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How to…. write well

There may be times when you are struggling with writing an essay, your internship report or your literature thesis. You are not the only one. Below I have collected tips and tricks and bits of advice that I have handed out to students over the years.

The development of LLM models and GenAI tools such as ChatGPT have been disruptive. There are pros and cons regarding their use. The first section provides my personal perspective on why you should not outsource your writing to such a tool, which is best summarized by “Writing is Thinking”. There is a lot more to say on the topic.

All other sections were written before the arrival of these tools. This writing advice still holds up and I strongly encourage you to master these basics before you outsource any part of your writing and editing to ChatGPT.

You will find a link to useful resources at the end of this document.

On the use of GenAI

As for using GenAI in the writing process, please be aware of the following:

1. Writing = thinking. It is not just about getting a piece of text on paper but about deconstructing a problem (topic) into multiple smaller questions (ideas) and about constructing an argument in which one thought flows logically from the other. Especially as an early career researcher, it is critical that you learn to develop these skills yourself. They are critical in any future working environment, because they equip you with the capacity to tackle problems you have never encountered before. Moreover, synthesizing your own thoughts and arguments by actively engaging with the material helps you to develop a true and deeper understanding[1]. This is something you should not and cannot outsource to an AI. So, use GenAI as a buddy for brainstorming and idea generation, or as a personal writing coach to polish your text – but don’t let it do the work for you. It really is the process that matters most. A well written product is the icing on the cake.

2. If you do use GenAI to streamline or improve a piece of text that you have written, then be a smart and critical user: Never just copy paste what you get back, but try to learn from the experience. Try to see (or ask the AI) which improvements it has made and why their suggestions are better than what you had originally. Ask it to highlight the changes. Then see if you agree. And always question any new information it returns to you.

3. Don’t flood the world with bland and generic AI texts. Good writers also have their own style and creative voice. This can take years to develop. While AI may be able to assist you in constructing grammatically correct sentences, don’t fall into the trap of thinking that what it produces is somehow a mold or general style that all writing should fit into.

[1] https://arxiv.org/abs/2506.08872

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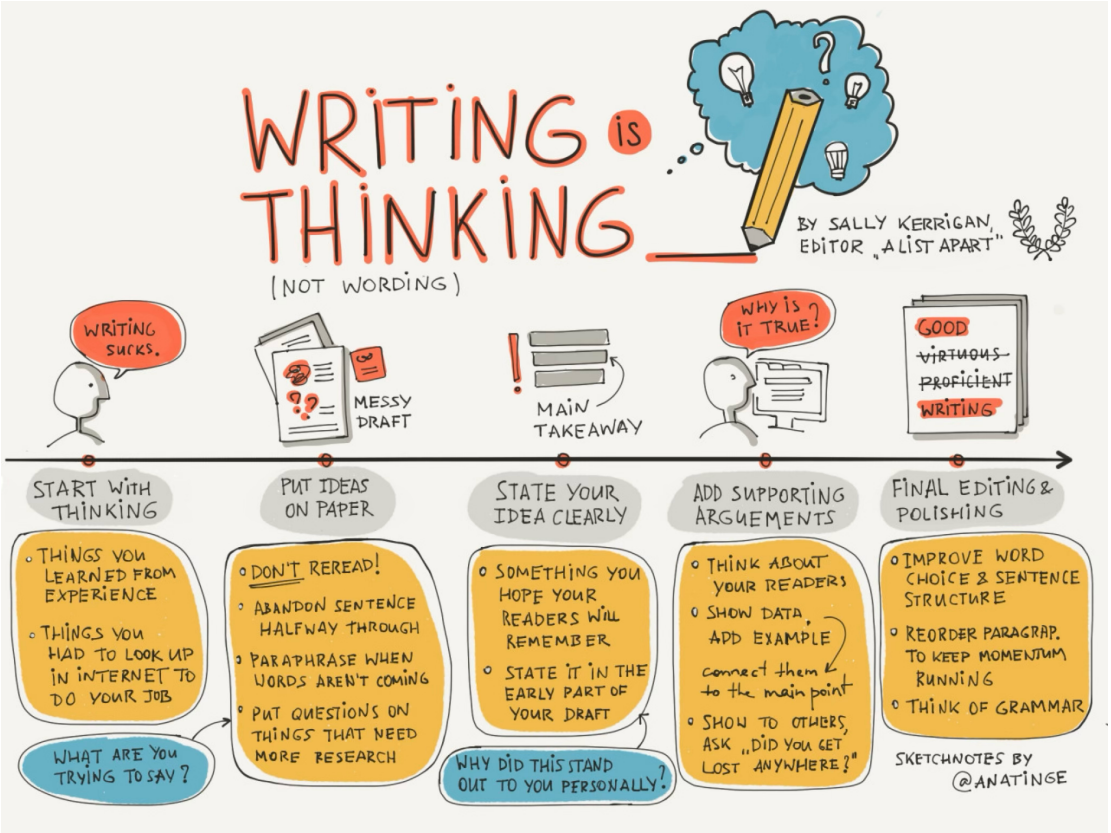

