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GUEST EDITORIAL

Communicating science to the general public: role of scientists and science writers

Today, we see an increasing division of labour between scientists who are content with producing knowledge and science writers who are content with communicating this knowledge to a broad audience. We tend to justify this separation as inevitable because science has become so complicated that scientists have neither the time nor the skill required to communicate science to the general public and science writers have neither the opportunity nor the skill required to produce knowledge. While this may be true to some extent, I worry that scientists are using the supposed complexity of science as an excuse to shirk responsibility and unnecessarily exaggerate the division of labour.

Ideally, there should be no division of labour between scientists and science writers. Scientists should not leave communication of science to the public entirely to science writers any more than the latter can leave knowledge production entirely to scientists. The joy of communication should be an important driver of knowledge production, and the joy of knowledge production should be an important driver of science writing. To experience the full glory of their craft, scientists should become effective communicators. How do we bring about this change? First, scientists should have the desire to write well. We should make writing in style a matter of prestige. Surprising as it may seem, this is not usually the case.

In introducing *The Two Cultures* by C. P. Snow, Stefan Collini, a professor of Intellectual History and English Literature at Cambridge University, UK, has described our predicament well:

‘In many forms of experimental science, writing plays no really creative role: it is not itself a process of discovery, as it is in the humanities, but an after-the-event report – “writing up”, as the idiom revealingly has it. Accuracy, clarity, economy are certainly required in the presentation of results, but arranging one’s findings in intelligible form is regarded by many research scientists as something of a chore ... Elegance of style tends not to be cultivated or prized as a professional ideal, though individual scientists may cherish it.’

I agree. But we must reform the world of science so that Collini’s description is no longer accurate.

How can we do this? I have some pet ideas. We must read voraciously and indiscriminately. Unless we read the good, the bad and the ugly, we will not become discerning readers and good writers. We should also help ourselves to a generous dose of fiction. Besides exposing us to style better than non-fiction can ever do, fiction will help us develop our ability to imagine. Imagination is crucial in science, essential for proposing hypotheses, conducting thought experiments, and anticipating the implications of our theories. Imagination is also a critical ingredient of the skill set required to enter the mental world of uninitiated readers and help them understand complex scientific concepts.

To learn to write well, we must unabashedly consult guidebooks. However, our goal should not merely be to follow their advice. Instead, we must read, understand and experiment at flouting the advice given, and see the consequences, much like doing a controlled experiment. There are innumerable guidebooks for writing, but if the goal is indeed to read, understand and try to flout, then any will do. I would however recommend starting with *The Elements of Style* by Strunk and White or Stephen King’s *On Writing: A Memoir of the Craft*. Both are well suited to ‘read and flout’. But we need the confidence of a Stephen Fry who says that he tried to follow King’s advice but, ‘it’s no good... this is the writer [I am] and if people think it’s overwritten... over florid, then so be it, they will have to put the book down and turn to someone [else]’.

Another of my favourite ‘advice’ books is Steven Pinker’s *The Sense of Style: The Thinking Person’s Guide to Writing in the 21st Century* (2014). Being a psychologist, a linguist and a superb writer, Pinker is well placed not only to give advice on writing, but to show us the logic behind the advice, paving the way to flout advice with justification. Scientists must imbibe Pinker’s philosophy about writing: ‘Style not least, adds beauty to the world ... To a literate reader, a crisp sentence, an arresting metaphor, a witty aside, an elegant turn of phrase are among life’s greatest pleasures.’

I especially loved *How to Write a Thesis* (1997/2012) by Umberto Eco, the Italian polymath, best known for his philosophical novel *The Name of the Rose* (1994). On the face of it, Eco's advice is for students in the humanities living in the age of index cards, notepads and inter-library loans of printed books. But I think natural scientists in the age of the internet, Web of Science and Google Scholar should also read it. In the guise of advice on 'how to write a thesis', Eco gives us much advice on how to 'do research'.

There is no trade-off between form and content. Richard Dawkins makes this point well in his recent *Books do Furnish a Life*. A highly readable collection of Dawkins' previous writings, this book includes a surprisingly large number of introductions, forewords, epilogues and reviews written for other people's books. I love this genre, because it is free from the strict rules which are often imposed on more technical scientific writing – rules that frequently and unnecessarily diminish the quality of the prose. The essay format, so rarely encountered in scientists' writing, is a great tool to improve writing.

Unfortunately, we disparage this genre on the mistaken ground that it does not represent new knowledge. While serving on many selection and evaluation committees, I have been dismayed when all items in this genre are expunged from the list of publications of those being assessed. And, we have got rid of the essay format in student assignments in favour of multiple-choice questions. As a result, today's students will never know the joy of crafting an essay by finding out everything they can about a topic.

Scientists need role models for writing. Despite my lament that scientists write badly or don't write enough, there are many exemplary role models. Dawkins' *The Oxford Book of Modern Science Writing* (2008) has an inspiring collection of 394 examples from Martin Rees, Francis Crick, Fred Hoyle, Jared Diamond, Rachel Carson, Edward O. Wilson, Freeman Dyson, J. B. S. Haldane, Jacob Bronowski, Oliver Sachs, Lewis Wolpert, Carl Sagan, John Tyler Bonner, Sydney Brenner, John Maynard Smith, D'Arcy Thompson, Niko Tinbergen, Arthur Eddington, Peter Medawar and 60 more brilliant scientists.

One of my role models is Jean Henri Fabre (1823–1915), a French entomologist, naturalist and writer par excellence. Fabre has been called a belletrist (a person who writes essays, particularly on literary and artistic criticism, that are composed and read primarily for their aesthetic effect), 'the poet of science' and the 'Homer of entomology'. As I read Fabre's *The Book of Insects*, Pinker's words 'a crisp sentence, an arresting metaphor, a witty aside, an elegant turn of phrase are among life's greatest pleasures' ring in my ears, loud and clear, and make me want to write.

The culture of science must change and make it possible for scientists not only to contribute to high-quality research in whatever measure, but also to devote time and derive pleasure from better communication. Writing for a wide non-technical audience must begin long before writing technical papers, continue unabated alongside writing technical papers and persist long after we stop writing technical papers. We will find that even in the natural sciences, 'the most creative thinking [can] be done in the very process of writing'. That certainly is my experience.

What then is the role of professional science writers? We need not entertain the fear that if scientists write well and write for the general public, they will drive professional science writers out of business. The role of science writers is vitally important, but I would like to see them also as knowledge producers. Science writers should do more than just reporting, more than translating the gibberish of scientists into English or whatever language they may choose to write in.

If scientists do a good job of communicating their science to the public, science writers can concentrate their efforts on creating new knowledge as they are in a much better position to make lateral comparisons, understand the process of science and detect possible biases and conflicts of interest, something that scientists, being insiders, cannot do very well. So rather than just expect them to clean up our messy prose, we should elevate science writers to the role of knowledge refiners.

Science writers should also lace their writing with flavours of the history, philosophy, sociology and politics of science. The culture of science must change to give prestige to science writers and accept them as knowledge refiners and count them as scientists. Both scientists and science writers should effectively communicate knowledge. Such a cultural change will make the pursuit of science a more inclusive and democratic process, and expand the boundaries of what counts as science. Part of the cultural change needed is to stop packaging science as a sophisticated, expensive activity that only a highly trained, privileged few can undertake. (Readers' attention is drawn for a more detailed essay on this topic by the present author in *The Wire Science*; <https://science.thewire.in/the-sciences/scientists-science-writing-writers-knowledge-producers-imagination/>.)

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