

## Good data need good writing

What place has style in scientific writing? It all depends, one might argue, on where the scientific writing is found. Yet we have all read badly written published papers that are invariably less successful in communicating their ideas.

Style is the art of clarity, concision and uniformity of presentation of word or idea, in written form or in picture. The aim of 'good' style is ease of interpretation—to reduce to a minimum the mechanics of the transfer of ideas. As a service to the readers of *Nature Immunology*, the editors want to take this opportunity to discuss our stylistic requirements. This exercise will emphasize several examples of problems we often encounter in manuscripts that contribute to lack of precision and clarity. Some of these common problems are obvious; some are less so. All, however, cause papers to be less persuasive and impede successful communication of otherwise good data.

The stylistic requirements of *Nature Immunology* are not arbitrary. Their aim, in fact, is the opposite: to reduce arbitrariness. Modeled after stylistic requirements of many other publishing houses, these requirements are based on the codified and venerable codes of style found in such classic primers as *The Chicago Manual of Style* (now in its 15th edition). And because scientific manuscripts mainly present quantitative information, we also adopt the universally acknowledged standards of such studies as *The Visual Display of Quantitative Information* (by E.R. Tufté). There can be no argument that such guides in style and clarity actually reduce arbitrariness in publishing, bringing instead cohesiveness, clarity and uniformity to what would otherwise be chaos. We strongly urge authors to refer to such information and to our own guidelines (<http://www.nature.com/ni/authors/submit/index.html>) while preparing manuscripts.

In addition to those codified standards of style, other more idiosyncratic details should be considered when writing scientific manuscripts. The presentation of new data in any scientific manuscript, for example, should be discussed in past tense rather than present tense. This helps distinguish previously published work from the new data to be evaluated by the reader. We use active voice in the Results section for reporting the procedure of the experiments; passive voice can be used judiciously to report the experimental results themselves. The use of passive voice can be preferable in those cases because it emphasizes the important 'actor' of the manuscript, namely biology. In any event, the tense of all reported data should be past, whether "we injected the mice with antigen" or "there was an increase in proinflammatory cytokines."

In addition to tense, another common mistake found in science manuscripts is the use of 'helper words' to evoke an emotional tone or to shade the meaning of an upcoming sentence. For example, 'remarkably', 'interestingly', 'surprisingly' and similar adverbs are very often used with the aim of providing emphasis, but their actual function is to persuade—something that has no place in scientific manuscripts—rather than to convey information. If the data are indeed remarkable, readers will not need prompting to believe so.

Other problematic usages include 'level' (a term of position in space, not quantity) for 'abundance', 'concentration', 'frequency' or 'amount', and 'significant' (which should be reserved for statistical significance only, with statistical values stated) for 'substantial' or 'considerable'. A related issue concerns overstating the importance of data again with the aim of persuading, as in claims of primacy such as "we are the first to demonstrate" or "this highly novel result." Again, if in fact the data are truly novel, readers will not require prompting to think so.

Some authors are prone to discursively reiterating results in the Discussion section. This mistake is often made to emphasize certain points. However, instead of being a simple repetition of the results, a useful discussion puts the results into an appropriate context so that their importance and relevance can be evaluated. This usually requires a synthetic analysis of new and known data.

The 'category mistake' most often appears as the unintended description of biological processes as having human qualities. Such cases of 'anthropomorphism' occur with alarming frequency in discussions of lineage development of cell types; for example, cells are described as 'deciding' to become one type or other. In science, this is an egregious error because cells do not 'decide' anything; only people make decisions. Cells merely respond to stimuli. There are very important implications, in fact, to using anthropomorphic language to describe cell lineage fate, including erroneously attributing rationality to processes that are inherently stochastic gradients or thresholds and that therefore occur probabilistically, not rationally.

Some manuscripts are submitted filled with jargon and, for want of a better word, 'lab notebook' descriptions. This stems from a failure to consider readers in the broader immunology community. Sometimes this type of problem manifests itself as the use of abbreviations that are wrongly supposed to be universally known. Other problems include the use of nonstandard nomenclature when describing a gene and the confusion of the nomenclature for proteins with that for genes and vice versa. The issue of correct nomenclature also applies to the names of mouse and rat strains, which have unique, official designations that can be found at the Jackson Laboratory website (<http://www.informatics.jax.org>).

Finally, and perhaps most importantly, display of quantitative information in figures should be as uncluttered as possible. Constructing 'clutter-free' graphs and charts is not always second nature, as some times it seems authors are guided by a sense of 'more is more' when in fact 'less is more' would be better. Thus, it is better to avoid unnecessary lines, letter, styles, colors, details, shadings, patterns and so on.

This short primer on style is certainly not exhaustive of the types of problems that detract from otherwise good data. By paying such attention to style and clarity, we aim to publish not only the best papers in immunology but also those that effectively communicate complex ideas to a broad audience. Attention to both content and style make science more accessible.

