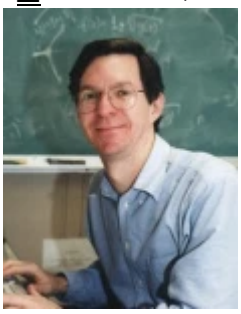
What is science and why should we care? — Part I

March 26, 2014February 8, 2015 essay politics, pseudoscience, religion, science, war


(https://scientiasalon.files.wordpress.com/2014/03/sokal-alan.jpg)by Alan Sokal

I propose to share with you a few reflections about the nature of scientific inquiry and its importance for public life. At a superficial level one could say that I will be addressing some aspects of the relation between science and society; but as I hope will become clear, my aim is to discuss the importance, not so much of science, but of what one might call the scientific worldview — a concept that goes far beyond the specific disciplines that we usually think of as "science" — in humanity's collective decision-making. I want to argue that clear thinking, combined with a respect for evidence — especially inconvenient and unwanted evidence, evidence that challenges our preconceptions — are of the utmost importance to the survival of the human race in the twenty-first century, and especially so in any polity that professes to be a democracy.

Of course, you might think that calling for clear thinking and a respect for evidence is a bit like advocating Motherhood and Apple Pie (if you'll pardon me this Americanism) — and in a sense you'd be right. Hardly anyone will openly defend muddled thinking or disrespect for evidence. Rather, what people do is to surround these practices with a fog of verbiage designed to conceal from their listeners — and in most cases, I would imagine, from themselves as well — the true implications of their way of thinking. George Orwell got it right when he observed that the main advantage of speaking and writing clearly is that "when you make a stupid remark its stupidity will be obvious, even to yourself" [1]. So I hope that I will be as clear here as Orwell would have wished. And I intend to illustrate disrespect for evidence with a variety of examples — coming from the Left and the Right and the Center — starting from some fairly lightweight targets and proceeding to heavier ones. I aim to show that the implications of taking seriously an evidence-based worldview are rather more radical than many people realize.

So let me start, perhaps a bit pedantically, by drawing some important distinctions. The word science, as commonly used, has at least four distinct meanings: it denotes an intellectual endeavor aimed at a rational understanding of the natural and social world; it denotes a corpus of currently accepted substantive knowledge; it denotes the community of scientists, with its mores and its social and economic structure; and, finally, it denotes applied science and technology. In this essay I will be concentrating on the first two aspects, with some secondary references to the sociology of the scientific community; I will not address

technology at all. Thus, by science I mean, first of all, a worldview giving primacy to reason and observation and a methodology aimed at acquiring accurate knowledge of the natural and social world. This methodology is characterized, above all else, by the critical spirit: namely, the commitment to the incessant testing of assertions through observations and/or experiments — the more stringent the tests, the better — and to revising or discarding those theories that fail the test. One corollary of the critical spirit is fallibilism: namely, the understanding that all our empirical knowledge is tentative, incomplete and open to revision in the light of new evidence or cogent new arguments (though, of course, the most well-established aspects of scientific knowledge are unlikely to be discarded entirely).

It is important to note that well-tested theories in the mature sciences are supported in general by a powerful web of interlocking evidence coming from a variety of sources. Moreover, the progress of science tends to link these theories into a unified framework, so that (for instance) biology has to be compatible with chemistry, and chemistry with physics. The philosopher Susan Haack [2] has illuminatingly analogized science to the problem of completing a crossword puzzle, in which any modification of one word will entail changes in interlocking words; in most cases the required changes will be fairly local, but in some cases it may be necessary to rework large parts of the puzzle.

I stress that my use of the term "science" is not limited to the natural sciences, but includes investigations aimed at acquiring accurate knowledge of factual matters relating to any aspect of the world by using rational empirical methods analogous to those employed in the natural sciences. (Please note the limitation to questions of fact. I intentionally exclude from my purview questions of ethics, aesthetics, ultimate purpose, and so forth.) Thus, "science" (as I use the term) is routinely practiced not only by physicists, chemists and biologists, but also by historians, detectives, plumbers and indeed all human beings in (some aspects of) our daily lives. (Of course, the fact that we all practice science from time to time does not mean that we all practice it equally well, or that we practice it equally well in all areas of our lives.)

The extraordinary successes of the natural sciences over the last 400 years in learning about the world, from quarks to quasars and everything in-between, are well known to every modern citizen: science is a fallible yet enormously successful method for obtaining objective (albeit approximate and incomplete) knowledge of the natural (and to a lesser extent, the social) world.

