

Elements of Technical Paper writing

For each paper- build the story top-down. Follow the steps below – assuming you have most of the results and a good understanding of the literature. What I am also assuming is that you have an approval from your advisor based on the preliminary version of items 1 and 4 below (that should be really the step zero!).

1. Write down the **take home message** you want the educated reader to have after reading your paper. This is typically one long sentence of few key phrases woven into one or two short sentences. Clearly, this take home message is not the description of what you are reporting but the “lesson learnt or novelty of the paper” that the reader would get. This step defines the entire paper and your strategic planning related to your career---recall the concept of “branding” your franchise.
2. Write a **short story** that will be weaved in to the narrative of the paper. It need not consist of scientific sentences that will go directly in to the paper but it helps you determine the flow and story-telling, which is one of the six elements of writing (see item seven). Ideally it is no more than half a page; but if you combine with an expanded bulleted list of item 3 below, it could be one full page.
3. In style of Powder Technology or other such journals, jot down three to five **research highlight bullets** – each very concise (strict guidelines is no more than 85 characters). These bullets generally expand the story of the paper from that you may have conveyed in step 1. When you are doing this, you also keep in mind key related papers from the literature – including target research groups/people whose work you are comparing with. Some of them could also be used as a list of reviewers.
4. Now that you have steps 1 and 2 done in a preliminary sense, you can develop a PPT or Word based **outline of main results as figures and tables** you will have in the paper; preferably the figures and tables are in the right sequence.
5. As you will now begin writing the paper, spend a little time on thinking of a **few reviewers**. Here, the idea is to have two lists in mind. The first list is what is your best guess for the names the editor will select based on the abstract and some of the key references you will use in the paper. This means that if you want the editor to pick some people and avoid some others, you then select the reference citations in the narrative based on this strategy.
 - a. The main objective is the idea behind using/selecting the references in your paper is all about the balance between the strategy you have in mind and respecting/crediting prior work done by others. One caution: If you need to refer to a method or an approach you have also used, try to cite the most credible and/or authoritative source. Example is if you refer to Carr index, you cite the work of Carr and not some arbitrary paper you read from 2010 that used the Carr index.
6. Now you start **writing down the paper**. Depending on your ability, you can avoid writing the introduction and conclusions in detail before you write the intermediate sections on materials, methods, and results. However, do not keep the introduction and conclusions blank. As you write, you need to at least put down bullets of items you will cover in some

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logical sequence for both the introduction and conclusions. Keep referring to what you did in steps 1 and 2 as you do this. You also follow the grand-style from ancient works on *six elements of writing*.

Six elements of writing are as follows—in each case, the Sanskrit word for each element is also stated for those who are familiar with that language:

- a. Consistent in the beginning and end (and in between) – *Upkramaupsamhara*
 - b. Repeatedly conveyed throughout (IBM example) - *Abhyasa*
 - c. Must be altogether unknown in prior-art (Novelty) - *Apoorvata*
 - d. Must convey the benefit of the novelty - *Phalam*
 - e. Story telling – flow that engages – not dry---*Arthavada*
 - f. Conclusions via logical approach; cogent thinking, impeccable organization and structure of results presentation -- *Uppapatti*
7. As you are developing the paper, you also create a **graphical abstract** – and example is in the style of International Journal of Pharmaceutics, even if this is not required by the journal you have in mind. You could then use this on your web-page next to each paper for easy dissemination of your work.
 8. In order to write the **introduction and conclusions** well, you must devote a sufficient chunk of uninterrupted time and keep revisiting and revising steps 1 and 2; while keeping in mind the topic of reviewers as listed in step 4.
 9. As you have made sufficient progress in the whole paper, you now **write the abstract**. This is the hardest part and again, you must spend good amount of time – making sure that abstract follows what you wrote in the steps 1, 2, 7 and in the conclusions. Write very clearly – avoid having sentences that appear like what you will write in the introduction section.
 10. **Suggesting the reviewer names and anticipating the reviewer comments:** It is not too early to start anticipating what you think the reviewers will say about your paper. This also requires following a well-planned strategy, knowing well you can never know what you will get back. The paper may have some easy to fix items that you let the reviewers pick on – avoid major holes that you cannot get out of.
 11. **Handling the reviewer response:** This is a separate topic – but it is strongly suggested you ask your advisor for a good example paper and the response from related previous work that is not your own.

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