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**SHORT DISCUSSIONS
FOR STUDENTS PAGE**

PUBLISHING YOUR FIRST FIRST-AUTHOR PAPER

You have worked hard in the lab and your supervisor thinks you have a nice story to tell. Job done, right? No, now it is time to convince your academic peers that your work is worth publishing in a peer-reviewed journal. Your research is only going to reach others if it is being communicated effectively and publishing in a journal is a good starting point. To be a successful researcher, not only do you need to have motivation, perseverance, time management and technical skills but you also need to be able to write well. Writing a scientific paper is something that comes naturally to some, but not to others. It may seem like a daunting task and a good paper may take a very long time to write, but hopefully the following tips can help you with the process (which I am still learning myself!).

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1. Decide on your main message

Writing a paper is merely a way to tell people what you have discovered. Decide on what story you want to tell and what the main point of your paper will be. Then you pick the results that best help you tell your story. List all your results and decide on whether you have enough 'evidence' to draw your conclusions. It can be a bit disheartening when you realise that only a small fraction of your results actually make it into a paper. You should resist the temptation to try and cram in as many results as possible in order to tell multiple stories in one paper. The key is to put yourself in the reader's shoes to get your message across.

2. Pick a journal

Once you have decided on your take home message, decide on which journal you want to submit your article to. Your supervisor and collaborators will be able to help you decide on the most appropriate journal. Finding the 'right' journal can be difficult and you may want to take into account the research area, reputation and target audience of the journal. Assessing the quality of a journal by its impact factor is a controversial issue as there are other factors that can influence the impact factor, not necessarily related to the quality of the papers being published. Nevertheless, the impact factor is still one of the main criteria to consider when choosing a journal. It is always a good idea to check which journals publish work similar to yours. You typically aim high (more prestigious journals) to begin with because you can resubmit to less prestigious journals if you get rejected. Be honest with yourself about where you realistically can see your work getting published, otherwise you may lose valuable time (and sleep) reformatting papers for submission. Chances are that your first paper will not be published in *Nature* or *Science* – many might go through their whole careers without ever getting one! So don't be disheartened as plenty of influential, highly cited and high-quality papers are published outside of these journals. Consider open access policies for the journals and publication fees. Once you have picked the journal, read the guidelines for authors that you must adhere to.

3. Prepare your figures

Whenever I get some exciting new data, I try to generate publication-quality figures as soon as possible, which can then be used in presentations and manuscripts. A well-constructed figure is worth a thousand words. Of course your figures do need to abide by the target journal's guidelines, so make sure you can still edit them if need be. The figures and tables, including the legends, should be self-explanatory and the information conveyed in a figure should not be repeated in another figure. I also find it is a good idea to have a mixture of different types of figures for a paper. Any figures that don't add to the main story but are important in supporting the paper can be included in the supplementary material. Don't forget to include appropriate axes titles and units.

4. Write a cohesive story – introduction, methods, results and discussion

It is unlikely that you will be writing your first paper alone. Remember that the reviewers are not necessarily in your niche area of research and you should make the review experience as painless as possible for them. I find it useful to find a good paper in the same journal that you can use as a guide.

A good introduction should convince readers that your work is important and will address an unresolved problem or gap in the literature. Add enough background information so that the reader can understand the remainder of the paper.

The methods you used in your paper should include enough detail that a fellow researcher can reproduce the experiment. But if a method is well established, use references to previously published procedures to keep this section succinct.

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Once you have prepared your figures and tables, you will find the results section relatively straightforward to compile. I tend to group the results together into subheadings if this is permitted by the journal. Keep the data in a logical order that helps you tell a coherent story, which is not necessarily the order you performed your experiments in.

After you have presented your results, it is in the discussion that you highlight the importance of your data and explain what it all means. You need to put your data into the context of your field. When writing your discussion, try not to overstate the conclusions. Try to come up with all plausible explanations for your results and let the results speak for themselves.

The order in which you write these sections is up to you. One of the key points in writing a good paper is ensuring that one section flows into the next.

5. Title and abstract

Even though a title is only a few words long, it often takes time to come up with one that you are happy with. Keep the title succinct and descriptive of the content but not so technical that it cannot be easily understood. I know a number of people who make the decision to read a paper or not based on the title. Think of the title as the advertisement of your article.

The abstract should be succinctly written and avoid the use of jargon. It is a way of highlighting the aim of the paper and the main findings. In some journals, the editor may only look at the abstract to decide whether a paper should be further considered and sent for review.

6. Feedback

Try not to dwell on your first draft too much before sending it to your supervisor for revision. More often than not, the draft will come back to you covered in red writing. Once you have incorporated your supervisor's feedback, pass it on to your co-authors. It is a requirement that all authors on the papers have revised and approved the final version of the manuscript. I also find it useful to get someone outside of my discipline or even a non-scientist to read the final draft of the paper. It is unbelievable the errors they can pick up even when they only understand the meaning of a few words.

7. Submission and revision

The senior author on the paper will be in charge of submitting the revised draft of the paper alongside a cover letter. The review process may take a few days but more likely, a few months. If major/minor changes are required you will have a timeframe to resubmit the paper. Consider the reviewers' comments carefully as you will often have to prepare a letter to respond to their feedback. When preparing your response letter, make sure you carefully address each comment in a calm and methodical way. I always find it a good idea not to address the comments immediately after reading it for the first time. Also, don't think of the comments as a personal attack on your research but merely a way of improving the quality of your publication. A glass of wine may also ease the process! Sometimes, reviewers may request changes to the manuscript or even more data. If you decide not to follow the request, make sure you provide a good justification for not doing so. Simply ignoring a request or criticism will not be looked upon favourably by the editor. Once you have addressed the reviewers' comments, with any luck, your paper will be accepted by the journal. When your work gets published in a journal, you tend to forget about the pain you had to endure during peer review and you start looking forward to putting together your next publication!

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