

# Notes on writing

Fredo Durand, MIT CSAIL

***This is clearly a document in progress.***

See also my slides How to Write a Bad Paper

<http://people.csail.mit.edu/fredo/FredoBadWriting.pdf>

Bottom line: Writing is important.

- Our major contribution is to communicate ideas, not only to create them
- It is NOT superficial for a committee to reject an article based on writing alone
- Even if ideas are great, when nobody can understand them, they are useless

Getting accepted is one thing, having impact is another one. I can cite a number of great contributions that did not have as much impact as they should have because no one (except maybe the reviewers) was able to understand the paper. And I can cite you a number of my papers that are confusing and resulted in misunderstanding. My 2002 tone mapping paper is a good example. Lots of people have found it hard to implement my method although it's really really simple. But it's not well explained in the paper. And a negative outcome is that some of the comparisons out there with my technique are not fair because people did not implement it well.

## High level

Assume reviewers/readers don't know much

Figure out your main story. Extract your main contribution(s). It's not that easy. I've messed that up many times.

Prioritize, organize your contributions and ideas into a hierarchy.

Make clear what's new, what's different about your technique

Favor clarity over style. You can always polish later.

Don't use an English that is too elaborate. Most readers and reviewers are not native English speakers. Don't introduce two ideas in one sentence. Sure the sentence sounds better and more elaborate, but cognitive overload will prevent your readers to understand anything.

Redundancy is good. Say what you're about to say, say it, then summarize what you've said. Just make sure you layer the levels of detail: the overview of the section says things at a high level, then you dive into the details, then you recap at a high level.

Sections should start with a small paragraph that gives a high level overview of the key points. Again, prioritize, draw a hierarchy of ideas.

Justify choices and technical points. Don't just say "our method does this, this, and this".

Provide motivation, say that since you want to achieve this, you need this step, etc.

Start by writing the overview. Personally, I refuse to read technical content before I can understand the introduction and overview.

Recall that many people do not read a paper linearly. One should be able to understand your paper by just skimming through it. Also, many times, readers will read a paper in multiples steps. It has to be easy to catch up with what was read before. Also, sometimes, I go back to a paper that I read a while back because I want to check a particular point. I should not have to re-read the whole paper to get the vocabulary and notations.

I find it easier to write once I have the figures. Referring to figures is an easy way to improve clarity and tighten the writing, especially in graphics.

## Where to start?

I advise that you start with a detailed overview, with maybe one or two bullets per paragraph. This is the right level of detail to make sure you have the story/information flow right. Then plan and create the figures you need. It's often easier to write (in particular to write clearly) when you have the support of illustrations.

It is in my opinion a bad idea to start too early writing equations and pseudocode.

## Choices

A technique involves a number of technical choices. Some of them are important, others are arbitrary. Make this distinction clear. Explain when a choice is pure question of artistic taste, when a choice is your very contribution, when it's constrained by technical requirements, when it's just the easiest thing to do but more advanced techniques might do better, when a parameter has important effect and what values you suggest.

In articles, we must explain the respective importance of choices

See my slides at <http://people.csail.mit.edu/fredo/student.html>

Choices:

- Model
- Algorithms
- Parameters
- User Interface
- Problems we choose
- Evaluation criteria

## Title

A title can be fancy/catchy vs. informative. The former is nice, the latter is more important.

Make sure your title is not misleading. You might get the wrong reviewers (cf. the whole billboard clouds debacle).

A good marketing idea is to make sure that part of the title (the method name) can be used in a sentence that cites your paper. Titles like "light field" are brilliant from this perspective. A variation of this, if your work is more systemy, is to name the system and use that in the title.

## **Abstract**

Should be independent from paper. Should be enough to understand what's good in the paper.

The paper should not need the abstract to be understood. It is expected that paper and abstract should be redundant. Some people copy-paste from one to the other, it's OK (although not great).

## **Intro**

The intro might be the most important section of your paper. It sets the expectations, it convinces (or not) reviewers that your problem is important and gives a high-level hint of why your solution is smart.

