

Tips for Writing a Paper

Prof. Kaushik Rajashekara

Doing the research

- Identifying a problem that has not been solved (perhaps obvious!)
- In order to get your paper accepted to a good journal, *some* acceptable mechanisms for research are:
 1. Solving a problem that has been solved before by others, but you want to use a *new* method and show that the new method has advantages over existing methods
 2. Solve a new problem that has not been solved before (sounds easy, but chances are that when you look hard, someone else has solved a similar or related problem). Going to the industry to hunt for an unsolved problem has led to many a path-breaking paper. Do note however that if it is too trivial a problem, it may be hard to get that paper accepted.
 3. You have a hypothesis, and you want to test it. Clearly, it should be an interesting hypothesis, i.e., of interest to your academic/industrial community.
- Bottom line: it is important to identify a gap in the literature, a gap worth filling, and ensure that you are filling it.

Identifying the problem

- Identifying the problem involves doing a lit. survey, and making sure you aren't reinventing the wheel.
- In the initial stages, when you know what problem interests you, it is necessary to read widely. Start with conference papers (they're usually easy to read) and then move on to the seminal journal papers (sometimes this kind of material can be found in advanced books). But reading the relevant papers is critical in the end!
- After you've identified a problem, you must work must find a novel method of solving it

Writing the paper

- Doing the work is only half the work; writing it clearly is the other half.
- Make sure you follow a proper format:
Abstract, Introduction, Lit. Review, Body of Your Research (Method/Problem/Hypothesis), simulation/experimental results, and Conclusions.

Abstract

- The abstract should not be copied from the introduction, i.e., avoid repetition.
- Should be of the proper length (author guidelines will tell you the word limit)
- The abstract has to highlight the main contribution.
- The abstract should be rather general in the beginning (introducing the broad field in one/two sentences).
- Should provide an overview of the paper

Introduction

- Needs to be an expanded version of the abstract
- Include parts of the lit. review in the introduction.
- In the last subsection of the intro., you can provide a roadmap to the rest of the paper (explaining what each section of the remainder of the paper contains).

Lit. Review

- Make sure you begin by citing some main references, e.g., seminal papers or textbooks that contain the fundamental theory for your specific topic.
- Then, introduce the relevant papers using a specific style of arrangement: either chronological (safest, so you don't offend a potential reviewer who believes his/her research is "more important" but cited later for no obvious reason!) or based on areas within the area you are working on.
- Your lit. review should pave the way towards showing what the gap in the literature is! **This is the most important thing about how to organize the lit review.**
- **Don't forget to include the most highly cited papers in that area if they are relevant.**
- Remember with a high probability, one of the people you cite will be your reviewers (who are almost always blind to you, though you may or may not be blind to them).
- However, don't cite someone whose work is not related just because you hope to have this person review your paper. That can backfire because the editor is very likely an expert in the field and can see right through that.

Lit. review can cause rejection!

- Papers are regularly rejected because they failed to cite a closely related work. In fact, if you know of some work that is closely related, you **must explicitly cite it** and **explain how your work differs from it**.
- Inexperienced authors oftentimes fail to describe how their work differs from existing work and what gap it is that they are filling. This is grounds for rejection, or a major revision, because the reviewer is confused about what the contribution is. Remember not all reviewers are people working in the *closely related* area, nor are they going to necessarily read the closely related papers. So if they are in doubt, they may reject. Furthermore, if you don't clarify that doubt, they will most certainly see that as a weakness in the paper.

Body

- This is the most important section in your paper.
- Make sure you present the notation properly. Don't use a symbol before defining it. That can be aggravating to the reviewer.
- You can introduce the notation as you go along; a glossary with bulleted items at the very beginning is also fine
- Your algorithm/method/problem domain/hypothesis must be clearly defined. Do not assume the reader knows it already; the reader is not trying to solve a murder mystery!
- A picture is worth a thousand words only **if it isn't confusing**. Pictures should convey something enlightening to the reader at first sight, but what they depict must be also explained within the text (for instance, Fig. 1 represents so-and-so).
- Organize this part into multiple sections/sub-sections as needed.

Some comments on writing

- Organize your material into short paragraphs. But how short is acceptable?
- One or two sentence paragraphs are usually rare in technical papers. They are used in newspapers.
- However, very long paragraphs can make the paper boring to read. If you have a long paragraph, split it into multiple paragraphs. Note that each paragraph should be limited to one idea.
- Don't start a sentence with a symbol if it is in the lowercase. “ α denotes so-and-so” does not read well. Instead say: “The symbol α denotes so-and-so.”
- Also, do not start a sentence or paragraph with “And”.
- Make sure that the sentences are connected. The new paragraph is linked to the previous paragraph.

Numerical results

- Provide ALL the inputs needed for perform the experiments you performed.
- Preferably use tables to show the inputs.
- Show all the relevant outputs that form the crux of your research. Use tables and also graphs if possible.
- Write this section clearly, because in some sense this is examined very closely. It is usually tied to your major conclusions and the gap you are trying to fill.

Revisions

- When you hear back from the editor, they will tell you one of the four things:
 1. Accept as is (rarely, but this is the dream scenario)
 2. Minor revision (sometimes)
 3. Major revision (usually)
 4. Reject (you don't want this)

Major revision is nothing to get too worried about, but it means you will probably need significant work, e.g., sometimes re-running your experiments and /or making changes to your model. Sometimes, it is just a matter of writing it better.

For 2 and 3, you must submit a revised paper. It has to be accompanied by a detailed report showing how you've revised the paper. Address every comment thoughtfully and in detail. You don't have to agree with every comment, but you must explain (respectfully) why you disagree. Reasonable reviewers usually buy your argument provided they think it is valid.

If your paper is rejected, please don't send a nasty email to the editor complaining! Unless you feel that the reviewers are being unethical or extremely unreasonable!

Dealing with a rejection

- Don't believe everything the reviewers say, but **be objective with your self-evaluation**: learn to reject the unfair criticism and accept the fair criticism.
- Finally: some human relationships don't work. If we refuse to accept it, we waste time. Similarly some papers have to be buried because the research is not publishable (i.e., they go into a drawer possibly never to come out). Hopefully, something like that will not happen when you are working on your dissertation, because your advisor (who should have the experience) will be able to foresee such an event and prevent it from happening.

Some Final Thoughts

- Don't select a conference because of its location; rather go to a conference (even if it is Cleveland, OH and not Paris, France!) if it is the main conference in your field. Chances are that you will be able to hear some of the leading authors in your field speak, which is very valuable because you may get insights from their talk that are not visible from reading their published papers.
- Read the *seminal* papers in your area (chances are they are old and not available online) even if they are not directly related to your research and even if that entails actually going to the library.
- Identify the best journals in your field, and try to identify the characteristics of the most cited papers from there.
- Aim your research at the best journal in your field (not the lowest one with a very high acceptance rate, e.g., one where you pay; all papers in the journal are open-source etc.).
- Even if your work doesn't end up in the best journal, try and do good research that will get cited as time passes!