Editorial Note: Guidelines for Research Papers Submitted to the *Journal of the AAVSO*

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Abstract This note gives a brief description of the recommended structure of scientific papers written for the *Journal of the AAVSO*.

1. Introduction

I had a friend who wrote scientific papers that were atrociously organized. As a result, he spent much of his life grumbling about the fact that no-one seemed to have read them. "If they care enough, they will put out the effort needed to read and understand them," he said. But his experience proved him wrong.

A well-organized scientific paper is much easier to understand and remember than one that rambles and leaves the reader wondering what is going on. A research paper cannot be written with the freedom of a novel, because readers of scientific papers expect certain types of information and a familiar sequence of topics.

2. The structure of a typical research paper

By using appropriately named sections the author can speed up the process of reading and understanding. The section names suggested in 2.3 through 2.6 may be replaced with the authors' preferences.

2.1. Title

The title should be explicit and brief without being obscure. Do not write a cute title; it will only annoy your readers, and you will soon tire of it yourself.

The current editor wishes to avoid using abbreviations of star names in titles of papers. Please spell out the constellations fully. We owe it to the stars!

2.2. Abstract

The Abstract has two purposes.

1. It will tell the reader whether this paper matches his or her interests sufficiently to warrant looking further. Make it punchy and informative.

2. If the abstract of your paper is selected by the editor of *Astronomy and Astrophysics Abstracts* for publication, it will alert the scientific community about your work and may make you famous. If specific yes-or-no results are claimed in the paper, these ought to be revealed in the abstract, so the reader does not have to hunt through the library and scan the entire paper before

finding out the result. Ordinarily, it is better not to load the abstract with numerical data. First of all, they do not make interesting reading, and more importantly, your readers should not be given the numbers without being told how you got them.

An abstract should consist of complete sentences, and it will typically contain fewer than 100 words. For reasons of economy, it should contain no citations to the literature. Finally, nothing should be stated in the abstract that does not appear more fully in the body of the paper.

2.3. Introduction

The opening section sets the stage by identifying the object of study and describing previous work by the present author and by others. (It is your opportunity to be generous to other astronomers.) A brief historical summary often provides an interesting framework for describing the relevant scientific concepts and for outlining the enigmas presented by the objects under investigation.

2.4. Goals and procedure of current project

Now tell your readers what you have in mind and what you think is important. Then describe your procedure in sufficient detail that a knowledgeable skeptic could do it again, given the appropriate resources. (Of course, they won't do it, but they must feel that you are not hiding anything and that it would be possible to retrace your path.)

You do not need to embarrass yourself by describing the blind alleys you followed in the research, but a brief mention of such failures can be useful to later research.

2.5. Observations and computations

This section is the heart of the paper, where you impress your readers by describing your work and detailing the fruits of your labor. It is typical of scientific papers that the work is made to sound easy, because it is the final result that counts, and scientists don't want to give competitors the pleasure of reading about trials and tribulations. One thing that characterizes a scientific result is that it can be disproved. Hence, to be "scientific" you owe it to your readers to describe your work in such a way that they can expose your mistakes and prove you wrong.

2.6. Conclusions and goals of future work

Here is where you stick your neck out and summarize what you have accomplished and what you think ought to be done next.

Negative results, showing that a plausible hypothesis is incorrect, can be a useful result of a scientific paper. (I am thinking of the Michelson-Morley experiment on the propagation of light.) You, as author, may be disappointed, but the readers will be grateful for your candor as they climb up on your shoulders.

3. References

Literature citations are links to scientists and their work (sometimes your own). An erroneous or incomplete reference is an unwitting felony against the scientists who wrote the cited paper and against fellow scientists who want to read it. It also can be a major nuisance for librarians who are faced with the task of decoding the reference and getting a copy of the publication.

You do not need to be a slave to uniformity of style, but it is essential to use abbreviations that are clear and unambiguous. (For example, use *Astrophys.* and *Astron.* in place of the single letter *A.*) To ensure clarity of references, authors are requested to use the list of abbreviations given at the beginning of each volume of *Astronomy and Astrophysics Abstracts*. If these volumes are not available, write out the reference in full, so that it may be styled by the editors of this journal. See the inside front cover of the *Journal* for reference format.

All in-text citations must appear in the reference list, and vice-versa.

4. Illustrations

Most scientists have never studied graphic design, but it is something they do (or skirt around if they rely entirely on their computer software) whenever they present a plot of their data or a diagram of some procedure. You do not have to become an expert in graphics, but a basic understanding can make a big difference. One useful guide to good visual communication is *Preparing Scientific Illustrations* (Briscoe 1996).

4.1. Graphs

Graphs submitted to the *Journal* should be high-contrast black and white. Avoid preparing graphs using color, grayscale, or halftones: what looks great on a computer screen will usually appear blotchy, faint, or pixellated when it is converted to black and white during the production process.

Keep in mind that your graphs and images will be reduced to fit the printed page. Submit your illustrations in a large size, high-resolution format. Use symbols that are clearly distinguishable from one another. Lines, tick-marks, labels, and symbols should be large and bold enough to survive reduction.

4.2. Halftone images

Photographic images or graphics that show fine gradations of tone must be reproduced as halftone images. This is an added cost in the printing. If you use such illustrations in your paper, expect to be billed for the cost of each of your halftone images that is published.

5. Recommendations and conclusion

Find a good writing handbook or two, keep them handy, and refer to them often. One modest but comprehensive guide we like at AAVSO Headquarters is *The Technical Writer's Handbook: Writing with Style and Clarity* (Young 1989). And you can always refer to past issues of the *AAVSO Journal* for a general idea of how things are done. Don't hesitate to contact the *Journal* staff if you have questions.

If your work is worth doing, it is worth describing well. Communicating the results of your research clearly and effectively is not something that you should leave to others to do for you.

References

Briscoe, M. H. 1996, *Preparing Scientific Illustrations: A Guide to Better Posters, Presentations, and Publications*, 2nd ed., Springer, New York.

Young, M. 1989, *The Technical Writer's Handbook: Writing with Style and Clarity*, University Science Books, Mill Valley, California.