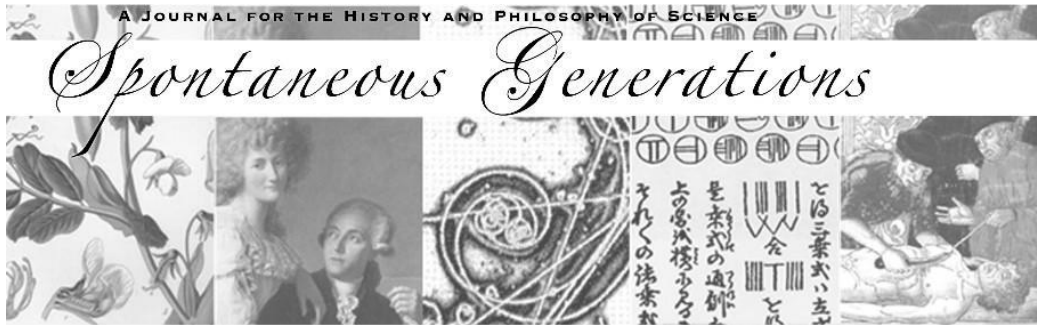




## The Best Popular Science

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## The Best Popular Science

Gregory A. Schrempp

**Abstract** Strategies of persuasion tapped in popular science writing are discussed under the assumption that effective science education and communication can offer antidotes to the revolt against expertise. It is argued that popular science can weaken the experience of science even while attempting to enhance it. Topics discussed include gimmickry, efforts at science-art fusions, and other contemporary mythologizing moves as well as the relationship between science and the humanities generally. Steven Weinberg's modern classic *The First Three Minutes* is explored as an example of successful popular science communication.

The comments that will follow are predicated on the optimistic premise that high-quality science education offers one type of antidote to the revolt against expertise. I will focus on popular science writing just because I have studied this contemporary literary genre in depth; but to some degree the issues I will discuss belong to most if not all science education and communication. As an academic mythologist my interest in popular science arose out of a sense that the strategies of persuasion tapped by popular science writers draw heavily on those I encounter in traditional mythologies. But from the start I had the feeling that popular science typically produces a deficient mythology, and this was followed by a feeling that it also often produces a deficient experience of science. While my purpose in the past has been to analyze and understand rather than to prescribe, here I will offer some thoughts on how the diminishment of science can happen in this genre and how it might be prevented.

At some point I realized that I am annoyed by popular science that seems gimmicky, especially the kind that employs what I will call macro-gimmicks; these are large-scale attention-grabbing devices which do not derive from the scientific content to be imparted and sometimes have little to do with science at all. A common macro-gimmick is the supplying of a story and/or story-teleology where there is none in nature. For example, Richard Dawkins, in *The Ancestor's Tale*, portrays biological evolution in the framework of the *Canterbury Tales*; here evolutionary history is fit into a pilgrimage of various species back to the origin of life. Another, related type of macro-gimmick involves importing and superimposing a surprising genre-form radically different from the logico-argumentative expositions intrinsic to scientific work and science communication. I once attended a popular forum in which a group of specialists presented their research into various aspects of evolution to a general audience, and in the mix was a presentation that took the form of a newly-composed folk song about highlights of evolutionary history and theory.

Such macro-gimmicks can indeed be clever and entertaining, but I am skeptical of their usefulness in science education. My skepticism congealed during the forum just mentioned, when a later speaker, a biologist, presented a stunning talk devoid of macro-gimmicks, and organized instead around a thoughtful discussion, with excellent photographic images, of different life forms, while raising quandaries about the nature and definition of life. In this case, the grab—and the amazement—came not from an imported gimmick but from the qualities of the natural world that were being described.

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Now, years later, I recall the issues raised in that presentation as well as some of the examples, but of the earlier “talk,” I recall only that it took the form of a folk-song.

I have a similar reaction over the longer term regarding a set of pioneering science films (including “Our Mr. Sun” and “Hemo the Magnificent”) produced by Frank Capra (of “It’s a Wonderful Life” fame) as part of a public service project of Bell Telephone in the late 50s and early 60s. After more than a half a century I recall vividly the macro-gimmicks—especially the anthropomorphic cartoon characters representing aspects of nature—but that’s about all. Arguably the films serve the cause of mythology more than science. This is not to put down Capra-corn (as this director’s gift has come to be known), or to say that mythology has no place in the world; it is just that these films are nominally about science. Ironically, within Capra’s films, science is often juxtaposed with, and as the better alternative to, mythology.