Getting started: the empty page

We all know the feeling of writer's block. The words don't flow, the ideas won't come and all you have in front of you is an empty page and a blinking cursor. Yet this how all writing is supposed to start: from scratch.
Some people will always find writing a tremendous struggle. Others will (come to) enjoy it. As you write more often, you will ultimately (over the course of many years!) develop your own personal style or "voice". Becoming a skilled writer takes practice and requires patience. I love writing – but there are still times when I spend an entire day on only three lines of text that I ultimately am happy with.
Therefore, my main advice for when the white page feels intimidating is this: Just jot down that first sentence, no matter how imperfect it is. If you do a good job editing and polishing your work, it is unlikely to make it to final version anyway. After all, writing is rewriting.

The right approach to writing

Writing can be hard enough in your native language, let alone a foreign one. Much of what you will write as a BSc or MSc student will be in English – in academic English, to be exact, which is another beast altogether. You will have to learn how to be specific and precise, by choosing exactly the right words. Learn how to do this by reading as many scientific papers as you can.

Ultimately, you have to develop your own writing mechanism. Do you prefer to work with a fixed outline of the entire story/essay before you can get started or are you someone who can dive right in and take a more organic approach? Personally, I tend to dump all my thoughts on paper and structure bits as I go along. There is no right or wrong here, and of course it also depends on the type of assignment and time available for completing it: Do you have time to develop your ideas and mull over your sentences for a couple of hours, days or weeks? Do whatever works best for you. When in doubt (or when working on a collaborative project), make an outline though – it forces you to structure your thoughts (and makes sure that everyone is on the same page).

Finding your voice

Every story starts with you, the author. You are in full control. This means you have the power and the responsibility to take your reader on a journey. And just because it is scientific writing, it doesn't have to be a boring one (if you don't believe me, see what my colleague Filipe Branco dos Santos had to say on the topic in 2015: https://www.elsevier.com/connect/archive/its-time-for-academic-writing-to-evolve-professor-says)
Regardless of whether you are writing down your own original work or summarizing someone else's efforts, every line should be written *de novo*, in your own words. Whatever you do, I urge you to stay away from "patchwriting" – a phenomenon that I must confess I had never heard about until 2017. It refers to the (apparently not too uncommon) fact that unskilled writers edit existing text by virtually (or literally) copying entire sentences or even paragraphs, while swopping out bits and pieces in the process – for example by replacing original words with synonyms. I want to emphasize that this is not the right approach to writing: even with good intentions it is rephrasing at best and a slippery slope towards plagiarism at worst. Yes, you have used "your own words" (after all, you have rewritten the text), but you did not formulate your thoughts from scratch or created an original piece of work. You did not build a house, you redecorated one (you gave it a sloppy paint job – to be honest). Opinions widely vary among scientists as to how much borrowing and recycling of (even one's own) text is allowed, so just don't go there, ever.
So how do you go about summarizing the literature or distilling the main thoughts from a scientific paper? Scientist Raul Pacheco-Vega is famous for his detailed note taking and memo writing of virtually every paper and book that he reads and he frequently blogs about his approach at http://www.raulpacheco.org/blog/.

So there you have the main gist: Don't be afraid of the white page and **always write from scratch**! You will become a much better writer in the process and your (academic) English will steadily improve as you become more skilled.

Now, on to a bit of detail for specific elements.

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Structure

Paragraph structure

As mentioned at the top of this hand out, there is nothing worse than an empty page staring you in the face. But remember that once you have gotten started, the white space on the page is your friend. Don't cover it all up with massive blocks of text – such pages are difficult to read and will put off your reader before they even get started (and often, that reader is the person grading or reviewing your work at the end of long work day when their eyes and brain are already tired). So help them out: use the white space to add some of air (increase your font and line spacing just a bit can make all the difference). Use headings and subheadings, like I did in this hand out. In short: let your work breathe.
Press ENTER every once in a while, to start a new paragraph and structure your arguments. You want to do this every time you start a new thought or direction at the very least. Remember, a paragraph can contain as few as (but no less than) three sentences: An introductory one, one that actually tells you something about a topic and another one that serves as a bridge to the next paragraph ("tell them what you're gonna tell them, tell them, then tell them what you've told them").

