

A Formula for Technical Papers

*“Begin at the beginning,” the king said, very gravely,
“and go on till you come to the end: then stop.”*

— *Lewis Carroll* —

Most technical papers¹ are organized according to a formula. That formula is essentially the one we learned in junior high science class: Introduction, Theory, Experiment, Observations, and Conclusions (including Discussion or Recommendations). In addition, most papers have an Abstract and References, and some have one or more Appendixes. These sections may not be explicit in the paper, and one or more may be missing, but this is still a rough outline of much technical writing. It is usually a good outline to follow, whether you are writing a onepage paper, a letter to the editor, a thesis, or a lengthy report.

The American National Standards Institute suggests a similar organization: Introduction, Materials (when appropriate), Method, Results, and Discussion. This form is widely used and, in effect, combines Theory and Experiment into Methods; and Observations and Conclusions into Discussion. As above, the sections need not be explicit in the paper; both formats are simply suggested outlines to follow. Neither, for example, precludes beginning a paper with its main conclusions or recommendations, and ANSI points out that the material should not be forced to conform to the ANSI format. In particular, short letters, papers with lengthy appendixes, mathematical or theoretical papers in which the methods and the argument are the same, and engineering specifications or instruction manuals need not follow either recommended format in detail.

The Title is also an important part of a paper. In fact, it is the part that will be read by the most people. Do not skimp on your Title; make it say something to the reader. No one will read your paper if the Title is uninteresting or unintelligible. Make the Title brief and to the point, but let it tell the reader that an interesting paper or a meaningful result follows. A poor Title or a Title that does not convey the real importance of your paper usually sells your work short.

The Abstract is equally important. Too many authors write a significant paper and then toss off an Abstract that conveys little or no information. Today, when there are Abstract journals and computer databases, many readers will see nothing but your Abstract. Give them enough information to make them want to go to the trouble of finding your paper and reading it. Conversely, give them enough information that they can avoid looking up your paper only to find that it is irrelevant to them. In short, make your Abstract an informative summary of your paper and include your results or recommendations whenever possible.

¹This is an excerpt from “The Technical Writers Handbook”

The Introduction is the place to give the background for your paper. You may want to explain why you pursued the line of research you did, or you may want to describe the work that led to your own. Don't make the Introduction a series of references that tell who did earlier work but nothing about that earlier work. To the greatest extent possible, let your paper stand on its own feet, so that it can be read without recourse to the References. Only those who want to study the subject in greater detail should have to consult the References.

The Introduction can also include a summary of the paper. There is nothing wrong with telling what you are going to demonstrate in the body of the paper and, perhaps, how you are going to do it. Complex papers with relatively narrow interest can often be improved greatly if the Introduction is so complete that the nonspecialist can read it alone and profit from it.

ANSI recommends, further, that you make your assumptions explicit in this section and justify your method when there is an alternative. Even the specialist has not followed your line of reasoning before; that is why you are writing the paper.

Some papers contain both a Theory section and a section on Experiment or Apparatus, whereas others have only one of these sections. This is where you get down to business and, often, write solely for the specialist. Describe your experimental design or your theoretical approach in as much detail as you think necessary, but try not to leave out whole lines of thought (without saying so). Make your paper detailed enough that an expert can reproduce your experiment or your calculation without reinventing most of your development. If the description or the theory seems too tedious, consider putting some of the more detailed or mathematical material into an Appendix.

As a general rule, write a section on Discussion or Results separate from your detailed Theory or Experiment section. A reader might initially want to skip the more complicated parts of a paper and yet learn of your new results. Whenever possible, explain your results so that the reader can appreciate them without reading the entire paper in detail.

Include an explicit Conclusion section only if there is still something unsaid, or if you think that the conclusions should be grouped together and stressed. But do not feel that you must have a Conclusion, and then write a vague summary with no real point to it. Make every word count.

References are for a reader who wants greater detail or additional background. They are not a substitute for an Introduction, nor are they a list of credits, as at the end of a movie. Make your References as specific as possible. If the publisher allows it, include titles and first and last pages of papers you cite, and include page or chapter in book citations.