

Some Guidelines for Writing a Formal Report

If you are writing a technical paper for the first time, you will find the task is much harder than just reading a paper. You will be frustrated but do not be discouraged. Keep a positive attitude and try to learn how to do it right (and impress your advisor). Below are some pointers worth keeping in mind when you write your Master's report, or any technical report.

Remember, with few exceptions, you have complete freedom to present your material in a coherent way for the reader to understand and appreciate. Your paper should be concise (i.e. short and include essential material); do not make it unnecessarily long.

(Not in order of importance)

1. Avoid beginning a sentence with a symbol, e.g. θ is the unknown parameter in the model.
2. Avoid having long complicated sentences. As a start, limit your sentence to 3 lines or less. In general, short sentences are easier to manage and they tend to be clearer.
3. Avoid having a matrix, a column vector or formulas inside a sentence, e.g. the design matrix is $\begin{pmatrix} 1 & 2 \\ 2 & 4 \end{pmatrix}$.

Also avoid splitting a formula at the end of the line. For instance, when you write " $g(y) = \lim_{a \downarrow 0}$

$\frac{(1-a)f(y,a)}{a}$ ", two errors are committed. First, $g(y)$ is awkwardly split into two parts, and secondly, fractions are to be avoided inside a sentence (similar to column vectors, etc.). An alternative is to write " $g(y) = \lim_{a \downarrow 0} \{(1-a)f(y,a)/a\}$ ". Note that the all symbols should also be proportional in size; avoid

grotesquely looking formula, e.g.: "..... $g(\mathbf{y}) = \lim_{a \downarrow 0} \frac{(1-a)f(y,a)}{a}$ ".

4. Display and label an equation or formula only if you need to refer to it repeatedly later on.
5. Avoid use of redundant words/phrases; always try to express what you want to say by using the least number of words, without losing clarity:

e.g. 1. "According to the impressive and nice formula given in (4.1) by Kiefer's 1974 paper...." is wordy. A more effective way may be "Using formula (4.1) in Kiefer (1974),", or better still, "Using (4.1) in Kiefer (1974), ..."

e.g. 2. "The paper is devoted to the study of regression diagnostics". A shorter way of saying may be "This paper studies regression diagnostics..."
6. Some words/phrases are to be avoided; e.g. avoid using words/phrases like good formulas, my very interesting findings, etc. Other examples include "The objective function is rather not smooth and so the convergence really depends on ...". I would delete the words "rather" and "really". In general, words used in technical writing are usually devoid of emotion.
7. Make sure you define all notation (except obvious ones like transposes, inverses, etc.) This is important; good notation uses fewer words to convey an idea. Choose your notation cleverly and introduce them

appropriately. For example, don't define a symbol or a concept if it is used several pages later. Also, avoid similar notation that may confuse the reader; for example, let a and a denote generic elements in the sets A and B respectively. (I would use a and b instead). Check to make sure you did not define a symbol/notation and never use it in the rest of the paper.

