nature structural & molecular biology

Scientific writing 101

Less is more when it comes to writing a good scientific paper. Tell a story in clear, simple language and keep in mind the importance of the 'big picture'.

Ah, the pleasures of reading. Whether it's a piece of fiction, a poem or a scientific paper, you know when you've read a really good one. We have all also struggled through really poorly written pieces with no end in sight. Though most of us have the luxury of abandoning pieces of writing that are not up to snuff, editors and reviewers don't and must slog through papers that seem to go on forever and, more dishearteningly, have the main points and interesting bits inexplicably hidden.

So, in an effort to kill two birds with one stone, we would like to give our authors a few simple pointers on how to write better papers and in so doing (perhaps) make everyone's lives just a little bit easier. Before we begin, our apologies to those for whom this is obvious—our aim is not to be insulting or condescending. Instead, think of these as tips and gentle reminders of what you learned long ago but may have forgotten along the way.

Tell a story. We all love listening to a good story. And we all tell stories, but some are better at it than others, and those who tell the best stories are most able to get their points across. How you got your data is not that important—we don't need a chronology (first we did this, then we did that, etc.). Instead, now that you have the data and have interpreted them a certain way, think about how best to tell a story in light of all the previous work in the field, the question(s) you are addressing and why that question is important. How do your results advance our understanding of the question(s)? Have you discovered something new or unexpected? Consider how your findings fit into the broader context of the field, whether they are likely to change the way people in the field will think about the topic and how they will drive further experiments in the future.

Be clear. Making your story clear is not the same thing as dumbing it down. No reviewer has ever said that a paper was too easy to read. We do, however, get complaints from reviewers about how complicated, convoluted or downright confusing a paper is. Clear, simple language allows the data and their interpretation to come through. Remember that clarity is especially important when you are trying to get complicated ideas across. Keep the jargon to a minimum and explain the terms you do use. When you're done, give your paper to a scientist outside your field and ask that person to read it for clarity. He or she will be able to point out all the remaining jargon, whether the experimental design, results and data interpretation are clear and how interesting your paper is to someone working in another area.

Provide an informative title and abstract. PubMed allows one to search through ~19 million citations, and Table of Contents e-alerts bring you the latest from your favorite journals. And what do you see when your e-alert arrives or your search is complete?—the title and abstract. Most people will stop there without reading any further, so don't blow it with a boring title. Make the abstract clear and try to get

the 'big picture' across. Do not get bogged down in details. As an author, this is also your chance to draw your readers in, to entice them to read on. If the title and abstract are comprehensible to only a handful of people directly in your field, you have greatly narrowed the potential readership of your paper.

Titles like "Studies of X and Y…" or "Characterization of A and B" make my eyes glaze over. They tell you nothing and don't offer much hope for the rest of the paper. The title should highlight the main point of the paper. The abstract should frame the question(s) to be addressed and why they are important, how you have solved the problems and how the results can be placed in the wider context of the field. The experimental details should be left for the body of the paper (unless you are describing a new technique). End your abstract with the broader implications of the work.

Make the introduction short and concise. Remember, you are not writing an Annual Review of XYZ. You need to tell the reader only what he or she needs to know to understand this piece of work (we know that you know much more than you are telling us here). Provide just enough background so that the reader can understand how the question(s) you are asking fills a gap in the knowledge of the field. You should cite all the relevant references—remember, we use PubMed too—and finish the introduction with a short paragraph stating what the paper shows.

Clearly distinguish Results from Discussion. The Results should describe the results, and the Discussion should put those results in a broader context. Thus, the Discussion should not be a repeat of the Results. Instead, it should be an interpretation of those results and how they fit (or don't fit) with previous work as well as a description of how your work provides a conceptual advance beyond those studies. The Discussion should end with unanswered questions. A model (in the form of a schematic diagram) is often useful to tie together your work with previous data (I often find myself trying to draw one; I'm sure the authors could do a better job).

I'd like to discuss the importance of the cover letter, but I am out of space, so I have to end with a few personal gripes. Run a spell check before submitting your paper. Numerous spelling mistakes give us (and the reviewers) the impression that the paper was either hastily or sloppily prepared, or both—not a good start. Also, number your pages and figures (but please don't number the lines; it's very distracting). Once the paper is printed out and we begin to read it, a lack of page numbers makes our task and that of the reviewers more difficult than it needs to be. Use fonts and line spacing that are easy on the eyes. These are simple things that take only a few extra minutes when preparing your manuscript, but they can make a big difference to the experience of reading it. Remember: the idea is to make the editor's (and reviewers') life easier, not harder. ∎