But, surprisingly, not everyone accepts this; and here I come to my first — and most lightweight — example of adversaries of the scientific worldview, namely academic postmodernists and extreme social constructivists. Such people insist that so-called scientific knowledge does not in fact constitute objective knowledge of a reality external to ourselves, but is a mere social construction, on a par with myths and religions, which therefore have an equal claim to validity. If such a view seems so implausible that you wonder whether I am somehow exaggerating, consider the following assertions by prominent sociologists:

"[T]he validity of theoretical propositions in the sciences is in no way affected by factual evidence." (Kenneth Gergen) [3]

"The natural world has a small or non-existent role in the construction of scientific knowledge." (Harry Collins) [4]

"For the relativist [such as ourselves] there is no sense attached to the idea that some standards or beliefs are really rational as distinct from merely locally accepted as such." (Barry Barnes and David Bloor) [5]

"Since the settlement of a controversy is the cause of Nature's representation, not the consequence, we can never use the outcome — Nature — to explain how and why a controversy has been settled." (Bruno Latour) [6]

"Science legitimates itself by linking its discoveries with power, a connection which determines (not merely influences) what counts as reliable knowledge." (Stanley Aronowitz) [7]

Statements as clear-cut as these are, however, rare in the academic postmodernist literature. More often one finds assertions that are ambiguous but can nevertheless be interpreted (and quite often are interpreted) as implying what the foregoing quotations make explicit: that science as I have defined it is an illusion, and that the purported objective knowledge provided by science is largely or entirely a social construction. For example, Katherine Hayles, professor of literature at Duke University and former president of the Society for Literature and Science, writes the following as part of her feminist analysis of fluid mechanics:

"Despite their names, conservation laws are not inevitable facts of nature but constructions that foreground some experiences and marginalize others. … Almost without exception, conservation laws were formulated, developed, and experimentally tested by men. If conservation laws represent particular emphases and not inevitable facts, then people living in different kinds of bodies and identifying with different gender constructions might well have arrived at different models for [fluid] flow." [8]

What an interesting idea: perhaps "people living in different kinds of bodies" will learn to see beyond those masculinist laws of conservation of energy and momentum. And Andrew Pickering, a prominent sociologist of science, asserts the following in his otherwise-excellent history of modern elementary-particle physics:

"[G]iven their extensive training in sophisticated mathematical techniques, the preponderance of mathematics in particle physicists' accounts of reality is no more hard to explain than the fondness of ethnic groups for their native language. On the view advocated in this chapter, there is no obligation upon anyone framing a view of the world to take account of what twentieth-century science has to say." [9]

But let me not spend time beating a dead horse, as the arguments against postmodernist relativism are by now fairly well known: rather than plugging my own writings, let me suggest the superb book by the Canadian philosopher of science James Robert Brown, Who Rules in Science?: An Opinionated Guide to the Wars. Suffice it to say that postmodernist writings systematically confuse truth with claims of truth, fact with assertions of fact, and knowledge with pretensions to knowledge — and then sometimes go so far as to deny that these distinctions have any meaning.

Now, it's worth noting that the postmodernist writings I have just quoted all come from the 1980s and early 1990s. In fact, over the past decade, academic postmodernists and social constructivists seem to have backed off the most extreme views that they previously espoused. Perhaps I and like-minded critics of postmodernism can take some small credit for this, by initiating a public debate that shed a harsh light of criticism on these views and forced some strategic retreats. But most of the credit, I think, has to be awarded to George W. Bush and his friends, who showed just where science-bashing can lead in the real world. Nowadays, even sociologist of science Bruno Latour, who spent several decades stressing the so-called "social construction of scientific facts," laments the ammunition he fears he and his colleagues have given to the Republican right-wing, helping them to deny or obscure the scientific consensus on global climate change, biological evolution and a host of other issues. He writes:

“While we spent years trying to detect the real prejudices hidden behind the appearance of objective statements, do we now have to reveal the real objective and incontrovertible facts hidden behind the illusion of prejudices? And yet entire Ph.D. programs are still running to make sure that good American kids are learning the hard way that facts are made up, that there is no such thing as natural, unmediated, unbiased access to truth, that we are always prisoners of language, that we always speak from a particular standpoint, and so on, while dangerous extremists are using the very same argument of social construction to destroy hard-won evidence that could save our lives.” [10]

That, of course, is exactly the point I was trying to make back in 1996 about social-construction talk taken to subjectivist extremes. I hate to say I told you so, but I did — as did, several years before me, Noam Chomsky, who recalled that in a not-so-distant past:

“Left intellectuals took an active part in the lively working class culture. Some sought to compensate for the class character of the cultural institutions through programs of workers’ education, or by writing best-selling books on mathematics, science, and other topics for the general public. Remarkably, their left counterparts today often seek to deprive working people of these tools of emancipation, informing us that the ‘project of the Enlightenment’ is dead, that we must abandon the ‘illusions’ of science and rationality — a message that will gladden the hearts of the powerful, delighted to monopolize these instruments for their own use.” [11]

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Alan Sokal is a Professor of Physics at New York University and Professor of Mathematics at University College London. His most recent book is Beyond the Hoax (http://www.amazon.com/Beyond-Hoax-Science-Philosophy-Culture-ebook/dp/B006TC2EIO/ref=sr_1_1?ie=UTF8&qid=1395341303&sr=8-1&keywords=sokal+Beyond+the+Hoax): Science, Philosophy and Culture (Oxford University Press).

