Science Writing

"I'm thinking of getting a tattoo with the definition of science straight out of Webster's Dictionary. So it will say, quote, 'I don't know, but I'm trying to find out, OK?', end quote."
-Cecil Palmer, *Welcome to Night Vale*

WHAT MAKES SCIENCE WRITING SPECIAL?

The goal of science writing, just like any other type of writing, is to communicate ideas and information to an audience as efficiently and effectively as possible. Like other types of writing, science writing follows a set of conventions and best practices. In science writing, these conventions are based on principles similar to those behind the scientific method: objectivity, precision, clarity, and efficiency.

Unlike some other disciplines, scientific writing places the primary importance on facts and subject matter, rather than rhetoric, emotion, or personal viewpoint. Readers of scientific material want to be able to easily evaluate the validity of results and conclusions, using the evidence they have before them. Another way of putting this is that science writing should place the focus on the research rather than the researcher. The information below all comes back to this point.

GETTING STARTED: THE BIG PICTURE

While science writing can seem mysteriously rigid and technical, the big picture concerns – research, citation argument, and audience – are actually much the same as with any other type of writing.

Research and Citation: Many times, scientific writing will involve reporting on your own research. Each scientific discipline has its own special rules and format for doing so (see our Lab Reports handout). Even if the bulk of the assignment is your own research, though, you will likely be asked to put this research into the context of an academic conversation. The major difference between citations in science writing and citations in the humanities is that science writing only very rarely requires direct quotations or footnotes about a source. Because the focus is on the information itself, rather than the wording or the authors' views, paraphrasing usually suffices. In text citations tend to be minimal (depending on the style you're using), and all the sources you cite should be listed at the end of your paper in a "References" section.

Audience: In any type of writing, the language and level of detail that you use are dependent on your audience. Even professionally-published scientific papers take into account the readership of the journal where they are published. You will (probably) not be publishing your research in a journal, but you should still consider your audience. The most obvious audience is your professor, but remember that (s)he already knows all the information contained in your paper; writing to him/her risks taking this knowledge for granted and failing to properly explain your thought process. A better option is to imagine an audience of your peers – other students in a similar course, but not with the exact same instructor. They will have the same background information you, but will likely not be aware of the smaller details or technical terms that you are using in your research.

Argument: Scientific writing may seem like a statement of fact rather than an argument, but if all scientists agreed with one another's "facts," research would be at a standstill. Scientific writing is trying to convince its audience of something – whether it's the validity of the researcher's experiment or the direction that further research should take. Scientists want their readers to draw the same conclusions from the evidence that they did; they therefore must present their chain of logic as clearly as possible. Unlike arguments in other disciplines, scientific arguments are built solely on evidence and logic and do not include emotions or opinions. This doesn't mean, though, that they are any less concerned with persuading their audience.

This handout is adapted from resources originally created by Frederick Coye Heard of the University Writing Center at the University of Texas at Austin, M.C. Nagan and J.M. McCormick at Truman State University, Bates College, and The Writing Center at the University of North Carolina at Chapel Hill.

PRINCIPLES OF SCIENCE WRITING

The following are some general principles and more specific guidelines to keep in mind for sentence-level revision of your scientific writing. Remember, when in doubt, refer back to the overall framework discussed in the second paragraph of this handout.

Objectivity: Objectivity in science means keeping the focus on the facts and evidence rather than on intuition or opinions. Using passive voice (see below) can help with this, but word choice is important as well. Words like "proved/disproved" or "true/false" imply unquestionable conclusions. Unless a principle or piece of evidence is widely upheld as true, use less loaded language – like "suggests," "indicates," or "supports."

Precision: Good science almost always comes down to the details. Precision gives your reader the clearest possible view of your evidence. Whenever possible, quantify your descriptions with specific measurements and percentages rather than using figurative language (swamped, icy) or comparative terms (more, colder). Specificity is always preferable to ambiguity; use technical terms when necessary, and don't fear sounding repetitive. (If your audience does not share your background, you may need to explain technical terms the first time you use them).

Clarity: Clarity is particularly important in scientific writing, because the material is so complex. Long strings of prepositional phrases <u>like the ones</u> <u>that I am including</u> <u>in this sample sentence</u> are tempting <u>when describing many details</u>, but they cause sentences to wander. Break up sentences when necessary. Remember, too, that you *must* explain the logic of your argument to your reader; you cannot take for granted that they will follow the same thought process or draw the same conclusions as you. If you find yourself really struggling to clearly communicate the concepts in your paper, it's likely that you need to go back and gain a better understanding of the material.

Efficiency: Science writing requires detailed explanations, but the reader should be easily able to follow your process and argument without being distracted by irrelevant facts. (Deciding which facts are "irrelevant" requires you to think critically about your audience's perspective.) Watch out for overly convoluted language that can obscure meaning: "use" and "utilize," for example, mean basically the same thing, but "use" is the more common word and therefore the more appropriate choice. "Titration," however, describes a process that would otherwise require a multi-sentence explanation; if your audience has a background in chemistry it is therefore an appropriate technical term. For more on efficiency, see the "Reducing Wordiness" handout.

THE NITTY GRITTY DETAILS

Tense: Science writing makes very specific use of verb tense. Ongoing natural processes which are (presumably) still occurring are referred to in present tense ("the boiling point of unobtainium is 100° Celsius"). Research, experiments, and data are all referred to using past tense (they are over and done with). One wrinkle in this comes when discussing ongoing scientific research. Here, past tense is used for older research that is generally accepted as truth ("Dr. Brown indicated that time travel was possible") whereas the present perfect is used to refer to newer research, which is still being disputed ("Dr. Brown has indicated that time travel is possible").

Passive Voice: Science disciplines and journals are somewhat divided on the use of the passive voice, so check with your instructor to see what is accepted in your discipline. When used properly, the passive voice places the emphasis of the sentence on the most relevant information. For example, in the sentence "I sewed body parts together to create the monster," the emphasis is on the scientist ("I"). The passive version – "Body parts were sewn together to create the monster" – places emphasis on the process and methodology, information which is more scientifically relevant. (For a more thorough discussion of passive voice, see the "Passive Voice" handout).

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