

# Scientific writing recommendations

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## Recommended order of writing steps

1. Start with putting headings for all sections to **have a structure**. If you have a longer story with multiple distinct aspects, use a combined “Results and discussion” section (if the journal allows).
2. Continue with filling the **last part of the introduction** section. This is where your research questions (or hypotheses) go. Writing these first makes sure that you do not get off-track. It is absolutely important that the questions/hypothesis are formulated **to the point**. Any ambiguity with regard to your goals would be detrimental for writing (and the investigation as such).
3. Next, bring structure to the results (or results and discussion) part. Paste in essential results as **graphics and bullet points**. Do not waste time with formulating beautiful text at this stage.
4. Formulate the intended **take home message** (bullet points sufficient), either at the end of the discussion or in a dedicated conclusions section.
5. **Check the story line**. Does it logically connect questions/hypothesis, results, and take home message? If not: Can this be cured solely by altering the presentation? Or is there a problem with study design or replication, maybe? In case of doubt, seek external advice from a colleague.
6. Only then start filling the other sections. Always **use bullet points first** to make sure you follow the story line, only **formulate proper sentences later**.
7. Writing the abstract, possibly with some “distance”, is the final task.

## How to focus on the story line during writing

- Initially fill any sections with **bullet points only**. It helps to focus on the logic, the story line, without distraction by language details. Formulate proper text only when the story has finally settled. This also **saves precious time** as it avoids revising longer paragraphs.
- It may help to first use your **native language** and only translate later. Again, this helps putting the full resources of your brain on the story line.
- Do not waste brain resources on formatting. But do use **style sheets** for headings and main text (if software allows) to automatically get a table of content for navigation.
- Enter references as DOI (the full link) only. You can still build a proper bibliography later, when the story is complete.

## Other

- The title should reflect the **outcome** of your investigation. It should basically be the shortest possibly summary of your take home message. Bad example: “Investigation on the effect of X on Y” Use instead: “Y is controlled by X”
- Ideally, headings of subsections in the results (or results and discussion) section should **summarize the main message** of the respective subsection. Bad example: “Outcome of experiments” Try instead: “Y and X are highly correlated”.
- **There is no place for unnecessary information.** Hence, you should **drop whatever information is not strictly needed** to tell the complete story! Even if you spent months on certain data / analysis: If it is not informative, don’t present it. It would only confuse readers.
- At the same time, you **must never selectively suppress information** only because it contradicts your message / desired interpretation. Doing so is scientific fraud.
- Keep sentences short. Split complex sentences.
- Check sentences for possible ambiguity and adjust wording if necessary. Repeat words is often better than using three different terms for the same thing.
- Decide for passive (“experiments were performed”) vs. active (“we performed experiments”) and avoid frequent switches between styles.
- If applicable, perform statistical tests to reject or keep hypotheses. Although **p-values are useful**, you should always **present effect size** in an intuitive unit too. Present p-values as they are (e.g.,  $p = 0.08$ , instead of  $p > 0.05$ ) to allow for proper interpretation.
- **Round numbers** reasonably. In most circumstances, 3 significant digits are appropriate and realistic given the precision of measurements.

## Software

- If you submit to a journal, check what formats are accepted. Ideally, PDF is accepted at initial submission which gives you freedom with regard to software.
- **Option A: Quarto markdown** or **LaTeX** let's you focus on the content. It is especially useful if you create graphics and tables with R (or similar) because you can embed the code or reference files (no need to paste in content). Labeling and cross-referencing is particularly save easy. Integration of bibliographies by biblatex works very well.
- **Option B:** If you prefer Libre Office writer, MS word, or similar, consider using google docs instead. The latter is particularly useful for collaborative writing and commenting. It works nicely with zotero as a reference manager but lacks features for auto-numbering and referencing of figures and tables.
- The main difference between A and B? **Option A** comes with a steep learning curve. It is difficult to start with but once you know it, you can create consistent documents with hundreds of pages. Perfect for technical reports, books, monographs. **Option B** lets you start typing text instantly. But troubles with consistent formatting and numbering accumulate when documents become longer. Still a reasonable option for smaller documents.