Writing Cheat Sheet

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Introduction

> **Pro-Tip:** The 20+10 rule for incomprehensible sentences says that for every ten words above 20, a sentence becomes twice as hard to read.

Well-crafted research influences policy, guides practice, and shapes society. By detailing evidence, methodologies, and results, writing supports the validation and verification of research. Writing allows for subjecting findings to peer review for quality, replicability, and reliability. The clarity and precision in effective writing ensure the accessibility of complex ideas to a broad audience. Engaging in writing is a crucial aspect of researchers' professional development, enhancing critical thinking, analysis, and communication skills and contributing to knowledge and discovery.

If you want others to understand, remember, and cite your work, reduce the cognitive load your writing places on them.

`[Good]` Use simple language. Short sentences are more effective. `[Bad]` Convoluted sentences with multiple clauses, especially nested ones using stray punctuation, make it harder for the reader to follow the argument; avoid them.

> **Pro-Tip:** A reader should understand your research by stripping out the text, reading the abstract and conclusion, and looking at the headers, figures, tables, and corresponding captions. These elements should clearly define the study's focus, outline the methodology, and present your key findings. Think of the captions as mini-summaries describing the data and explaining the significance of your work.

Basic Rules

> **Pro-Tip:** Know your audience. Assume they know the same basics you know. They know what mean squared error (MSE) is. You do not need to give them the equation for MSE.

- Niche terms for your discipline or field are acceptable if the audience understands them.
- Keep new abbreviations to three or less.
    - This count excludes well-known abbreviations from your field, e.g. MLP, CNN, MSE and LSTM.
- **Eradicate erudite vernacular utilised irrespective of necessity** (Don't use long words unnecessarily).
- Keep sentence length down to 22 words on average in your scientific writing.
- You can start a sentence with the word this. However, you must make sure its antecedent *(the noun or concept it points back to)* is clearly stated in the sentence.
- "Research" as a noun is the plural of study. Change "a research" or "in this research" to "a study" or "in this study".
- Numbers twelve and less, we always write in full in the text unless they are a label or a result, e.g. "Fig. 10 shows a 10.0 increase in MSE after ten iterations."
- Avoid remarks in parentheses and excessive use of footnotes. If something matters, say it. If it doesn't matter, leave it out.
- Do not use don't or other informal abbreviations.
- It is *et al.* and is used like so: van Zyl *et al.* (2023) [0] said do in text citations this way.
- Full stop goes after citation, and you should have a space between it and the word [0].

First and Third person

> **Pro-Tip:** Traditionally, scientific writing used the third person, but the rules are less stringent these days, and it is now acceptable to use both the first and third-person pronouns in some contexts.

First-person: **e.g. I, We, Me, My, Mine, Us, Our and Ours.**

Third-person: **e.g. It, Its, One, One's, Everyone, Anyone, Them, They, Their and Theirs.**

- Don't feel shy to use we in the first person if:
    1. It is we, as in, you (the reader) and me (the writer), e.g. "We see from the results that [...]".
    2. Use we as in the researchers, if it is a crucial detail that it was you, e.g. "We inspected the generated images."
    3. Although unlikely, use I if you are the only person involved in the research.
- Use the third person for the Literature Review and Results.
- Use the first person for the Introduction, Method, Discussion and Conclusion.

Active and Passive Voice

The active voice is the subject, then the verb, e.g. "We analyse the results to show [...]". The passive voice is the active voice in reverse order, e.g. "The results are analysed by us to show [...]". Often the [by us] is left out to create fake formalism, e.g. "The results are analysed to show [...]".

- Generally, the active voice is more lively, shorter and easier to read.
- Use the passive voice sparingly to emphasise the object as the most important thing in the sentence, e.g. "The generated images were inspected by us."

> **Pro-Tip:** Rather, change the **topic** (subject) and **stress** (object) of the sentence and use active voice, e.g. Rewrite "We see from the results that [...]" or "From the results it can be seen that [...]" like this "The results showed that [...]".

Maths

1. Math should flow as if written as part of the sentence. The equation for squared error is given by: $(y_i - \hat{y}_i)^2$ where y_i is the actual value and $\hat{y}_i$ is the predicted value.
2. Put important formulas on their own line, but they should still flow as part of the sentence.
3. Words should separate different formulas, e.g., Consider S_q, where $q < p$.
4. The statement preceding an equation should be a complete sentence or end with a colon.
5. Do not start a sentence with a symbol.
6. Replace logic symbols such as "for each" and "for all" with words unless you do formal logic.

Tense

When discussing past research, it is not as if the outcomes or results suddenly stopped being true. So we write about them in the present tense, e.g. Rewrite "van Zyl *et al.* (2020) results **showed** that B comes after A in the alphabet." as "van Zyl *et al.* (2020) results **show** that B comes after A in the alphabet."

- Use the past tense when writing about what you did in your study.
    - Most of the Introduction, Methods and Results are in the past tense.
- Use the present tense when writing about other researchers' work.
    - All Literature Review is in the present tense.
- Use the present tense when writing about what is now confirmed by your study.
    - Most of the Discussion and Conclusion is in the present tense.
- Future work in the future tense.

> **Pro-Tip:** Research proposals are written in the future tense, except for the literature survey which is in the present tense.

Tables and Figures

1. All tables and figures must have a caption, float, and be referred to by their label in the text.
2. Table captions are always above tables. Figure captions are always below the figures.
    1. Figure captions are sentences helping the reader interpret the figure.
    2. Table captions are headings, not sentences describing the table.
3. Do not use the words above or below to refer to images or tables.
4. Be consistent with writing Equation, Figure and Table in full or use Eq. or Fig.
5. Text is left justified and numbers are right justified in tables.
6. Maximise your ink to data ratio.

> **Pro-Tip:** When the start of a word is used as an abbreviation such as Prof., Eq. and Fig. then we use a fullstop to indicate the missing letters.

Reference and Further Reading

1. http://www.lithoguru.com/scientist/science-writing.html
2. https://www.cl.cam.ac.uk/~pr10/teaching/dissertation.html
3. http://www.eecs.qmul.ac.uk/~norman/papers/good_writing/Technical%20writing_ver_5_2.pdf
4. https://science-sense.com/scientific-writing-made-easy/
5. https://www.enago.com/academy/we-vs-they-using-first-or-third-person-in-a-research-paper/
6. https://www.letpub.com/author_education_Research_vs_study
7. https://www.universityaffairs.ca/career-advice/ask-dr-editor/jargon-can-make-for-good-academic-writing/