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Comment

Boom and bust in popular science

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The obvious thing to say about popular science publishing in the last twenty years is that there has been a lot of it! That is important in itself. But it also means it is hazardous to offer general comment. The British journalist and commentator Bryan Appleyard recently wrote in the Sunday Times that the "hard stuff" in science was no longer attracting so many readers. Books answering many small questions about the world, or evoking a sense of wonder, do better - he reckons - than those which offer large certainties based on a scientific, or scientistic view of the world. That type, Appleyard claims, dominated the field for years after Steven Hawking's *A Brief History of Time*, with its promise of a theory of everything.

The trouble with this is not that it is not true that there were authors who were important to the popular science boom who were offering answers to big questions about the meaning of life. But in Hawking's wake, as now, there was always much more going on. A journalist can paint a picture of a trend by singling out a few titles, but that leaves scores of others out of the reckoning, not to mention the fact that many of the books asserting science's right to answer those big questions remain strong sellers. Richard Dawkins' first book, *The Selfish Gene* still outsells all his later works except his very latest (non-scientific) title *The God Delusion*.

Still, lets throw caution aside for a spell, and try and sketch some trends in the rather ill-defined genre the English give the possibly oxymoronic label popular science. I cannot comment on the Italian market, but the Anglo-American boom in popular science publishing has certainly faded. There are still plenty of new titles, but few big sellers. This is inevitable, I think. These books do last, and we now have a mature market.

The subjects which have been treated most often – the trio of cosmology, consciousness and chaos theory, along with genetics and evolution - are now available to readers in many versions, from elementary to near-textbook level. In the case of Roger Penrose's doorstopper The Road to Reality, the popular book is, in effect, a textbook, although I bet few without a degree in physics have actually worked through it! More generally, new titles need a new angle. A new cosmology title, for example, is not going to set a publishing editor's heart racing unless it is spectacularly good. There is new science, of course, but revolutions in understanding are rare, despite what authors are tempted to claim.

There are still spectacular successes, like Bill Bryson's A Brief History of Nearly Everything, which sold in numbers so vast it was a stark reminder that the great majority of "popular" science books remain a minority interest. But the generally quieter times for popular science do make it easier to pause and ask what these books might be for, and whether they are any good.

I would like to work out, for example, why books are still an important way of conveying aspects of science, in an era when the media landscape has been transformed by broadcasting and electronic communication? I want a good way to explain why I think some are better than others. And I am interested in the effects this literature has in the wider culture, aside from pleasing readers who want to know about science.

I cannot answer any of those questions fully, but let me say a few things about each one.

First, why do books retain their prominence as a way of packaging science for lay consumption? Part of the answer lies in the traditional virtues of the book. Books are cheap to produce. In the UK, a trade publisher expects to print enough copies of a paperback to bring the unit cost down to around one Euro or less. That depends on cheap printing without much illustration, and there may be considerable investment behind it for a big-name author. But, title by title, it is not particularly expensive to play this game.

Books are also easy to distribute, and remain user-friendly compared with reading on screen. Printed and bound texts are still excellent for the kind of reading where a text needs to signal its own organisation and are very adaptable to many different readers and kinds of reading.

Books also suit science, in a way. Scientific explanations are very often highly embedded – one thing depends on understanding several others and there is often a whole web of concepts and entities which have to be introduced to tie the explanation together. And books lend themselves to extended - often *very* extended - many-layered, explanations.

It is hard to build a presentation of contemporary theoretical physics, for example, without going through something like the following steps. Once, there was a Newtonian universe, first successfully described in the scientific revolution. Then came two new theories, radically different in some ways from the old physics. One dealt with the macro-world, ruled by Einsteinian relativity's notions about space-time; one with the micro-world, governed by the even more counter-intuitive rules of quantum mechanics. Now, physicists are striving for a theory which will unify these two realms, and account for all the particles and forces which exist, and the properties of space and time, within a single overarching framework. And books on the candidate theories – whether superstring theory, loop quantum gravity, or something else, do tend to be quite long because most of them rehearse this history as well as dealing with the latest thinking. This realm of science is particularly entertaining at present because some of the physicists arguments - shorn of the maths - are being fought out in popular books. Proponents of superstring theory such as Brian Greene are under attack by those who favour other approaches like Lee Smolin partly because they have been so good at promoting their ideas to the wider public. Smolin's recent *The Trouble with Physics* is an attack on PR as much as on superstring theory.

Superstrings and the like also highlight one or two other advantages of unadorned words. They are good for discussing the unvisualisable, and for laying out thought experiments. And they lend themselves to operating on several different levels at once. Finally, they are a useful medium for trying out explanations and analogies. For example, one process we can see unfolding now is the gradual development of a set of ways of describing string theory in ways which non-physicists can begin to grasp. Watching this process suggests that it is, in some senses, evolutionary, and succeeds better when many authors contribute, and adopt and modify each others' analogies. Over time, some become conventionalized as the generally accepted 'best' ways of depicting certain features of a theory, just as you hardly ever read a sketch of relativity theory which does not liken the gravitational field to the distortion of a rubber sheet pulled down by a heavy weight. In the current disputes about quantum gravity, one of the disadvantages the competing theories face is that they seem much harder to put into words than superstring theory.

