Writing guidelines

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Full Research Guidelines are:
`https://jvgemert.github.io/ResearchGuidelinesInDL.pdf`

1 Writing guidelines

Science is also about communicating ideas. This makes writing an essential part of research. The five most common writing comments that I give back are:

- Terms/concepts are not motivated. A new term/concept first has to be explained and introduced by motivating why the term is important.
- A paragraph has no single topic and no conclusion (ie: no answer to the "So What?" question)
- Sentences do not follow each other. (Sentence 2 should continue on topic where sentence 1 ends.)
- Figure captions do not explain how to read the figure.
- Figures/Tables have no conclusion in the caption (ie: explicitly write what should the reader see, and answer "So What?")

My writing guidelines are summarized in the table below, and followed by the guidelines themselves.

Writing guidelines		
General	**Structure**	**Form**
WG1 Unburden	WS1 Self-contained	WF1 Single topic
WG2 Audience	WS2 Consistent	WF2 Windows/orphans
WG3 Less is more	WS3 As discussed	WF3 Very
WG4 No guessing	WS4 Paragraphs	WF4 In order to
WG5 Read out loud	WS5 Ref words	WF5 Sort cites
WG6 More space	WS6 Ref paragraphs	WF6 Brackets
WG7 Write as code	WS7 Latter/Former	WF7 Synonyms
Tables/Figs	**Introduction**	**Related work**
WT1 Captions	WI1 Motivation	WR1 Subject
WT2 Figs are complete	WI2 First sentence	WR2 Paragraph
WT3 Tables	WI3 Few research	WR3 Layout
	WI4 Fig 1	
	WI5 3x contribute	
Method/approach	**Experiments**	**Discussion**
WM1 Argumentation	WE1 Question	WD1 Summary
WM2 No datasets	WE2 Group	WD2 Limitations
WM3 Number eqs	WE3 Analyze	WD3 Conclusions
WM4 Eqs are text	WE4 3 types	
WM5 Explain symbols	WE5 Scale 0-1	
WM6 Explain eq	WE6 proved	
WM7 Remove eq	WE7 One more	
WM8 Define		

1.1 General writing guidelines

WG1: Unburden the reader. If a reader misinterprets the text: its the writer's responsibility. Prof. Freeman: *The most dangerous mistake you can make when writing your paper is assuming that the reviewer will understand the point of your paper.* Avoid that the reader has to do work.

WG2: Audience. Who are you writing for? What is their background and what are they looking for? Help your audience find it. It often helps to keep a specific person in mind as your writing target.

WG3: Less is more. Every word should have a reason to exist. ie: Remove all unnecessary words. To quote Blaise Pascal: *"I would have written a shorter letter, but I did not have the time."*. Writing concisely takes time and effort; it enhances readability.

WG4: No guessing: make it explicit Never expect a reader to do inference. As a writer you need to spell out the thought process for the reader. If the reader has to guess, the guess will often be not what you had in mind. Always explicitly write what the reader is supposed to see/conclude.

WG5: Read out loud. After some time, you will no longer be able to read your own text. Instead, you will read what you meant; not what you wrote. Tip: read your own writing out loud.

WG6: Important topics take more space. The more important or relevant something is to your paper, the more space it takes. If it is not so important don't write too long about it.

WG7: Writing is like coding. Like good code, a paragraph is modular and self-contained. Do text refactoring just as you would do code refactoring. Good code is not written in one go, neither is text. Like code, you start with an initial structure, and restructure several times.

1.2 Structure

WS1: Self-contained. The reader has not memorized the full text. Remind the reader of definitions or symbols when defined 'a long time ago'.

WS2: Consistent. Use a defined symbol consistently and uniquely.

WS3: As discussed before, as pointed out earlier, as motivated in section XXX, as will be described in XXX Avoid using this, it has no function. The standard sectioning structure of a research paper dictates where information should be found (main motivation in Intro/Related work; the technical in the Method; empirical evidence in Experiments, etc.). Assume your paper will not be read linearly.

WS4: Relation between paragraphs. Paragraph topics follow a logical order. It is helpful to start with a skeleton of topics and keywords. In addition, creating an *inverse outline* helps to validate the story. An inverse outline is created by starting with a text and write down the first and possibly last sentence of each paragraph: a logical structure should emerge.

WS5: Reference words. Reference words such as 'this', 'it', 'that', 'there' are often confusing: they require inference/work by the reader which should be avoided. Avoid referring: explicitly repeat what 'it' refers to. (Here, for example, 'it' should have been replaced with 'the reference word').

WS6: Avoid reference words across paragraphs. For example, do not start a paragraph with 'however'. It is unclear to what you refer to.

WS7: Avoid "latter/former", and "respectability". These reference words require mental ordering and memorization by the reader; avoid making the reader do this work. Instead, rewrite it without the reference words.

1.3 Form

WF1: A single paragraph, has only one single topic. A paragraph has an intro sentence to define the topic. Each sentence logically follows the previous sentence. It has a concluding sentence that concludes the topic: it answers the "So What?" question.

WF2: Widows and Orphans. Avoid paragraph endings with 1 word on a new line. Avoid paragraph endings with 1 line on a new page.

WF3: Very. Do not use "very". It is supposed to emphasize, yet, it does the opposite. See also: `https://www.proofreadingservices.com/pages/very`.

WF4: In order to. Can almost always be replaced with 'To'.

WF5: Sort citations. If using numerical citation, make sure not to cite it as [7,2,5], but sort them like [2,5,7] to reduce reader effort.

WF6: (brackets). Avoid brackets. If it's not important remove it; yet, if it is important, then it should not be in brackets.