The problem is that the strategies used to augment the accessibility and appeal can take over, and can also encourage a feeling that one grasps the science better than one actually does. Though they may be good for the immediate grab, in the long run there’s a kind of no-win situation for such macro-gimmicks in popular science: either they suffuse the exposition and the science gets diluted, or else the scientific discourse manages to maintain a degree of integrity and the gimmick comes across as a loosely-attached add-on put there just to grab attention—as a gimmick, in other words.

One problem with this argument, though, is that not all of the tantalizing large-scale images tapped by scientists and science writers are necessarily gimmicky; some are analogies that rest on a genuine and significant overlap in the character of two objects or phenomena. Consider the relationship between the brain and the computer. In the mid-twentieth century electronic computers were commonly referred to as “electronic brains,” but now it is more common to hear that the brain is a sort of computer. In both directions there would seem to be an anthropomorphizing process. The first analogy arose when electronic computers were giant, alien objects, so we made them less scary—domesticated them—by analogizing them to an object we thought of as more familiar: our “brain.” The second, reversed analogy comes to prominence later when, in the spirit of cognitive science, the brain is strategically distanced as a mysterious organ about which our everyday assumptions are inadequate, while computers have become virtually parts of ourselves. Anthropomorphizing can curtail objectivity, but in this case there seems to be a significant common ground between the objects analogized. Exploring the commonalities—and assessing the extent to which one object can provide a model of the other—can be pedagogically useful, scientifically purposive, and possibly even necessary for intellectual progress.

Given that large-scale analogies can be appropriate and useful, in the end, the sort of macro-gimmick that arouses my skepticism may be best defined functionally: they are those that, vis-à-vis the object being analyzed, become ends in themselves or take on lives of their own, overwhelming and/or undermining the scientific tenor or content of the exposition. Popular science writers share the goal of making science more accessible and broadly disseminated, and some speak specifically of democratizing science. One factor contributing over the long term to habits of mind underlying the revolt against expertise, then, is that in a razzle-dazzle society the strategies for ingratiating expert knowledge to the broader public can end up diluting it. Also—and importantly for the issue at hand—popular science writing tends to emphasize findings more than methods, and thus typically ends up conveying only a very meagre understanding of what expert knowledge is and how it is built up.

But can this kind of skepticism be taken too far? And does it lead to a view of science and the humanities, of facts and values, as incompatible, incommensurable realms? One of the works that I have continually returned to in thinking about the nature of

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popular science and its rhetoric is Steven Weinberg's *The First Three Minutes* (first published in 1977). While considered a modern classic, in important respects this short book laid out what was to become the road less travelled by subsequent popular science writers. The artistic and humanistic content, including Weinberg's personal and moral reactions to his findings, are mostly concentrated into short opening and closing sections, which frame a long, expository middle-section. In his brief conclusion, Weinberg famously comments that "the more the universe seems comprehensible, the more it also seems pointless," and that the scientific "effort to understand the universe" is one of the human activities that can give life meaning.<sup>1</sup>

In-between the opening and closing chapters of *The First Three Minutes* lies a rather spartan laying out of astrophysical evidence, calculations, and theories, punctuated by digressions into episodes in the history of science relevant to the theories. Weinberg seems fascinated by seeming accidents, failures, missed opportunities, and other quirks in the history of research, and allows himself some highly speculative moments (asking, for example, whether the formation of an ice-crystal offers an analogy for processes in the early cosmos). The extreme heat of the early cosmos gives rise to occasional cooking metaphors, but he uses these in the manner of a true chef: subtly and sparingly. The aesthetic or poetic content to be found in this long middle section resides mostly in the esoteric elegance of mathematically-based theorizing and in the aura of millennia-long intellectual striving and achievement. In other words, the great divide between science (i.e., the long expository middle section), and something more in the spirit of the humanities (the moral reflectiveness of the introduction and especially of the conclusion) in Weinberg's book is fairly pronounced: they are poles that react or respond to one another more than they blend or fuse.

I suggest that many of the influential popular science writers of my generation—John Barrow, Carl Sagan, Stephen Jay Gould, for example—strove, in contrast to Weinberg, to create a genre in which art and science are presented in some sort of more continuous, integrated blend, as though there is a natural dovetailing of these two pursuits.<sup>2</sup> The science presented is continuously imbricated with literary and artistic flourishes, allusions, and metaphors, the author's persona and personal stories and anecdotes, cultural, political, and moral commentary, and attempts at poetic turns of phrase. In visual forms of popular science, such as either Sagan's or Tyson's *Cosmos* series, we also have stirring musical accompaniments, not to mention the many glitzy visual "effects." Although I am less skeptical of such blends than of the macro-gimmicks discussed above, I do have misgivings.

