How to Write a Scientific Abstract

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One of the most important parts of a scientific article is the abstract. Successful authors put substantial effort into crafting their abstracts, which act like advertisements for their papers.

Unfortunately, some authors fail to understand how important a good abstract is to the success of their scientific article. That was one of my problems when I first began writing technical papers. Like many novices, I treated the abstract as an afterthought. I left the abstract until the last minute and then dashed off a mediocre summary composed of sentences copied from the narrative. Only much later did I understand that the abstract is one of the most important components of a scientific paper.

Why is the abstract so important? Well, because it is often the only section of a paper that is read and usually determines whether a reader downloads and reads the rest of the paper. Or, in the case of a conference paper, the abstract will determine whether it is accepted or not for presentation to colleagues. Conference organizers and journal editors and reviewers pay close attention to the abstract because it is a good predictor of the quality of the paper or talk. A poorly written abstract says the author is inexperienced or doesn't care about quality.

Writing a decent abstract is not difficult — if you know what information needs to be included and how to structure it. If you've never written an abstract before, you may be uncertain about what exactly goes into one. Essentially, an abstract should reflect all the parts of your paper, but in shortened form. In other words, a person reading only your abstract should be able to understand why you conducted the study, how you conducted it, what you found, and why your work is important. In general, avoid the novice's cut-and-paste approach when crafting your abstract and instead write a unique, standalone summary. Although inclusion of data is acceptable, report only those numbers that represent the most important information. Some authors include citations or URLs in their abstracts, but many journals discourage or prohibit such additions. Be sure to stay within the word limit, which most journals and conferences set for abstracts.

Let's now consider how to structure your abstract. Some journals or conferences provide a template that specifies four or five sections, e.g., Background or Aim, Question, Methods, Results, and Conclusions. If so, then follow those instructions. If not, then the four-part structure provided below will serve as a basic guideline. If you follow this formula, your abstract will be well organized and will contain all the essential elements. There are four main parts in which you need to answer the following questions:

> **1. What problem did you study and why is it important? Here**, you want to provide some background to the study, the motivation behind the study, and/or the specific question or hypothesis you addressed. You may be able to set the stage with only one or two sentences, but sometimes it takes a longer description. You'll have to use your best judgment here as to how much to say in this first section.
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> **2. What methods did you use to study the problem?** Next, you want to give an overview of your methods. Was it a field study or a laboratory experiment? What experimental treatments were applied? Generally, you want to keep the methods section brief unless it is the focus of the paper.
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> **3. What were your key findings?** When describing your results, strive to focus on the main finding(s) and list no more than two or three points. Also, avoid ambiguous or imprecise wording, which is a common mistake found in conference abstracts written before the data have been completely collected or analyzed. If your data are incomplete or still being analyzed, you are not ready to present your paper.

4. What did you conclude based on these findings and what are the broader implications? The conclusions section is where you want to drive home the broader implications of your study. What is new or innovative about the findings? How do your findings affect the field of study? Are there any applications? In writing this section, however, don't state sweeping generalizations unsupported by the data or say that insights "will be discussed".

Another important consideration in preparing an abstract is Search Engine Optimization (SEO), which means including search terms people are likely to use when looking for papers on your topic. In addition to including such terms in the title and keyword field of your paper, you want to repeat those terms contextually throughout the abstract. Such repetition is used by search engines to rank an online document. By optimizing your abstract for discovery by search engines, you can raise the ranking of your paper in a search and make it easier for colleagues to find.

A final point is that some journals are now encouraging or requiring "enhanced abstracts" such as graphical abstracts or video abstracts. Although such abstracts include additional visual components, the same basic guidelines I've covered in this post still apply. All good abstracts recapitulate the paper and contain the four key parts listed above.

Writing good abstracts is not an art, but a learned skill. Developing such a skill takes practice. Here is an exercise to help you develop this skill. Pick a scientific article in your field. Read the paper with the abstract covered. Then try to write an abstract based on your reading. Compare your abstract to the author's. Repeat until you feel confident. If you've not yet published a paper, this exercise will help you hone the skills necessary to write a concise and informative abstract.

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