Sentence structure

Don't try to cram too much information into a single sentence. Your reader should not have to stop mid-sentence to start over in order to make sure they are still following the argument. You can use long sentences every once in a while, if you know what you are doing of course, but try to break them up with a few shorter ones. A piece of text is like a piece of music. Find your rhythm.

Connect the dots

Unless you are Agatha Christie, don't leave your reader guessing. If you want them to follow you, you have to take them by the hand. You do this, by first structuring your own thoughts and then making sure you also structure your written sentences and paragraphs to give your story a nice, logical flow from beginning to end.
Don't forget: even if you only spent a few days reading up on a topic, you have become a specialist in that little corner of the literature. Don't skip steps in an argument. What may be obvious to you now, will be new to the reader who sees your piece for the first time. Put yourself in their shoes. Explain specific terms and definitions. Put things into **context**.
Most importantly: don't hide your train of thought, but structure your argument in a **logical** fashion. Connecting words will help. Words like "therefore", "however", "as a result", "in addition", "in contrast", "for instance". Don't use them at the start of every sentence, but do use them: they are the best way to prevent your reader from getting lost, because they immediately show whether you are contrasting two opposing views, highlighting one particularly interesting example, or deducing something from text that came before.
Make sure the reader understands **why** they are provided with specific information. Don't offer them a paragraph of details without telling them why they should care first! Look in the primary literature for examples. You will often see paragraphs that start with a goal ("To test whether DKK inhibits WNT signaling, we did Y"). You can

do the same in your writing ("To test if LGR5 indeed marks stem cells, the authors performed a lineage tracing experiment"). You can spice it up of course. Start with a question ("But how could the authors be sure that LGR5 indeed marked stem cells?") every now and then. The bottom line is: First tell the reader why they should be interested. Once they understand that, they will happily digest the details you feed them next. Finally, don't forget to **summarize** a long or particularly complex argument. If done well, the reader will thank you. Taken together, be crystal clear and leave no room for confusion.

References

Who to cite
Of course, you use the scientific literature to back up your claims, and you will often find yourself summarizing other people's work (giving due credit to the work by properly citing or 'referencing' the relevant studies). Ideally, you always cite the **primary literature** (i.e. actual research articles rather than reviews). Specifically, you want to refer to the very first paper describing the original finding or discovery. And don't forget: you should only cite content that you have actually read (at least superficially) to ensure that the paper actually states what it claims!

While reading the literature you will encounter the following:
First, the older the papers the more obscure some of the techniques may be to follow (I remember having to read a paper from the 1970s for a course I took as a PhD student in the early 2000s and was utterly confused because none of the biochemical approaches were familiar to me – nowadays my own PhD students don't have an intuitive grasp of what it means to do a Southern blot anymore).
Second, it is not uncommon to be sucked into a trickle-down citation wormhole, where you think you have found the right reference only to find that that particular paper says: "as shown in [16]", with [16] saying "as previously shown [Abacadabra et al.]" and [Abacadabra et al.] writing about something totally unrelated.
Third, if you want to write about accumulated knowledge in a field (say "the molecular mechanism of WNT signal transduction"), you cannot possibly cite all of the primary literature. In such cases, I recommend that you cite relevant reviews. However, I also recommend that you show the reader that you are aware that you are citing a review rather than a primary research paper, for instance by saying "…, as reviewed by [Wiese et al., 2018].
As an example: There is a reason that [Logan and Nusse, 2004] is cited so frequently, apart from the fact that it is a well written review: After 2004 our knowledge of Wnt signaling became too large to summarize all of it in a comprehensive review. Show your reader that you are aware of this. For instance, you could write: "While the core mechanism of Wnt-signal transduction has been well known for over more than a decade (as reviewed by [Logan and Nusse, 2004]), our knowledge of how activity of the pathway is controlled continues to develop (as reviewed by [Gammons and Bienz, 2018] and [Tortelote et al., 2017]). This is something you will have to play and experiment with to support your story.

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How to cite

I strongly recommend that you find some **referencing software** that you like. It will make collecting and formatting references much more efficient and it will also prevent you from making mistakes or introducing typos. There are many options (e.g. Endnote, Papers), but also free ones (e.g. Mendeley, Zenodo), and it is really a matter of personal preference and/or cost). Some of these will also allow you to annotate the PDF files in your library, replacing paper sticky notes on a pile of print outs on your desk. If you're a fan of Google docs, there are multiple plug-ins to insert references as you go (https://www.makeuseof.com/google-docs-add-ons-citation-bibliography/). The bottom line is: if you are still typing out references by hand, stop doing this as soon as possible.