[1] Orwell, George. 1953 [1946]. Politics and the English language, in A Collection of Essays, pp. 156–171. Harcourt Brace Jovanovich, p. 171.

[2] Haack, Susan. 1993. Evidence and Inquiry: Towards Reconstruction in Epistemology. Blackwell.

[3] Gergen, Kenneth J. 1988. Feminist critique of science and the challenge of social episte- mology. In: Feminist Thought and the Structure of Knowledge, edited by Mary McCanney Gergen, pp. 27–48. New York University Press, p. 37.

[4] Collins, Harry M. 1981. Stages in the empirical programme of relativism. Social Studies

of Science 11:3–10, p. 3.

[5] Barnes, Barry and David Bloor. 1981. Relativism, rationalism and the sociology of knowl- edge. In: Rationality and Relativism, edited by Martin Hollis and Steven Lukes, pp. 21–47. Blackwell, p. 27.

[6] Latour, Bruno. 1987. Science in Action: How to Follow Scientists and Engineers through Society. Harvard University Press, pp. 99, 258.

[7] Aronowitz, Stanley. 1988. Science as Power: Discourse and Ideology in Modern Society. University of Minnesota Press, p. 204.

[8] Hayles, N. Katherine. 1992. Gender encoding in fluid mechanics: Masculine channels and feminine flows. Differences: A Journal of Feminist Cultural Studies 4(2):16–44, pp. 31-32.

[9] Pickering, Andrew. 1984. Constructing Quarks: A Sociological History of Particle Physics. University of Chicago Press, p. 413.

[10] Latour, Bruno. 2004. Why has critique run out of steam? From matters of fact to matters of concern. Critical Inquiry 30:225–248, p. 227.

[11] Chomsky, Noam. 1993. Year 501: The Conquest Continues. South End Press, p. 286.

54 thoughts on "**What is science and why should we care? — Part I**"

1. **alansokal** says:
   March 31, 2014 at 12:18 pm

   "I wonder why you spend so much time & space dredging all that up here & now. "

   This misleading impression probably arises from the way that this essay (which was originally a 1-hour talk) was serialized in three parts. As you'll see from Parts II and III, I actually spend _very little_ time or space battling academic postmodernists, compared to more dangerous (as I see it) adversaries of the evidence-based worldview.

   P.S. I think I can guess which of the Social Text editors you were a student of. I am now a rather good personal friend of his, as a result of our work together on the Open Letter from American Jews to our Government (http://www.peacemideast.org/ (http://www.peacemideast.org/)).

2. **alansokal** says:
   March 31, 2014 at 12:21 pm

   Yes: I was being charitable to Latour by quoting the clearest part of his article. I do not endorse the whole (or even claim to understand it); nor do I claim to know what Latour's epistemological position really is.

   But I guess you should ask him, not me.

3. **alansokal** says:
   March 31, 2014 at 12:38 pm

   "I think the problem of skeptical regress is one which makes me give at least some credence to relativism of the kind in which the claim is that although there are truths, we can never be sure."

   That is not relativism; to state that "we can never be sure" is simply _fallibilism_.

   But it is also important to distinguish between "not being sure" with regard to _extreme_ skeptical propositions ("I am just a brain in a vat." "There exists an external world but it does not in any way resemble my perceptions of it." "The universe was created five minutes ago

along with all the documents and all our memories referring to the alleged past in their present state." etc etc) and "not being sure" with regard to questions that are genuinely uncertain _without_ reference to extreme-skeptical arguments ("How large is the human contribution to global warming?" "What is the correct theory of quantum gravity?"). Many "relativist" ideas are, in fact, nothing more than banal reformulations of Humean radical skepticism, but applied in unjustifiably selective ways. As Philip Kitcher observed some years ago, "some practitioners [of Science Studies] effectively demand a response to the global skeptical challenge for entities they don't like (the ontologies of the sciences) and then proceed to talk quite casually and commonsensically about things they do like (people, societies, human motives)."

All this is discussed further in Chapters 6 and 7 of my book "Beyond the Hoax" (Oxford UP, 2008). [These chapters are co-authored with Jean Bricmont.]

4. **Naomi Indah Sari** says:
   April 6, 2014 at 1:43 am

   Reblogged this on Naomi Indah Sari (http://naomiindahsari.wordpress.com/2014/04/06/what-is-science-and-why-should-we-care-part-i/).

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