

Writing Papers with Karon

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Barriers to excellent technical writing, as I've experienced it with student writers, and recall over my own life-long learning on this topic, take several different forms:

1. **Plan to get Input from Others.** Allow time and resources for revision. Plan your writing schedule to involve the people who will help you improve it.
2. **Structure and Frame the Big Picture.** Decide on the “story” you will tell, or the idea you will argue; devising a high-level organization that supports this story and/or persuasive argument.
3. **Constructing Persuasive Paragraphs.** Make each paragraph support a communication goal. At a lower level, structure every single paragraph so it does an explicit communication job.
4. **Document your Work as you Do it.** Don't take chances on not being able to recall why you decided to use that nonstandard counterbalancing method, months later.
5. **Describe Clearly and Concisely.** At a very low level, your sentences, figures and paragraphs must be transparently understandable. Takes many passes.
6. **Take Command of the Language.** Use “good English” in things like grammar, sentence structure, vocabulary and spelling, correct use of idioms.

Many novice writers, particularly those who are writing in a non-native language, are under the impression that item 6 is the most important, and perhaps even the only important factor. THIS IS WRONG.

Much has been written on items 5 and 6 (good grammar and clear descriptions). The things we need to work on together in SPIN are Planning, Structure and Framing, and Paragraph-level writing; and earlier, work documentation. These elements are highly inter-linked.

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1. Planning & Communication

A lot of this section is common sense, and/or completely in accord with basic expectations of professionalism in any civilized organization. I've found that many students, including those with work experience, come to graduate school without understanding these principles, and I've come to have some strong feelings about them. **The basic principle is pretty simple: if you don't make good use of my time and funding, I'm not going to give you more of it.**

Involving your supervisor(s):

I need to be involved at the start.

I'll say that again: I need to be involved from the start. Other supervisors might do it differently; that's how it works here. **This means** I come in when you have a **detailed** outline (see Structure/Framing below), and give feedback at that stage.

It is not acceptable (because it's terribly inefficient) to show me a near-complete draft, that I am likely to require restructuring of. If this happens near a deadline, it is major, major bad brownie points. Multiple instances of this may have dire consequences.

As we start on a writing project, please create a **schedule** for when each milestone (detailed outline, various sections complete (for larger projects), first full draft, review by others) is expected, including when you hope for my feedback.

We need to discuss this outline early on to make sure it's feasible. As progress continues, keep me informed immediately of setbacks and changes to the schedule.

Exceptions to this rule of my early involvement need to be explicitly agreed upon well in advance. In general, they would be granted when your prior work with me has indicated that you're up to it in terms of *both* reliability and writing ability, and there's little chance of your putting the writing project at risk.

Communication during writing: particularly during the last stages, in deadline-driven work (e.g. conference papers), it is crucial for co-authors to keep one another informed of their status, availability and whereabouts. **Under no circumstances** is it acceptable to "disappear" at a time like this; or to miss a promised draft delivery without an explanation and a revised plan. If an exceptional circumstance comes up, then you are expected to make a **heroic effort** to communicate the situation, and your plan for dealing with it, to your co-authors as early as is humanly possible.

I hold myself to this standard as well.

Involving others:

It is extremely valuable to involve others in your writing as well. Your labmates provide expert domain reactions, and can tell you when something is not clear or doesn't make sense. Others – including friends and family – can help you edit your writing for good English, clarity, and general comprehensibility.

This takes time. There's never enough. Don't put it off.

2. Structure & Framing

Write your Detailed Outline first. Start by writing the COMMUNICATION GOAL of each section of your document.

- If it is a rebuttal, for example, this is likely to be an altered belief of a reviewer; a new understanding that you must convince him/her of.
- [other examples]

Start with THIS, **not with the argument and reams of supporting data!!!**

More specifically, your first steps should or could be:

1. **List the contributions** being described or argued (may or may not retain in this form in final document, but **MUST** be very clear on them while writing). You will, for example, need to be quite clear about what is new and what is already reported.

This is **THE VALUE OF THE PAPER**. Every other word will be about supporting an understanding of and belief in, and valuation of those contributions by your readers. Everything.

So you better start by knowing what they are yourself, and agreeing on this with your co-authors. Your contribution statement may shift as you write the paper, and understand them better yourself; this is normal and completely okay. But keep the current definition of them up front at all times.

2. What is the primary, framing argument? This will depend on the venue/audience, the space you have to develop the idea, the contributions. It will influence how much space you include on the various parts; how you construct the background.
3. DETAILED OUTLINE. This means: sub and maybe sub-sub headings, **with a sentence or two stating the primary point being made for each one**, and actual or described supporting data / figures that will be used, as relevant.

This is the level at which I ABSOLUTELY REQUIRE to have input on any document I participate in writing. Do NOT give me word-complete drafts.

Need to provide example

4. Make a page budget, and a timing schedule (see below).

Then, after you have secured consensus on the general approach and begin to develop the paper, there are a few common errors.

Background section:

Show the gaps. Don't just list other papers. Explain what they contributed, and *the limits of their contributions which you plan to fill*. Choose the references you cite so as to "frame" – show the need and context for – the work you are describing.

Explaining an experiment and its results

These examples are for explaining an experiment, but very similar heuristics apply for describing a design or other technical development. It had a purpose, and a lot of decisions along the way, and in the end you had to assess it.

Why did you design the experiment in the first place? Obviously, just as for the paper as a whole, you need to start with the point of doing the experiment: the research question. Why did this experiment need to be run; what conclusion did you need to make, one way or another? Were there other ways of getting at this information that you considered and rejected?

What were the design decisions? Given the goal, justify the way you set it up. What problems were encountered and how did you solve them? For the usual necessary compromises, what were the tradeoffs and how did you mitigate them?

