

Writing a scientific paper

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Tips and perspectives on writing a scientific article

- About the process of writing, submitting and publishing an article (Mark)
- Not a writing clinic, *per se*, but some tips given by Riikka!

Mark: background and “credentials”

- BSc in Mechanical Engineering (1984)
- 10 year career in the City of London (nothing to do with science!)
- Return to higher education. MSc 1996, PhD 2000
- 2000-2006 BioComposites Centre, University of Wales, Bangor
- 2006- TKK/Aalto (research manager / professor w.e.f. 1.1.2007)
- 9 doctoral students successfully supervised so far
- Written or co-authored >110 peer-reviewed articles (+6 book chapters)
- Most cited paper: 675 times (several >100 citations)
- Total citations: 3495
- H-index: 32 (Web of Science); 40 (Google Scholar)
- Reviewer for many journals and on editorial board of three.

Why write an article?

- Usually as it is a part of an article-based dissertation!
 - Good way to receive timely, independent, feedback about your work
 - It helps to structure and schedule your thesis and provides intermediate check points along the timeline of your thesis
 - Ideally it will be a series of connected documents that support your thesis. It is therefore important to have a good idea of what you will eventually produce
 - Naturally this will change along the way!
- Important to share your work with the scientific community
 - Peer-review establishes the credibility of your scientific work
- Contribute to knowledge
 - One of the “acid tests” of a doctoral thesis is that it needs to demonstrate an ‘original contribution’ to knowledge
 - It is hard for a pre-examiner and opponent to argue that you cannot demonstrate originality if you have published papers! Not so with a monograph.

Getting started

- Need results!
 - But don't procrastinate – just start writing as soon as you have results
 - Try to plan your experiments so that the results answer your research questions
 - (Too often I've seen experiments conducted without any thought about why. Sometimes this works; more often it leads to results that are never written-up! I've done this myself - far too often)
- What results do you need?
 - What are your hypotheses, objectives?
 - What are the research questions that you intend to answer?
- Do you already have a journal in mind?
 - The “storyline” will differ depending upon the journal
 - Is what you intend to write about “in scope”? Rejection of submitted manuscripts because they are out of scope is common. Resubmission will entail a loss of time in your studies.
- OK, GET STARTED!!

Structure and the writing process

- Will it be in the traditional format?
 - Introduction, materials and methods, results and discussion, conclusions
 - Most probably the answer will be “yes”!
- Assuming you have the results, there may be different ways in which these can be presented in order explain the “storyline”. Be prepared to re-think how to present them as the manuscript develops. What results to include, is some times a tricky question. Should some results go to another paper?
- The **materials and methods** section is a good place to start. It is factual and gives a sense of achievement when complete. You should have all the details to hand. Remember what the materials and methods section is for. It is a “how to” section. Don’t include superfluous information (background, literature review etc.)

The writing process

- Personally, I nowadays like to start with the **introduction** it helps me think clearly about what the purpose of the article is. Readers (in particular the reviewers) like to see the context; it helps to establish that the manuscript is within the scope of the journal
- It should be comprehensive and brief at the same time
- I usually use about 1-2 paragraphs of fairly general background to establish the rationale for the study
- Introduce any relevant theories and review the pertinent literature in 2-3 pages or so (It is good to write the ms in double spaced text (font Times New Roman), aligned left)
- State the objective clearly and unequivocally
- Generally, I like to write the first draft of this section quickly and “off-the-top-of-my-head” (you should have a pretty good idea of the literature in this area as you will have read enough by this stage). It gets the main points down on paper. You will undoubtedly change things and “polish” the final version

The writing process

- The results and discussion section is arguably the most difficult to construct
- It helps if there are clear objectives and hypotheses. This helps to structure thoughts and gives “flow” to the paper
- Remember: it does not hurt to make it reader friendly!! Even though it is a scientific article, it can be written in a way to make it more accessible and enjoyable. Remember: the reviewers will be the first to read your paper, and it is them you have to convince! If they can't follow it, or it is difficult for them to follow, they're likely to reject it. Use simple language.
- Remember: a reader and a reviewer will not be familiar with your work, so lead her/him through the text.
 - Introduce the results *“as you will see from Figure 1, the Young’s modulus of the composite containing modified fibre....”*
 - How do your results compare to other similar work (i.e. justify that your results are valid)
 - What do these results mean in the context of your objectives (i.e. how do they answer your research questions)
- (It sometimes pays to take a step back and re-read your ms after a week or two. Does it still make sense to you?)

