The Weissman Center for Leadership and the Liberal Arts
The Speaking, Arguing, and Writing Program
122 Porter Hall

Writing in the Sciences: General Advice for Non-Majors

What's hard about writing in the sciences? For a humanities major, just about everything. The math, the charts, the graphs: everything seems to conspire to confound the humanist. In the sciences, the questions are certainly intriguing: How did the universe begin? What are the laws of physics? How do genes work? The problem for the humanist is not the questions so much as the answers. In the sciences, answers require precise methods of measurement and hard empirical evidence - in other words, elements that the humanist doesn't usually employ in his work.

Though debates in the sciences can grow heated, scientists (unlike humanists) do agree that there is only one correct explanation for a phenomenon. This one correct explanation comprises scientific "truth." Science has as its goal the discovery of these explanations. The aim of scientific writing, then, is twofold: *first, scientific writing informs the community of new discoveries; second, it helps the community to arrive at a consensus about the truth.*

Evidence and Methods

The sciences exist to examine the phenomena of nature. Chemists, biologists and physicists all work systematically to investigate the behavior of nature, from the very big phenomena (like the creation of the universe) to the very small (like molecular studies or the examination of DNA). Scientists begin their work by forming a question, or hypothesis, about the phenomena of nature. They then devise an experiment that they hope will measure the behavior of the phenomenon in question. Scientists understand that many things might influence an event. Which do they look at? Scientists understand that even the misses are worth investigating and reporting, because they can rule out certain hypotheses, thereby taking the sciences one step closer to the truth.

Truth in the sciences is crafted out of fact. How does a scientist know whether or not she is working with facts? She tests them. Scientists establish fact by working with empirical evidence - in other words, evidence that is both observable and verifiable. Experiments must therefore be carefully crafted, conducted, and reported, so that their results can be verified by other scientists. Only after an experiment has been verified and re-verified will its results be considered true.

We'll leave it to your science professor to teach you the appropriate scientific method of his discipline. But, we will emphasize here the importance of the lab notebook to your experiments. In the lab notebook, you should list all details and observations relevant to your experiment. Most importantly, you need to include where the experiment took place, and under what conditions. You will also want to note what, precisely, you did, and in what sequence. You will want to make exact measurements of your subject and its behavior, and record these measurements carefully and clearly in your notebook. Remember: the purpose of keeping this notebook is so that you can provide other scientists with the information that they will need in order to replicate your experiment and confirm your results. Accordingly, your lab notebook should be clear, thorough, and precise.

Structuring the Paper

In your science classes, you are likely to be asked to write one of two kinds of papers: the **lab report** and the **review of the literature.**
The **lab report** is a straight forward summary of your experiment's purpose, methods, and results. The typical lab report will have:

- An introduction, which states the problem, question, hypothesis, or objective. The introduction should state why this problem is worth investigating.
- A summary of your methods, told chronologically and precisely, so that other scientists might replicate them.
- A summary of your results, in which you lay out for your readers the data that your research has generated. Again, you will want to present these results clearly, thoroughly, and precisely.
- A discussion of your results, in which you explore their significance. Even if your results haven't provided you with the information you sought, they remain important in that they might suggest other experiments to scientists interested in your subject.

A **review of the literature** looks at what has been published on a given problem; however, it is not simply a summary of what's been written. It is instead a paper that tries to synthesize existing articles to form a coherent and thorough understanding of the matter at hand. It also evaluates these articles and the experiments upon which they are based, alerting the reader to potential weaknesses.

Preferred Style of Writing

Every reader, no matter what his profession or academic discipline, prefers prose that is clear, concise, and coherent. Understand, however, that writing for a particular discipline means more than simply writing good sentences. Every discipline has a preferred writing style.

Because the purpose of most scientific writing is to present evidence that is verifiable, it's important to write with an almost mathematical precision. Forget adjectives and adverbs: scientific writing is rooted in nouns (natural phenomena) and verbs (their behavior). It is not important when writing a scientific paper to be eloquent. It is critical, however, that you be clear.

Finally, it is important to understand that scientific writing is often a collaborative effort. More than one scientist will contribute to a lab report or journal article. Accordingly, it's important to avoid any sense of individual style. The very consistent voice of scientific writing makes collaborative efforts seem seamless, permitting them to read as if they were all "of a piece."

Source:
Gocsik, Karen. Dartmouth College. July 12, 2005.
http://www.dartmouth.edu/~writing/materials/student/sciences/write.shtml