WF7: Synonyms. In non-scientific writing it's sometimes advised to make the writing less repetitive by not repeating the exact same terms and use synonyms. In scientific writing, instead, using a different term for the same thing will confuse the reader. Choose a single term, and use it consistently. Clarity trumps eloquence.

1.4 Tables/Figs

WT1: Captions in figure/table. Figures and tables should be self-contained. A reader often starts an article in 'comic book' mode: first look at all the pictures. The caption should explain everything to understand in the figure/table. Always end with a conclusion to answer the "So what?" question: make explicit what do you want the reader to see here.

WT2: Figures are complete. Label all axis, show the units on the axis, use a legend with clear differences between entries and add a title to each (sub)figure. Do not label sub-figures (a), (b) and explain what (a) and (b) are in the caption: instead label each sub-figure with a title. Do not use too thin lines or too small of a font.

WT3: Tables. For formatting tables, read section 2 of this document: "booktabs tables" and update your tables accordingly.

1.5 Introduction writing

WI1: Motivation and scope. The intro starts with a "just broad enough" motivation; not too broad, and not too specific, then quickly narrows the scope smaller, and smaller, culminating to exactly your topic.

WI2: No generic first sentence. The fist sentence of the introduction should focus/engage your audience. Don't use a sentence that can be added to any other paper in your field. Test if it would still make sense if you leave out the sentence, and, if it does, then leave the sentence out.

WI3: 3 contributions. Rule of thumb: your paper has 3 contributions. A contribution is something that a peer researcher will find interesting. Do not expect the reader to do inference work, so end the introduction by explicitly stating your contributions.

WI4: Figure 1. Make a visual abstract of the paper in Figure 1. Best if this is the main idea, but it can also be a pipeline figure.

WI5: Few research. Just because a topic has seen 'little research' is by itself not a good motivation (For example: my right thumb has not been researched at all, but its still uninteresting.). Don't motivate by what others have not done –put that in related work–, instead: motivate what is inherently interesting about your research, ie: what problem does a possible 'user' have, and what can be gained by reading this paper? What would a peer-researcher find interesting to learn?

1.6 Related Work writing

WR1: The subject is the method, not the paper. Do not write: *The important work of [a] does X which is followed by the work of [b] that does Y.* It has papers as the subject. Instead, make the method the subject and add citations to the method: *X [a] is important, and extended by Y [b].*

WR2: Paragraph topic. One paragraph in the related work section is grouped around a single topic. Related papers often have multiple topics. It is up to you to group related work as best for you. Rule of thumb: Each paragraph has 3-10 citations.

WR3: Paragraph layout. The first sentence defines the scope. Then, the following sentences, you group papers based on what they do. The final, concluding, sentence is how are these methods *related* to your method. You have two options: option 1. *All so great, we make use of it.* Option 2. *All is great, but we do something different because ...*

1.7 Method writing

WM1: No general argumentation. The method should only motivate and explain the technical method. All argumentation for the main idea should be in the Introduction or in the Related Work sections.

WM2: No datasets. Datasets and their description belong in the experiments. Only a toy problem is allowed in this section if it helps to explain the method. The method section only explains the technical part of the method. (Exception: when you are writing a dataset paper)

WM3: Number all equations. Maybe you do not refer to them, but others (reviewers, readers) may want to. Only if the equation is not essential, it is OK to have it in the flow of the text without a number.

WM4: Treat equations as normal text. If an equation ends the sentence, the equations ends with a period. If the sentence continues, use a comma after the equation.

WM5: Explain all symbols. Directly before, or directly after introducing an equation: all symbols should be explained. A formula should be self-contained: the reader should be able to understand it without searching for symbol definitions elsewhere.

WM6: Explain equation in words. Directly before giving an equation, first explain why and what you aim to achieve in English. This makes the following equation easier to follow.

WM7: Should be understandable without equations. The method should also be understandable without reading the equations. Motivate and describe in English what is happening, the equations make the words exact. Test if you can still get the main point of the paper when all equations are removed.

WM8: Only define the relevant. Do not define everything you can think of, only define things you will actually use. Best to first write the results, and later define only what is needed to obtain these results.

1.8 Experiments writing

WE1: Answer a question. Every experiment starts with a question. Explicitly write this question. The experiment should answer that question.

WE2: Group an experiment together. Make use of sub-sections or bold-words, to help the reader understand the structure of the section. Each experiment is grouped as a module. Give each experimental question a number: "Experiment 1: How X applies to Y".

WE3: Analyze results modular. Every experiment has its own tables/figures for the results. Do not mix experiments by grouping all results in a single huge table. Group results together that are compared together. It may mean you have to repeat values in multiple tables/figs.

WE4: Experiment types. Broadly speaking there are three types of experiments. 1: *Validate*: does it do what you claim it does, (fully controlled setting?). 2: *Investigate*: what unique properties does your method have. 3: *Compare*: how does it compare to others. Present them in that order.

WE5: Scale scores between 0 and 1. Avoid useless zeros, scales 0-1 scores to 0-100. E.g.: '0.07' becomes '7'.

WE6: Proved. Experiments do not prove. A proof is derived in math, experiments demonstrate empirically for the setting at hand.

WE7: One more. When you think you are done, see if you can add one more experiment to show relevance for a different domain or application.

1.9 Discussion writing

WD1: Summary. Small summary of what you did to highlight the context.

WD2: Limitations. No method will always be the best. Showing insight where it fails is strong. The goal of research is understanding.

WD3: Conclusions. "Great paper; but So What?". Answer this question to draw conclusions. Don't make too broad conclusions; keep it modest and factual, and at the same time don't shy away in mentioning what is interesting and why.