There is a particularly interesting precursor for such attempted blends in the first-century BCE epic poem by Lucretius, *De Rerum Natura*, which is built from an extraordinarily skillful combining of science (ancient science, as we now call it) and art—perhaps it is still the most successful such venture to date. And yet Lucretius' own assessment, presented as part of his poem, portrays not a profound synthesis, but rather a disjunction between the difficult content to be imparted (materialistic atomism) and the mode of enticement he will employ (poesis):

My art is not without a purpose. Physicians, when they wish to treat children  
with a nasty dose of wormwood, first smear the rim of the cup with the sweet

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<sup>1</sup> Steven Weinberg, *The First Three Minutes* (Toronto: Bantam Books, 1984): 144.

<sup>2</sup> I offer detailed analyses of these and other recent writers' persuasive strategies and styles in Gregory Schrempp, *The Ancient Mythology of Modern Science* (Montreal: McGill-Queen's University Press, 2012).

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yellow fluid of honey. The children, too young as yet for foresight, are lured by the sweetness at their lips into swallowing the bitter draught. So they are tricked but not trapped, for the treatment restores them to health.<sup>3</sup>

Despite rhetoric suggesting otherwise, it is not clear to me that contemporary popular science writers have moved very far beyond Lucretius' formulation.

One of the moral anxieties of recent decades is the humanistic concern over the possibility, and too frequently the reality, of science and technology devoid of values. I share this concern, and agree with those who insist that science is a human activity which must always be held morally accountable. The issue here is not whether science and humanities, the realms of facts and values, should be brought together, but how this is best accomplished. I do not see the more tightly "blended" popular science approach just discussed as achieving a more compelling resolution than Weinberg's approach. In my opinion attempts at more integrated science-art blends typically end up compromised on both scores, offering diluted science mixed with strained and not very compelling art. Once again the proponents create a way for the scientifically illiterate or semi-literate to think that they are grasping the science better than they actually are, while at the same time allowing writers to subtly convey their own political, cultural, and aesthetic proclivities as though these are imbued with the authority of science, or as though it is really the cosmos speaking to us through the writer. Science operating without values is certainly a danger, but the problem more visible in the past few years is of a different character: factual claims becoming so tightly linked with specific political values that the idea of a fact disintegrates.

Even putting aside the scientific content and considering only popular appeal, Weinberg's approach has its advantages. For one thing, the difficult journey through the math of the middle section leaves one thirsty and ready to hear some sort of human reaction: so, what does this all mean for us? The book is about the Big Bang, but in terms of a moral commentary, the presentation follows the strategy of a so-called periodic sentence, saving the Big Bang until the end. Despite its brevity, there are few lines in popular science writing that have provoked more response than Weinberg's comment about the pointlessness of the universe and the possibility of human meaning within this condition. Even for those who quickly skip to the end of the book for the moral message, and whether or not they agree with it, the middle section offers a testimonial to the labor lying behind the moral reflection.

It is also noteworthy, and I think appropriate, that Weinberg offers his comments in the form of a personal reaction or opinion. Scientific findings should initiate further debate, and of two kinds: first, concerning the accuracy and adequacy of the research and the announced findings; and secondly, concerning what these should mean in terms of our attempt to envision the human good—how we should live. Weinberg leaves the scientific and moral concerns where, in my view, they most productively reside, at least for the moment: as two kinds of issues, both important for human life, both in need of ongoing debate, related to and informed by one-another, possibly inspiring and or challenging one-another, but each also requiring its own integrity and kind of discourse. Notions of some deeper synthesis or consilience (in E.O. Wilson's term)<sup>4</sup> between

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<sup>3</sup> Lucretius, *On the Nature of the Universe*, trans. R.E. Latham (London: Penguin, 1994); 32-33. See Lucretius, *De Rerum Natura*, Book 1, 926-48.

<sup>4</sup> In *Consilience*, Wilson says that "the greatest enterprise of the mind has always been and always will be the attempted linkage of the sciences and humanities." See E. O. Wilson, *Consilience: The*

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science and art at this point are, I think, premature.

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Wilson, E.O. *Consilience: The Unity of Knowledge*. New York: Alfred A. Knopf, 1998.

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*Unity of Knowledge* (New York: Alfred A. Knopf, 1998), 8. Wilson's various works display a range of approaches toward the enterprise of forging the link; they are interesting but at best only partial successes with respect to consilience.