Scientific journals have different citation styles. Personally, I tend to prefer author names and years (so: "Wiese et al., 2018" rather than [45]). This is mostly because it allows someone with expert knowledge from the field to immediately deduce which papers are being cited without having to skip to the reference list. However, when word count is limiting (Nature papers and grant proposals, for instance) I will skip to citing by number.

When to cite

I note that many students tend to insert a reference at the end of their argument or paragraph. I'm not sure who teaches them that, but I don't think this is the right way to go about it. If you structure your paragraphs correctly, your main message should be in the first or second sentence. The rest of the paragraph then elaborates on that main statement by providing further details.

In this scenario, the reference goes right at the top: As soon as you make an important statement, you include a reference in support of this claim. As an example, some sentences just scream for a reference. Sentences such as:

"The first mammalian Wnt gene was identified in 1982".

"P16^{ink4a} and P19^{arf} are encoded by the same genomic locus".

If you then elaborate on the details and you want to make sure the reader knows all of this information is still coming from that same reference, by all means: include it again at the end. But ALWAYS put it in the most important sentence – the one that makes the actual claim you are trying to find support for. Don't let the reader guess where that conclusion is coming from!

Of course, it is better to not build an entire argument on a single source. Rather, you will combine information from multiple papers in a single paragraph or section. This is another reason why you want to cite your references in the right place. For instance, you might write:

"Breast cancer stem cells can be isolated using flow cytometry [24, 31]. Popov and colleagues showed that the combination of cell surface markers S, P, Q and R could enrich for tumor initiating cells as tested by xenografting [24]. Harris and colleagues used ALDH1 to enrich for cells with tumorsphere initiating activities when grown in vitro [31]. If and how these populations overlap remains to be determined."

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Grammar

Proofreading
Your reader/grader/reviewer is not your spelling checker. Word processing software comes with built in spelling checkers, so use them. Don't be sloppy. If you don't care about your text before handing it in, why should I, as a reader, put in my time?
Don't just depend on an automated spelling checker, as there are some mistakes that your spelling checker doesn't get, simply because you made a typo ("write" and "right" are both perfectly fine words, but they do mean something totally different), because it doesn't recognize specific scientific jargon, or because autocorrect is trying to outsmart you (try writing about the Netherlands Foundation of Scientific Research – NWO – without going back at least five times to change it back from "NOW" into "NWO").
Proofread your work (printing it out works surprisingly well for catching stuff you may have glanced over for weeks – even converting to a PDF and opening it in another program can work wonders). If you KNOW you are someone who has a hard time catching grammar or spelling mistakes, ask a friend or family member to proofread it for you. Try to return the favor, as proofreading is also a good learning experience: it is often easier to spot mistakes in someone else's work than in your own, and you can use it to improve your own writing. Another trick is to read your work out loud. Added bonus: You will notice where you stumble on a tricky sentence structure. Fix it, because your reader will stumble here as well.

UK or US English
Sometimes one or the other is mandatory. Often either will be fine, but if you do have a choice: make sure to pick one and stick to it. Don't mix them up. My high school English teacher allowed us to use US English spelling, as long as we then also said "trunk" rather than "boot" of the car. This means that –ou always goes with –ll and –o with –l, as in the examples below:

UK English	*US English*
Behaviour	Behavior
Signalling	Signaling
Programme	Program

Adjectives and Adverbs
Know the difference between "bijvoeglijke naamwoorden" (adjectives) en "bijwoorden" (adverbs).

The protein is *primarily* localized in the cytoplasm.
The cytoplasm is the *primary* location where this protein is found.
This is an example of a *slow* process.
This reaction occurs *slowly*.

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That/Which
That and which are not used in exactly the same way. Think of them as indicating a "beperkende bijzin" (which) and an "uitbreidende bijzin" (that).
As a rule, "which" is preceded by a comma and that is not.

This effect is due to the change in localization *that* these proteins display upon stimulation with LPA.

This effect is due to the change in localization*, which* these proteins display when they are phosphorylated.

Joining sentences
'Samentrekkingen' are notoriously difficult in any language. Sometimes they end up being ugly. At other times they are simply wrong. If you do end up joining sentences that share a subject, make sure that they are equal in their use of verbs. Do not combine "koppelwerkwoorden" with "hulpwerkwoorden"!