See retreat CFP co-written with Jovan:

"the summary should discuss the following (not necessarily in this order):

- (1) high-level description of approach
- (2) general motivation for the problem
- (3) what are the alternative approaches to this problem
- (4) what is different about your approach
- (5) what is your silver bullet or a key idea/concept "

It's a good idea to summarize your contributions at the end of the intro, with a bold "contribution as a paragraph title because it helps reviewers identify and praise your contributions. Again, contribution summary is different from method summary. Parts of your method might be well-known previous work.

## **Previous work**

Avoid laundry list, compare, organize.

classify

make distinction between competing and related (orthogonal) previous work.

When previous work is not directly competing, you can further summarize with one single sentence about the whole category.

## **Body**

When a section just uses well-known techniques and is here just for completeness, say so.

## **Results**

Your results should support your claims. Be critical of your own results before deciding to include them. Too often, only the authors see why a given result demonstrates that the technique is good.

Make sure you compare to appropriate previous work.

Try to break down various aspects of your methods for both cost and benefits.

## Figures

Especially in graphics, figures are critical. Make sure that one can get the full story just by looking at the figures and their captions. The captions should be as self-contained as possible. In particular, make sure that if you show a naïve result or failure case of previous methods, it's very very clear that it's not your results: a reviewer/reader could get the wrong idea.

## System papers

They're tough!

See How (and How Not) to Write a Good Systems Paper by Roy Levin and David D.

Redell <http://gatekeeper.dec.com/pub/DEC/SRC/publications/levin/SOSPhowto.html>

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The borderline between acknowledgments and authorship is a blurry controversial one.

## Vocabulary inflation and other pet subjects

Avoid paradigm at all cost

Avoid framework unless it's relevant.

Title: no ?, no :, no towards

Avoid acronyms unless they're really well established (e.g. BSP trees)

Avoid parentheses and footnotes. If something is useful, put it in the main text body. If it's not, delete it.

Avoid the future tense.

Avoid the passive form. I have been surprised to see that some technical English teachers advise students to use the passive form. I understand that using "we" all the time is not the most elegant formulation ever, but it clearly explains that this is what we do. The passive form makes things really ambiguous: do things "get done" magically or does your method do it? Take responsibility for what you do !

Avoid words such as "thus", "therefore", and "hence." If an argument does not follow logically, they won't help and will only highlight the fact that you don't have a good argument.

## Early drafts (e.g. for retreats)

There are bad misconceptions about feedback and the interest of presenting your work to the rest of the lab. I believe that this is because people look for the wrong kind of feedback at the wrong stage of a project's life.

At the beginning of a project, before it's fully scoped you can get useful help about technical solutions and scope. Is this a useful problem to solve? Should it be re-scoped to be easier, harder, more relevant, more general, etc. Does it remind someone of a similar

problem, are there proven solutions that can be adapted? Is the technical approach you are planning to use well known to be flawed? Are there easier better alternatives? Such early stages are the ideal moment to give a meeting-meeting talk. In terms of writing/presubmission, it can be useful to write an introduction+previous work as well as a short overview of the proposed approach.

When the project is farther along, you are less likely to get as much technical feedback, because anyway, you have already solved your technical problems. In addition, things gets very specialized and few people understand the bells and whistles of what you do. But this is great time to get feedback about the exposition and demonstration of your contributions. This is the best time to write a presubmission and see if people understand what you are trying to solve, if they are convinced that it's useful, if your paper is readable by someone else than you, if you fail to separate your contributions from well-know methods. Do your demos really showcase your contributions?

The earlier you write the paper, the more important the introduction is. The most useful feedback you will get is about the scope and motivation. Make sure you provide enough context.

Do not focus on the low-level technical details.

Do figures early. They will make your high-level ideas clearer.

Speculate about potential benefits and the kind of results you are hoping to show. This will help reviewers get a sense of your potential contributions.

## **Links**

See <http://people.csail.mit.edu/fredo/student.html>