From Inspiration to Publication

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There's room for more: Opportunities in science editing

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Abstract

Editors tend to shy away from working in the sciences if they don't have a science degree. But this presentation takes the view that a science degree is not essential for editors who work with authors on their scientific papers, books and reports—as the presenter has been doing for some 26 years.

A science editor need not query a scientist's science (which has usually been thoroughly scrutinised by other scientists anyway), but can rehash their sentences in the name of greater clarity, cut their waffle and trim the verbiage—just like any editor working outside the sciences.

This talks focuses on the opportunities out there, discusses some of the characteristics of these generally bright—and always ambitious—clients, and suggests that the skills in science editing can readily be extended to offering writing workshops for scientists.

Once upon a time, in the 1600s, when experimental science gained ascendancy over philosophical science, 'men of science' reported their work to intelligent, interested listeners and readers who shared a similar background and education. In 1840, a new profession was recognised when the word 'scientist' was coined. Today, scientists define themselves more narrowly: they are geophysicists, geneticists, molecular biologists, ecologists, and so on. Their audiences and readers are now largely their peers in the same specialisations. To cater for general audiences, the job of science communicator was created (the assumption being that scientists themselves were no longer capable of writing for general audiences).

The three pieces I'm going to read you will, I hope, illustrate this evolution—and illustrate some changes in the language scientists use.

The first piece was written in 1664 by Robert Boyle, the ' father of chemistry'. It describes one of his experiments.

> 'We took a Leaf of Such Foliated Gold as Apothecaries are wont to Gild their Pills with; and with the Edge of a Knife, (lightly moysten'd by drawing it over the Surface of the Tongue), and afterwards laid upon the edge of the Gold Leaf; we so fasten'd it to the Knife, that being held against the light, it continu'd extended like a little Flagg.
>
> This Leaf being held very near the Eye, and obverted to the Light, appear'd so full of Pores, that it seem'd to have such a kind of Transparency as that of a Sive, or a piece of Cyprus, or a Love-

> Hood; but the Light that pass'd by these Pores was in its Passages so Temper'd with Shadow, and Modify'd, that the Eye discern'd no more a Golden Colour, but a Greenish Blew.'

Robert Boyle , Experiments and Considerations Touching Colours (1664), Experiment 9.

Nearly 200 years later, in 1859, Charles Darwin wrote in *Origin of Species*:

> 'Owing to this struggle for life, any variation, however slight and from whatever cause proceeding, if it be in any degree profitable to an individual of any species, in its infinitely complex relations to other organic beings and to external nature, will tend to the preservation of that individual, and will generally be inherited by its offspring. The offspring, also, will thus have a better chance of surviving, for, of the many individuals of any species which are periodically born, but a small number can survive. I have called this principle, by which each slight variation, if useful, is preserved, by the term of Natural Selection, in order to mark its relation to man's power of selection.'

Charles Darwin (1859) On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life, chap 2

My third example is a sentence from a paper written a few years ago:

> 'The optimum fungicide must be in combination with elevated fungotoxicity in addition to minimised concentrations of mammalian toxicity and phytotoxicity, and with an absence of tainting or other deleterious consequences when the fruit undergoes processing procedures.'

What happened to science writing in those 350 years?

Firstly, and most obviously, new words have been coined to create a specifically scientific vocabulary. An author's editor without a science background increasingly needs access to the most up-to-date science dictionaries (which are easily found on the web).

Secondly, the general vocabulary in the last piece has been infected with bureaucratese (such as 'in combination with' instead of 'combine', 'with an absence of' instead of 'no') and the use of 'posh' words in preference to 'plain', as in 'deleterious' instead of 'harmful', 'elevated' instead of 'high' or 'raised'. An author's editor does not need science training to reduce that sentence to something like this:

> The ideal fungicide must kill fungus effectively, but must be harmless to animals and plants, and must cause no tainting or other harmful side-effect when the fruit is processed.

A third marked change from the writing of earlier scientists is illustrated in another sentence:

> 'Widespread concern to prevent or abate eutrophication prompted many studies on the role of phosphorus, and that chlorophyll *a* concentrations in the euphotic zone are frequently determined by phosphorous concentrations has been amply demonstrated.'

It's lumpy and badly structured. It doesn't take much skill to change the structure:

> Widespread concern to prevent or abate eutrophication prompted many studies on the role of phosphorus, showing it frequently determines the chlorophyll a concentrations in the euphotic zone.

Again, an author's editor does not need a science degree to make that change.

In case you're not already persuaded to think about joining the tiny band of author's editors of science writing, let me make some further observations.