Other thoughts

- Writing is a creative process: I find that I can manage only 2-3 hours of productive writing per day. The remaining “down time” can be used for “processing” information (reading literature, making notes, analysing results etc., etc.)
- Multi-tasking does not work (for me at least! And probably not for most). Find time to devote to writing. Find a quiet space without interruptions (I work from home when needed)
- Presentation and language are really important! Don't expect a reviewer to correct your language!
- Have it proof read by a native English speaker, if possible
- Good graphics are becoming increasingly important
- Avoid typos etc. It looks bad and raises concerns in the minds of reviewers about the quality of the work
- (This is even more true of the thesis itself)

Choosing a journal

- First and foremost, ensure that your chosen outlet follows **rigorous peer review** practices. Practices vary from discipline-to-discipline, so carefully check where you intend to publish.
- Journals with good JUF0 number/impact factor preferred!
- Manuscript fits scope (see also later). Check: are you citing papers published by your chosen journal? If not – think again!

Working with others

- Most papers will be collaborations with other researchers
- Be clear from the beginning about what your roles and contributions will be
- You will need to report in your thesis what your contribution[#] has been (remember the role of the pre-examiners and opponent is to assess this)
- Suggest that you write this down at the outset so that there are no subsequent disagreements
- If you are the main author take charge of the writing process. Give your co-authors deadlines (**especially supervisors!**)
- Even if you are not writing part of the paper make sure you understand what was done by another contributor – it is not very convincing to say at your defence that *“I don’t know about that, my co-author did the experiments and wrote that bit”!*

[CRedit author statement](#) seems to be becoming popular!

Working with others

- Keep every one “in the loop”
- If you are the lead author manage the process
- Seek help from more experienced researchers regarding writing style (instructor / supervisor should be able help here significantly)

Submission to the journal

- Once your manuscript is submitted, you will get a response from the journal.
- If the editor deems the manuscript to be “out of scope” you will probably hear back pretty soon with a “I regret to inform you.....” note.
- One way to “prove” that your manuscript is in scope is to cite references that have been published by the journal. If you don’t cite any papers published by your chosen journal, don’t be surprised in the editor takes a dim view!!
- If the manuscript goes forward to the reviewers, it may take some time to receive the reviews (reviews can take up to several months – most journals are acutely aware on the time frame and “encourage” reviewers to act quickly). But be patient.
- Reviews can vary from being supportive and constructive to quite harsh and critical. (Some review can be very insightful and helping improve the paper)
- They can also be highly variable in length from a curt sentence or two, to several pages of detailed comment/correction!

Dealing with rejection

- This can affect your motivation and self-esteem but dealing with this 'rejection' is an important part of moving forwards and developing as an independent researcher.
- Even if the editor's decision is "reject," use the feedback that you have received as constructively as possible:
 - E.g., If a reviewer "did not get the point", was this because he/she did not read the manuscript carefully enough.... or was your text not clear enough?
- Don't give up! If your manuscript is rejected from one journal, use the feedback to improve it as much as possible and re-submit to another..... And, if necessary, another!!!
- If you are asked to make "major corrections" (most journals ask reviewers to make one of the following recommendations: "*accept as is*", "*accept following minor corrections*", "*accept following major corrections*", "*reject and invite resubmission and re-review*", "*reject*"), this is a relatively good signal (why invite additional work for the reviewers and journal staff, if it is ultimately to be rejected?!).

Prepare the best manuscript you can.....

- Assuming that the basic science is fine, ensuring that the manuscript is well-crafted, and well-presented, is the best way of ensuring that it will be favourably reviewed.
- Well-written?
- Suitably referenced?
- All details included, but nothing superfluous?
- ~~Linguistically~~ correct? Linguistically correct?
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