If these are some of the general advantages of the book, what criteria should we apply more particularly, to identify which are successful? For science books, as for any book, some of the answers will come from looking at these books in general literary terms. We can analyse the stories they tell, the quality of the writing, the brilliance of the metaphors. We can ask for elegance, wit, and unities of tone and style in science writing as in any other kind of writing.

But this is an unusual literature. Science is supposed to reveal truths about the physical universe and science books, while they may tell stories, are conveying those truths. This is a literature of reality, of *how things are*.

That means we should examine how a book treats the nature of science. Every narrative which relates something of what science has found, and how it was found, takes a view on the status of scientific knowledge. You do not have to delve very deep into the mass of popular science books to find that ideas about the nature of science vary a good deal. There are realists and positivists (as Stephen Hawking describes his own view) as well as, less commonly, authors who view scientific knowledge as a more contingent, culturally fragile construction.

But I also think that the most common take on the nature of science has been shaped by the promotional inclinations of publishers. Many books suggest that science can offer the best answers to everyone's questions about life, the universe, and everything. And Appleyard is basically right in his suggesting that this was also the most common pitch which publishers were making at the height of the boom. If you wanted to know why people do the things they do, understand the mind of God, or even fathom "the meaning of it all", scientists were supposed to be able to tell you. The publisher of Stephen Pinker's *The Blank Slate*, which followed previous successful titles by the same author, put out a poster declaring excitedly that "the man with the answers is back", without even saying what the question was.

But this oracular science was always going to disappoint. Science is about scepticism, tentative theories, and the fascination of unanswered questions, not about the meaning of life. If some of the

excitement around popular science has faded, perhaps it is because the public has caught on to the fact that readers were promised things that science really cannot deliver.

If so, then the things which it really can deliver may become more important. And one of the most important is clear explanations of complex ideas. This explaining is one of the core attributes of popular science texts and one of the things which distinguishes them from other non-fiction.

Explanation is also, I believe, where this literature of reality is most often genuinely creative. And it seems likely it is the source of the satisfaction which sends some readers back to these books, and to particular authors. It is not the satisfaction of finding answers to questions about the meaning of life, but of feeling that our human minds can understand the working of a small part of the universe.

Which brings me to the last of my three questions. Is that satisfaction – of understanding something new – the main thing these books deliver? If not, what other effects can they have in the culture?

We know rather little about this. Research studies tend to focus on news media, although there are interesting treatments of the effect of books on publicising particular fields, such as chaos theory. But here are a few tentative observations. The simplest is that, especially in view of the wealth of titles now available, one should consider the ensemble of books.

An individual title rarely reaches a mass audience. But I think that, aside from spectacular individual successes, the outpouring of popular science writing has cumulative effects above and beyond each single title. And there are various ways in which the existence of large numbers of books – and authors – enhances their impact.

One is that, in an Anglo-American publishing world where new titles can fall out of print with alarming speed, science books seem to have remarkably long shelf-lives. Modern classics like *The Selfish Gene* (1976), *The First Three Minutes* (1978) or *Cosmos* (1980) are all still available, along with many others. This is good business but means that a publisher – and authors – are very aware of competing with the backlist, and are constantly driven to find new topics, and new angles. The selection of topics is still in some ways a narrow cut across the whole of science and technology, but the large number of pop-science titles in any major bookstore does help create a sense that much of science is accessible.

It also means that authors can easily see themselves as relating to a developing genre, with particular styles and techniques. Like any writers, they may define themselves as for or against these characteristics of what is already out there. But it seems to me that there is more of a common interest among science writers than those in many other genres. They cheerfully borrow analogies, metaphors, bits of explanation, even turns of phrase from one another. Some are re-used so often that they become common property – like the conventionalized images of relativity theory I referred to earlier. We end up with a common stock of explanatory stories, which are readily available for re-working and re-use. So there is a sense in which the whole ensemble of books becomes part of a larger cultural project to recreate scientific ideas in ways which are easier for non-scientists to appropriate.

Finally, books have a number of interesting second and third order effects on cultural production. This is not just because a book is still a cultural token of such high value. It is not just that a book is a common source for a TV documentary. It is also because the renderings of science which appear in popular books stimulate other creative people – novelists, poets, playwrights, film-makers, artists, musicians, choreographers. They may of course be directly inspired by scientists, or go and find some to talk to after being excited by a book. But a lot of the science-influenced art, which has been such an important growth area in the UK in the last ten or fifteen years, shows traces of these non-fiction texts.

So all in all popular science books are making a large contribution to the assimilation of specialized ideas by the wider culture. That gives me great pleasure as a reader, and continuing hope as a writer. It raises a host of intriguing questions for critics. Scientific ideas are a vital part of our culture, and the books which convey versions of these ideas to the rest of us should be taken seriously as literature!

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