Tips for Writing Papers

Over the years, I have started to find myself repeating the same things again and again about how to write a paper. Most of it I learnt from Jacques Noyé [http://www.emn.fr/noye/] while I was doing my PhD thesis. The rest I learnt by interacting with students and colleagues, and reading other similar pages on the web, about how to write a thesis, present papers, etc.

Writing papers is an art, it requires practice and dedication. Unfortunately, we we were not taught about it when we studied at school. As a researcher though, it is vital to master it. Don't forget, a good idea badly explained is not worth a penny (at least not a publication). So as a wanna-be researcher, you should consider this dimension of the work seriously, and be willing to dedicate yourself to it up to the point where you enjoy it (and others do too!).

If you are a student working with me, do not hand me a draft of a paper/report without having gone carefully through all these points.

- **Polish your English.** International research uses the English language. Nothing is more annoying for a native speaker to read a paper written in bad English (even for non-native speakers, it hurts). The first step to getting your paper accepted, is to produce an "acceptable" paper. Of course, "readable" is a good starting point! Check basic things: tense (use present tense), grammar, be sure that verbs and subjects match, that each verb has a subject (¡no es castellano!), etc. Use a spell-checker. Don't hesitate to frequently consult a good dictionary, thesaurus, and grammar book (if your English is sufficiently advanced, monolingual books are a good idea). Go on the web, buy books, read, learn. [Btw, thanks to Ren Cerro for correcting my own English in this page!]

- **No more than one idea per sentence.** An idea may require several sentences to be properly spelled out. But never mix several ideas in the same sentence. Use short, direct style, concise sentences.

- **One word (expression) per concept.** Do not refer to the same 'thing' in different ways. Be minimalistic in the vocabulary. Introduce new terms only (only) when necessary. In that case, make your best effort to give a positive definition of the concept, rather than explaining a concept through what it is not or how it differs from others.

- **Do not assume anything from the reader,** beyond the fact that he/she knows how to read, and is reading your paper in isolation. You can't even necessarily assume that it is being read sequentially, so when you use crucial elements presented upfront in the paper, include a back reference. Include tables/figures/lists that help the "browsing reader" to get a feel of what you're doing. Properly explain figures in the text. This also means that you need to precisely define all the terms you use. Even a paper on aspects at AOSD starts with explaining what aspects are (one paragraph is enough). Define the terms you use the *first time* you use them.

- **Reference appropriately.** If the topic is old and well known, reference either the seminal paper or a classical textbook. Be careful about making mistakes in the bib references. They propagate fast. Do not trust the way others cite papers. Go and find genuine information on digital libraries, the authors pages, etc. (Do not commit a bib entry on the svn unless you're sure that it is complete and correct.)

- **Capture the interest of the reader as quickly as possible.** (Shriram Krishnamurthi [http://www.cs.brown.edu/~sk/]) In a paper, you have 3-4 pages to convince/provoke enthusiasm in the reader. You have the remaining pages to explain, justify, illustrate, prove, etc. If at page 3-4 the reader is not excited about the contribution, bad news is coming. (Note that this is for a 12-page paper approx, so if you are writing a short paper, reduce the allowed space for excitement proportionally.)

- **Clearly identify the reusable brain stuff.** (Simon Peyton-Jones [http://research.microsoft.com/en-us/people/simonpj/]) Most probably, people are not interested in the actual prototype you are building. Rather, you should make clear what the "intellectual added value" (aka. reusable brain stuff) of your work is. What do I learn from this work, that can be applied and reused in other contexts? For this you must make a specific effort to filter out the details from the essence.

- **A thesis(/paper) is not finished when there is nothing more to add.** (Eric Jul [http://www.diku.dk/~eric]) It is finished when there is nothing more to remove. Every single sentence/paragraph/section is a candidate for removal. Does it add something useful or necessary? Does it detract from the main argument?

- **Adopt structured and modular writing.** A major challenge is to organize the flow of ideas coherently. Analyze the structure and the dependencies between the different sentences/paragraphs/sections. Avoid repetitions. Prefer back references to forward references. Don't be afraid of refactoring!

- **When describing an idea, start with most interesting/compelling part first.** It is ok to leave certain details unclarified and address them once the main point has been made. The devil is in the details, but do not start with the details. First, the interest of the reader needs to be captured by the idea you are putting forth. The reader is not a compiler and can accommodate a certain amount of undefined bits if they are not central to the story. Just make sure these bits are defined by the time you move on to the next idea.

- **Be careful with what you claim.** Be modest. True, but modest. Make sure all claims are clearly justified. If in doubt, skip, or be honest about the doubt. This is science, not marketing (of course, a drop of marketing skills helps, but in the end justifications must be provided).

- **Be careful with what you criticize.** When you relate to other pieces of work, do it in a way that is meaningful, diplomatic, and correct. Meaningful: we are not interested in a couple of small defects of a proposal. Focus on the essential points, how they relate to the essence of your paper. Diplomatic: the reviewer might be the first author of the work you are criticizing. Use empathy (what if you were the reviewer, reading an unjustified critique of your own work). Find a mild and clear way of making your point. Correct: be 200% sure about what you claim to be wrong in another's work (again, use empathy). In other words, *discussion of related work should be instructive, not destructive*.

- **Be self-critical.** Put the paper away for a few hours/days. Then go through it 'as if' it was written by your worst enemy. Go hunt for violations of each of the above points. When you get comments from colleagues, be thankful. Each error/problem they point out is one less weakness for the reviewers to see.

- **Learn from the good papers and theses written by others**, not only on content, but also on structure, form, etc. In particular, there is a lot to learn from good authors. So when you identify them, read their papers even if they are not completely related to your work. Study how they manage to explain intricate concepts in a concise and elegant manner, and strive to achieve this level of efficiency. A corollary of this tip is: (try to) forget the other papers. There are a lot of bad and/or badly written papers published out there, much more than you might imagine. Choose your influences wisely!

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