Correct:	*Incorrect:*
The protein is 92kDa and sticky.	The protein is 92kDa and being transferred.
I am tired and grumpy.	My supervisor has issues and been on TV.
This result is cool, but unexpected.	This test is difficult, but can be done.

Know your personal pitfalls
Depending on your native language, you may be more prone to making some mistakes than others. Many of those have to do with sentence structure – the fact that words come in a specific order. Dutch sentence structure is different from English, which is different from Spanish, etc.
Other common mistakes are the wrong use of articles ('the', 'a', 'an') – know when to use them in English and when to go without. For instance, some languages don't have articles, and those native speakers may use 'the' and 'a' interchangeably, without having a natural 'feeling' for the difference between the two.

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What do others say?

Here's what others had to say when I asked Twitter for tips on how to become a better writer as a student:

RandomASCII @anyanikd Volgen

Als antwoord op @wntlab @HITSabel

Read a lot. This way your brain "machine-learns" the structure of scientific sentences. Look-up for the synonyms if need be. Don't aim to build a perfect manuscript in first go. Write a good backbone and then build around it. Improvise.

Biancastella Cereser @BiancastellaC Volgen

Als antwoord op @wntlab

Read a lot, not only science, to see how a story can be told in a cohesive way. I now recommend my students to run parts or all of their drafts into pro writing aid software (online, free) as it gives awesome style tips, also for academic writing.

prowritingaid.com the software is all about suggestions and comments, and they also explain why for instance a passive form (papers have shown that) is not as readable as an active form (papers show that). They give you tons of tips and you can decide if you want to

Correct them or not. They give you examples and synonyms and all sort. You can try it yourself, you just need to register with an email. I literally just read online of a guy using it, so I have also tried it for some of my recent writing 😅

Dr Matt Benton @mattbenton123 Volgen

Als antwoord op @wntlab @the_Node

Don't feel bad/embarrassed about looking up grammar and style (or even words!), native speakers do it allllll the time.

MadScientist @MadS100tist Volg je nu

Als antwoord op @wntlab

Read a lot! You pick up good structures, words and grammar!

sophie_astrof @AstrofSophie Volgen

Als antwoord op @wntlab @the_Node

Two things that helped me, 1) having papers/grants edited by native English speaker(s), to learn by example and 2) reading a lot of classical and modern literature by American and British writers.

Mira Krendel @KidneyMyosin Volg je nu

Als antwoord op @wntlab

Get a good style guide (I personally used to like Strunk and While, which my advisor used, but it may be a bit outdated by now).

Christophe Leterrier @christlet Volgen

Learn everything you can from reading/working with/writing with people who write well. Join the cult of Zinsser and read "On Writing Well" once a year.

Emma Pewsey @Emma_Pewsey Volgen

Als antwoord op @wntlab

Rough drafts are your friends. Don't worry about the words you use in your first draft – use a mixture of languages if it helps. Once you've got the structure of what you want to say, then you can refine it into 'scientific English'

Christine J Watson @cjwhelix Volg je nu

Als antwoord op @wntlab

I read a lot of literary fiction. This gives a sense of good prose and how to write creatively. And it's a great de-stressor! A library of a few beautifully written classic papers is also good. In the short term a writing course can be helpful. We offer this to graduate students

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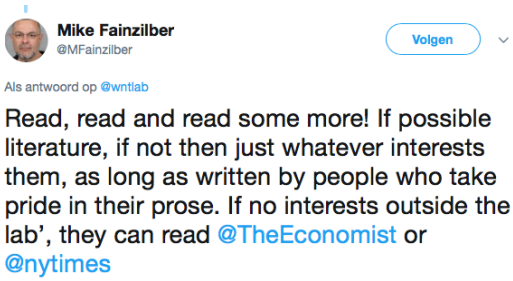

As you can see, "read a lot" tends to be the most popular advice. And I couldn't agree more!

A link to useful resources:

https://vanamerongenlab.nl/files/Word-Usage-in-Scientific-Writing.pdf
A great overview of "don't use this – use this instead". Originally compiled at Iowa State University and then modified and expanded over time as editors at the Journal of Mammalogy and Mammalian Species added their insights.
I found this PDF at http://www.bates.edu/biology/.

http://www.bushmanlab.org/assets/doc/ScientificWritingV39.pdf
I like this one because it goes beyond essay or report writing with tips for e-mails, grants and even figure making. Plus, all of the examples come from biology and after reading this you will never draw the DNA helix in the wrong direction ever again.