As well as being infected by bureaucratic speak, scientists are also influenced by the poorly written papers they must read. They, too, can turn vivid verbs into nouns and then supply such lacklustre verbs as 'make' and 'occur' in their place. They can devise acronyms along with the best of them. Their sentences, full of qualifications and often bare of helpful punctuation, can be yawningly long. They may leave out steps in a process or argument because they are too close to it. Their fear of using the words 'I' or 'we', inculcated by the older generation of scientists and journal editors, has resulted in a mind-numbing succession of sentences in the passive voice. Their preference for big, fat words over shorter and more concrete ones ('approximately', rather than 'about'; 'commence' instead of 'begin' or 'start') is probably attributable to their university lecturers. Their belief that you must not start a sentence with 'and', 'but', 'because', 'however' and 'if ' presumably comes from their primary school teachers, who also discouraged them from using the same words twice (Fowler's 'elegant variation') to avoid boring the reader.

Instead they confuse the reader by flitting lightly from 'method' to 'methodology', to 'technique', to 'approach' (often in the same paragraph). However, their avoidance of the words 'dead' or 'kill', preferring 'mortality', 'sacrificed', 'euthanased' or simply skipping from capture to dissection, probably comes from scientists being naturally sensitive and delicate souls.

But is there any point in an author's editor trying to make a scientist's paper more readable? Does it matter? Isn't the science the point, however frustrating it may be for the reader to extricate that science from the morass of verbiage and clichés?

I wish I could give you some statistics to convince you that there is, indeed, a point, but I can only give you what scientists call 'anecdotal information'. In other words, largely my own observations, drawn from 25 years of editing in the sciences, but supported by the well-known observation that clear writing and clear thinking are inextricably connected.

Firstly—and this is not anecdotal—although Reading Ease scores are a clumsy measure, it is notable that the classics of modern science, such as Watson and Crick's 'Molecular structure of nucleic acids', have exceptionally high Reading Ease scores.

Secondly, I know from my records that, provided the science is good, well-written papers get through the refereeing and publishing process more rapidly than those that are less clear, less easy to read and less well organised. I suspect this is so because the more turgid or ungrammatical the prose, the angrier reviewers become and the more likely they are to fling the paper back with some caustic comments. I'm afraid much good science from authors who are not writing in their first language is also rejected for this reason. Neither referees nor journal editors are generally willing (or sometimes able) to give detailed help to these writers.

Does it matter if papers don't get published? It certainly matters to the author, whose career will be influenced by his publication record. It matters to the science if potentially useful work is lost. It matters to the organisation that employs the scientist, as its reputation depends on the reputation of its scientists.

In Sir Peter Medawar's delightful book, *Advice to Young Scientists*, the Nobel Prize winner wrote:

> 'Scientific research is not complete until its results have been published.'

To this I should add that nowadays many research institutions in Australia demand that the publication must be in a journal with a high impact factor. Certainly no scientist would like his work to be undiscovered for forty years because it was published in an obscure journal, as happened to Gregor Mendel, but impact factors are overrated as indications of journal quality. Nonetheless, a high impact factor means that the competition to publish in it is fierce.

There's another pressure on scientists today: they must also write grant proposals and reports to funding bodies. With senior staff spending more and more time on administrative matters, the task of writing often falls to the younger, least experienced scientists. And these are the ones who need an author's editor's help. (The older ones may be past saving.)

As well as giving scientists one-on-one help, you might want to develop writing workshops.

I had the good fortune to work in the University of Texas at Austin at a time when the English department was deeply involved in finding effective ways of helping undergraduates to write at university level. After I was awarded an unusually high teaching evaluation, I was encouraged to design my own courses. I later combined these with teaching students (and staff) how to make full use of libraries and the extensive interlibrary loan facilities.

In Hobart, I saw that many scientists, particularly the younger ones, were struggling to write papers and reports. They were spending a lot of time on their papers, and so were the senior staff who reviewed these internally, and I was swamped with editing. So I developed short workshops for the people in my division of CSIRO, who were happy to tell me which parts worked and which didn't. Word got around about these constantly evolving workshops, and I've now given them to various CSIRO divisions, State and Federal government departments, universities and CRCs, scientific societies and medical schools in Australia, South Africa, New Zealand and Germany. I've never had to advertise, but I fear that's because there's little competition. And there will soon be even less, because it's about time I joined the happy band of retirees.

I believe there's plenty of work for author's editors in the sciences. If you don't have a science degree you may be frightened off by the science itself or by the technical vocabulary. But I contend you don't need much knowledge of either: you need a solid understanding of English (backed up by relevant books), an awareness of language changes, and knowledge of the scientific conventions (which you can acquire through reading science-writing guides and the journals of the sciences in which you are editing). You also need up-to-date general dictionaries, usage guides and web access to scientific dictionaries.

I also recommend you join one of the international science editors organisations. Learn from the people you work for—scientists are usually very good at explaining their work, verbally, if not in writing. You'll never be bored, because you'll always be learning—and you'll have some of the brightest, wittiest and kindest colleagues any editor could ask for.