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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 advise that I have handed out (and keep having to hand out) to students over the years. Use this information to your advantage and think of me when you win the Pulitzer Prize!

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

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 (nowadays) a blinking cursor. Yet this how all writing is supposed to start: from scratch. Every story starts with you, the author. And every line should be written *de novo*, in your own words.

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.

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 are going to have to develop your own writing mechanism. Do you read an entire stack of literature and then summarize what you have just read? Do you require a fixed **outline** of the entire story/essay before you can get started or are you someone who can dive right in? 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 own ideas after thinking about the material for a couple of days or weeks? Do you distill the most important message from a paper and put that into your own words? 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/>. Does the assignment require you to report on very specific findings in great detail and does this mean that you need to have the source text right beside you to get those details exactly right?

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, I'm not entirely sure...) copying entire sentences or even paragraphs, while swopping out



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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 (actually, 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. 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.

Structure

White space

As discussed above, there is nothing worse than an empty page staring at you, waiting for your writer’s block to pass. 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 do not look attractive to read and will tire your reader (who is likely the person grading or reviewing you) before they even get started. Instead, use the white space to add a bit of air and, more importantly, structure to your argument.

Press ENTER every once in a while to start a new paragraph. You want to do this every time you start a new thought 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. Use headings and subheadings, like I did in this hand out. In short: let your work breathe.

Sentence structure

Don’t try to cram too much information into a single sentence. Ask yourself whether your long sentence might be confusing your reader. He/She 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

Don’t leave your reader guessing. If you want them to follow you, you have to take them by the hand. Don’t forget that even if you only spent a few days in reading up for an assignment, you have become a specialist in that little corner of the literature. What may be obvious to you now, will be new to the reader who sees your piece for the first time. 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. What I like to call “signaling words” can 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



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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 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 after. Finally, don't be afraid to **summarize** a long paragraph or a particularly complicated argument. If done well, the reader will thank you. In summary, 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). However, you will quickly find that this can become difficult once you actually start reading these papers. Because yes – you should only cite content that you have actually read (at least superficially) to ensure that the paper actually states what it claims!

First, the older the paper 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 and was totally and utterly confused because none of the experimental approaches were familiar to me).

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 (for instance the molecular mechanism of Wnt signal transduction), you cannot possibly cite all of the primary literature. In such cases, I recommend that you cite comprehensive reviews that are on topic. 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].

Especially for literature thesis assignments you will often be required to work with the recent literature. Here you can run into another problem, because a field may simply become too big or complicated to be reviewed comprehensively. 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 so large that it is too much to ask to summarize all of it in a comprehensive review. In such a case, you have to give the reader guidance. 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



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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.

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), and it is really a matter of personal preference and/or cost).

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 (as it tends to be in 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.

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 feel you’ve gone a long time without making 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 [24]. Harris and colleagues used ALDH1 to enrich for cells with tumorsphere initiating activities [31].”

Grammar

Spelling checker

Your reader/grader/reviewer is not your spelling checker. You have tools to do that, so use them. Yes, those red and green wiggly lines in Word can be a bit much, because Word doesn’t understand your scientific writing as well as you want to, but sometimes your text editor has a point. Look at those spots in your text once you



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think you are done. Don't be sloppy. If you don't care about your text, why should I, as a reader, put in my time?

Proofreading

Don't just depend on your spelling checker. Proofread your work or, better yet, have someone else proofread it for you. 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) 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"). Proofreading is also a good learning experience: it is often easier to spot mistakes in someone else's work than in your own, but you can use it to improve your own writing.

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.

This means that –ou always goes with –ll and –o with –l, as in the examples below:

<i>UK English</i>	<i>US English</i>
Behaviour	Behavior
Signalling	Signaling
Programme	Program

Adjectives and Adverbs

Know the difference between bijvoeglijke naamwoorden (adjective) 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*.

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 always 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.



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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:

The protein is 92kDa and sticky.

I am tired and grumpy.

This result is cool, but unexpected.

Incorrect:

The protein is 92kDa and being transferred.

My supervisor has issues and been on TV.

This test is difficult, but can be done.



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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.

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.



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.



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 😊



Mira Krendel
@KidneyMyosin

Volg je nu

Als antwoord op [@wntlab](#)

Get a good style guide (I personally used to like Strunk and White, 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.



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 alllllll the time.



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'



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MadScientist
@MadS100tist

Volg je nu

Als antwoord op @wntlab

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



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



Mike Fainzilber
@MFainzilber

Volgen

Als antwoord op @wntlab

Read, read and read some more! If possible literature, if not then just whatever interests them, as long as written by people who take pride in their prose. If no interests outside the lab', they can read @TheEconomist or @nytimes

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.