Once you've presented the results: what do they mean? Eventually: what can you connect back to your original question / reason for running the experiment?

The future work: What remains to be done?

3. Constructing Persuasive Paragraphs

It's not until now that you get to write actual paragraphs. By now, you should have a full fleshed-out outline, a "roadmap" for every paragraph in your first draft – the point which that paragraph needs to get across to the reader. It's best to decide on this communication goal before you add a lot of words. The words will make it harder to see the shape and progression of the argument.

Each paragraph has a job, which is to make a point, often just one. This point is often stated in the first or second sentence, then explained and supported by the rest. Go read some good technical papers and study the individual paragraphs - you'll see what I mean. There's a bit of variation in

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a writer's style – some like short paragraphs, some longer. Complex points need more room for explaining, and maybe more paragraphs that break the larger point down.

As you develop your concise, clear language and make each point, hold on to the roadmap or skeleton (e.g., put the “point” sentence into boldface) and use it to test the quality of the paragraph: did it make the point? Is it inefficient - does it have extraneous material which is not needed, and perhaps detracts? Is something missing? Is the skeleton still right, or do you realize you need to shift the argument, drop the point, expand to a more elaborate explanation?

As you get better at it, this underlying structure of a section will become more visible to you without the extra highlighting and cycles. But it takes a long time to develop this “eye”. A good way to practice is by editing your labmates' writing – look for the “point” sentences and judge the efficiency and effectiveness of another student writers' paragraphs.

Or mine! I'm an okay writer, but I iterate a lot. The first pass on a paragraph may be pretty bad. I test and refine the paragraphs over and over again. Often, it helps me to have someone else bump a problem bit into another space, another way of explaining it.

4. Document your work as you go

Design decisions, ...

References

To Come

Specifics for particular kinds of writing projects

Proposals

Writing proposals can be a ton of fun – I really enjoy it. Proposals are creative – for a scientist, a proposal is a form of playing. It's one space in which you get to brainstorm about what you want to do, evolve your understanding of where the real problems and interesting solutions might be, and craft a plan of work amid many constraints.

But creating proposals can also be very stressful; there's usually time pressure, you may have to work with people you don't know very well yet, and there's a lot of boring parts along with the fun parts. If it's your first one – for example your PhD or Master's proposal – the “blank page” aspect can feel completely overwhelming.

Proposals are different from publications in a lot of ways, but they're still writing projects. The coordination aspects still hold, but it's usually unrealistic to expect to have a well informed picture of the final result at the time you start. We often use proposal writing as part of the process of understanding what we want to do; explaining and selling the idea to others means holding it up to scrutiny ourselves.

Theses – PhD is formal and will be defended; Master's is a kind of a roadmap which is a really good idea. Course projects need proposals too.

Writing a Paper Rebuttal or Revision Cover Letter

Here's the general procedure. Keep it short, professional, succinct and very readable (e.g. use clear headings to structure), whether or not you have a tight or generous space allowance. Your English must be perfect. Your meta reviewer has a huge caseload and is sick unto death of reading reviews and completely out of time.

1) Thank the reviewers for their time, and state your appreciation that the reviewers found value in X,Y,Z (the things we ourselves feel are most important about this paper which the reviewers recognized).

2) List the top ~3 (or less, as needed) issues that the reviewers had any negatives or suggestions about, then address each of them in turn. Rephrase the question, explain why we did it as we did, and state how we will fix the problem in the scope of a revision, given the limits of space and time before a final submission is due.

3) In closing, you can very briefly deal with anything else - just say that the reviewers also made very helpful suggestions about x,y,z and we will be handling those within the page limits of the paper.

4) *If room: thank the reviewers for any suggestions made about future work, but do not imply that they will be addressed in this revision.*

Writing your Thesis

Voice

Students often ask what voice they should use for a thesis: (1) 1st person singular (“I”) or (2) plural (“we”), or (3) some kind of mix. Typically we use “we” for non-thesis technical writing, and avoid passive voice; but a thesis is supposed to be *your* work, so won’t “we” sound strange? Certainly, the larger ideas and framing is coming mainly from you. But... often *some* of your thesis work was done collaboratively. It gets messy.

You’ll find different opinions and examples on this. Here are my thoughts.

While (1 “I”) is often used, I don’t like it. It’s not the way we write other publications, and thus to my ear it always sounds strange; and all the more so if there is an aspect of collaboration. There is usually at least a collaboration with the supervisor. While I’ve had committee members be surprised when anything but (1) is used because it’s not their norm, I’ve never had a problem after reminding them it’s just one of many conventions, and we found it an inappropriate one in the given case.

I personally find (2 “we”) the simplest. You don’t have to think, worry about transitions (potentially even within a chapter). You just write it all the same way. Importantly, make an explanatory note at the start (e.g., on the page where you explain the collaborative roles taken in each element of the reported research), stating that this is the convention you are using, to avoid distraction when shifting between collaborative and non-collaborative reporting. It is simply a convention and it will be accepted.

Consider a mixed model when distinct, well partitioned elements of your thesis were done collaboratively – e.g. a paper-sized chunk, which is being included as a paper largely intact, is a mixed model. For example, you might write the framing sections with “I” then transition to “we for the paper.

In this, what is really important is that the reader has it all explained, the transitions are clearly demarcated, and you are very consistent about how you do it. But consider it with care. It will very likely be distracting; it’s not terribly conventional.

One other problem with “I” that I’ve noticed: people tend to use passive voice a lot more because it feels uncomfortable to say “I” all the time. Then it can get actively confusing, often can’t even tell if the researcher(s) did it or it was done by some other entity.