8. Display important quantities only (this means create a line containing the formula or equation only). Typically, this formula or equation is labeled with a number for subsequent reference.
9. Check the accuracy of each sentence in your manuscript, e.g. do not say this matrix is the covariance matrix of the estimated parameters when you actually mean this matrix is proportional to the covariance matrix of the estimated parameters. Or, this is the estimated covariance matrix when you mean it is the covariance matrix.
10. Make sure all your sentences are complete and carefully chosen. Do not oversell. Your sentences should be clear and accurate and the reader cannot fault you easily. For instance, do not say my research is the first to study design with potentially missing trials when there are a handful of papers that have tried to address the problem. Rather, say my research is among the first few to study the problem.
11. Do spelling checks repeatedly using a software program. Make some decisions; is it modelling or modeling?
12. Make sure your notation are consistent, i.e. did you use $f(x,y)$ in one place and write $f(y,x)$ in another place? Did you write $f(x,y)$ and sometimes write $f(x, y)$? Did you abbreviate page as pg. in one place, p. in another place, and write page yet at another place?
13. Is your symbol well defined? For instance, when you write $\max f(x,y)$, do you mean you maximize over the x -space or the y -space?
14. Is your numbering of equations, headings and subheadings in sequence and consistent? Do not have Section 2.3 in one place and Section 3A in another.
15. Are your references complete and accurate? For instance, you may have referred to Kiefer (1974) in the text and have only Kiefer (1969) in the reference list. When quoting from a book or text, it is desirable to include the page as well, e.g. Fedorov (1972, p. 9). Make sure your journal references are also consistent; don't write JSPI in one place and Journal of Statistical Planning and Inference in another place, for instance. Also, do not create abbreviation for Journal names unnecessarily; follow the style of the journal you plan to submit your articles.
16. Leave 2 spaces after a period before beginning the next sentence.
17. Avoid having lemmas, corollaries, footnotes and remarks as far as possible, unless it is a rather technical paper. Remarks and notes can usually be integrated into the main text without much difficulty, or, deferred to the discussion section.
18. Make sure all pages are numbered. It is a good idea to date them as well because you will need to review the manuscript several times before you arrive at the final version. The date and time printed on the header will help you keep track the latest version.
19. Avoid 1 sentence paragraph. In any case, you should never have several one-sentence paragraphs consecutively.

20. All graphs and tables should be numbered serially with a short informative title. The graphs and tables should be as self-explanatory as possible. This means that you should try to make the graphs or tables understandable to a reader who has not quite read the complete paper yet. So avoid notation and symbols as far as possible, and if you include them, you may want to explicitly explain what they mean in the title.
21. Label your tables and figures in a consistent way. Do you have Figure 1.2 and Figure 1.2.3, for example? Always have tables and figures situated near to where they are referred to in the text or, alternatively, put them all at the end of the manuscript after indicating where each one of them should appear in the text. Depending on the journal you plan to submit, the titles of the tables or figures can be either at the top or at the bottom. Be consistent.
22. Do not define symbols or concepts in the statement of a theorem, lemma or corollary when you need to refer to them later on. Do so in the main body text.
23. Do not create a notation that you don't need or refer to again. Create notation only when it simplifies your life, i.e. help you avoid saying the same thing over and over again in a wordy fashion.
24. Are your sections created appropriately? Try to avoid having sections or subsections that differ greatly in length. For example, you should not have a section about 1 or 1.5-page long, and some sections that are 13 pages long.
25. If you have appendices, describe at the beginning the purpose of the each appendix. Make sure each appendix is referred to in the main text.
26. Are there places that I can cut down to reduce space without losing clarity and contents? You should be able to do this many times and still find places to cut down.
27. Grammatical issues? Rewrite or rephrase so that you are sure you are grammatically correct.
28. Finally, always refer to and consult some standard statistical journals when in doubt (as to what is the right thing to do).

Before submitting your manuscript to your advisor (or journal), you should read the whole manuscript critically - word for word, making sure you understand exactly what you are writing. Keep asking yourself lots of questions with the aim to improve clarity. For example, ASK

- A did I make clear all the assumptions I have made and the key concepts I talked about?
- B did I allocate writing space proportional to parts that are deemed important?
- C if I move this paragraph to an earlier (or later) page, would it improve clarity and read better?
- D are there ways to reduce clutter and simplify my presentation?

Remember, each paragraph should contain a single thought or message. A well-written paper contains paragraphs that are properly created and nicely linked with the neighboring paragraphs. Finally, whenever possible, ask someone to proof-read the manuscript. It is very difficult to spot your own errors and a different set of eyes can be a big help.

General format of a paper

Title (usually 2 lines or less)

Affiliation (name(s), dept and university)

Summary / Abstract

Key words: Give about five words or phrases in alphabetical order (they should not overlap with words/phrases already used in the title; also use singular tense, i.e. design and not designs)

1. Introduction/Motivation - statement of research problem
 - 1.1
 - 1.2
2. Background/Preliminaries
 - 2.1
 - 2.2
 - 2.3
3. Main results
 - 3.1
 - 3.2
 - 3.3
4. Numerical examples or Simulation Results or Applications
5. Discussion/Conclusions/Acknowledgements
6. References
7. Appendix (if applicable)