publications

Journal publications serve a similar purpose as conference publications, but are generally longer

Journal papers are usually more formal and considerably more detailed than conference/workshop papers

Just as for conferences and workshops, not all journals are of equal quality!

Publishing in high-quality journals is also seen as a demonstration of one's research worth (in some disciplines even more so than publishing at conferences)

Others

- Handbooks
- Textbooks
- Lecture notes
- Popular science books
- Scientific blog posts
- Public statements and informal newspaper articles

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Master the Language in Which You Are Writing

To write effectively, you need to have **excellent** command of the language in which you are writing

Language mastery doesn't just mean being able to use the language on a daily basis, but also knowing its **grammar** and **correct practical use**

English is the main language not only in MAS, but also generally in the scientific community, so you should try to master this language as much as possible

Master the Topic You Are Writing About (As Much As Possible)

Knowing the language does not help if you don’t know what to write about

Scientific writing communicates ideas and results; if they are to be taken seriously, you need to convince your reader that your know what you are talking about

Complete mastery of a topic is impossible and writing often helps you discover the limitations of your knowledge

Write For Your Intended Audience

Whenever you write something, you need to have some audience in mind; otherwise, your content is likely to confuse and/or annoy your readers

The audience usually changes depending on the type of manuscript you are preparing

Tell a Story

Scientific writing is not a storytelling discipline, but you still need to have a clear "story" in mind while writing

A manuscript that does not seem to have a clear logical flow is likely to be incoherent and thus difficult to read

Read Well-Written Texts and Use Them as Writing Samples

While reading papers about your area of interest, you will certainly find some that are very well-written

Use such papers as writing samples and try to learn from them as much as possible

You can however also learn from badly-written papers, i.e. you can try to avoid the things that decrease their writing quality in the first place

Write Outlines

Whenever you are faced with a writing task, start by writing an outline

Having an outline helps in multiple ways:

- it gives you an overview of your written work even before you start working on it
- you can easily talk about the outline with others (e.g. your supervisors)
- it helps you track your writing progress

Let Others Read What You Write

While writing, it is very easy to forget that your readers are reading your manuscript, not your mind

Sending manuscript drafts to your supervisors/colleagues/friends is usually very helpful to see what others think about your writing

Not everyone can give you useful comments about your work, so **send your manuscript to someone who will give you a (brutally) honest opinion about it**

Don’t take comments about your writing personally; people are trying to help you improve your work

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What is Writer's Block and Why Does it Happen?

It sometimes happens that despite the fact that we need to write and despite all our efforts, we just cannot seem to produce any text

This can lead to frustration and procrastination, which will further exacerbate the problem

We call this phenomenon **writer's block**

Writer's block may have different causes, but stress most likely lies at the core of it[1]

[1] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2277565/pdf/canfamphys00047-0094.pdf

Tips For Counteracting the Block

One very useful technique for counteracting a writer's block is **free writing**, namely simply writing about what you are supposed to write without thinking too much about the grammar, sentence structure, and wording

Another useful technique is forming/participating in a **writing/discussion group**

Simply talking with others about your work can also help sometimes

Thanks for your attention