Book Review

Impostures intellectuelles

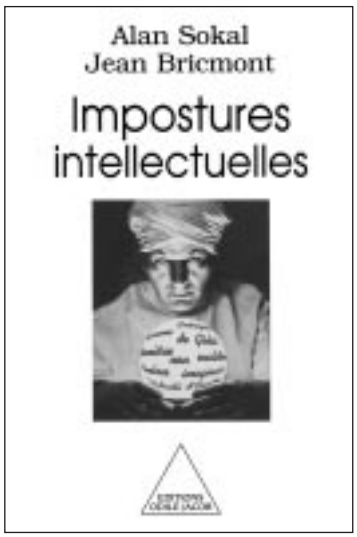
Reviewed by William G. Faris

Impostures intellectuelles
Alan Sokal and Jean Bricmont
Éditions Odile Jacob, Paris, 1997
Softcover 140 Francs (ISBN 2-7381-0503-3)

Quantized Relativity

In 1996 the mathematical physicist Alan Sokal published an article [S1] in the cultural studies journal *Social Text*. He argued that "deep conceptual shifts within twentieth-century science have undermined [the] Cartesian-Newtonian metaphysics... It has thus become increasingly apparent that physical 'reality', no less than social 'reality', is at bottom a social and linguistic construct...the truth claims of science are inherently theory-laden and self-referential; and consequently, that the discourse of the scientific community, for all its undeniable value, cannot assert a privileged epistemological status with respect to counter-hegemonic narratives emanating from dissident or marginalized communities."

Sokal's professed aim was "to carry these deep analyses one step farther, by taking account of recent developments in quantum gravity: the emerging branch of physics in which Heisenberg's quantum mechanics and Einstein's general relativity are at once synthesized and superseded." Space-



time no longer exists as an objective physical reality. "When even the gravitational field—geometry incarnate—becomes a noncommuting (and hence nonlinear) operator, how can the classical interpretation of $G_{\mu\nu}$ as a geometric entity be sustained? Now not only the observer, but the very concept of geometry, becomes relational and contextual."

The article might have passed unnoticed in the torrent of words produced by academics during the year 1996. Perhaps the heavy use of postmodernist jargon should have given it away. In any case, the author soon revealed it as a parody [S2]. This provoked a reaction from the editors of *Social Text*, followed by articles and exchanges of letters in the *New York Times* and the *New York Review of Books* and eventually in *Le Monde*. The dispute also generated new texts in the ultimate postmodern format, the Web page.

A scientifically alert reader might notice immediately that the article is not serious. For instance, in quantum mechanics the fundamental structure is a noncommutative algebra of operators, but Sokal's casual equation of noncommutative and nonlinear is ludicrous to a quantum physi-

William G. Faris is professor of mathematics at the University of Arizona. His e-mail address is faris@math.arizona.edu.

Editor's Note: *The topic of the book under review was also explored in "A mathematician reads* Social Text*", by Michael C. Sullivan, and "A report from the front of the 'Science Wars'", by Evans M. Harrell, both of which appeared in the October 1996 issue of the* Notices.

cist. One of the strangest features of quantum mechanics is that it is an entirely linear theory.

Relativistic Science

The book by Sokal and Bricmont—mathematical physicists who know the difference between noncommutative and nonlinear—continues the attack, implicit in the Sokal parody, on postmodernist views of science. It argues that relativistic views of science are both prevalent and wrong. It proceeds on two fronts. The first is criticism of authors said to use scientific language and metaphors in a misleading way. Those who merit chapter headings are Jacques Lacan, Julia Kristeva, Luce Irigaray, Bruno Latour, Jean Baudrillard, Gilles Deleuze, Félix Guattari, and Paul Virilio. These are French writers whom Sokal and Bricmont consider to be influential on postmodern thought in the United States.

Some of these writers produce quite extravagant prose. One author (Virilio) claims that "it seems necessary to reconsider the importance of the notion of ACCELERATION and DECELERATION (positive and negative velocities according to physicists)." (The capitals are in the original text.) Another (Baudrillard) suggests that "one should perhaps consider history itself as a chaotic formation where acceleration puts an end to linearity." After reading a number of these extracts, it is a pleasure to encounter a quoted paragraph that presents a clear and eloquent explanation of the principle of relativity; Galileo wrote it in 1632.

Sokal and Bricmont's other front is a more general attack on relativism in the philosophy and sociology of science. This is the notion that the validity of a scientific assertion is relative to an individual or to a social group. Sokal and Bricmont begin by a dismissal of radical skepticism, the doctrine that our sensations are not adequate to give us access to reality. They consider this to be a general philosophical position that applies to all forms of knowledge equally. They do not claim to refute it, but instead argue that a skepticism this universal cannot be relevant to the discussion of the reliability of particular forms of knowledge.

The real question is the degree to which scientific practice has a rational basis. Sokal and Bricmont insist on the continuity of scientific rationality with rationality in other areas of human knowledge and in everyday life. They admit that there is no definitive and complete codification of scientific practice, and they present the example of a police investigation as an analog of scientific research. In both cases principles of good practice arise through experience.

They also discuss a movement sometimes known as the "strong program" in the sociology of science [BBH]. This is a sociological explanation of the conditions that give rise to scientific beliefs. Some proponents maintain that the particular beliefs a person prefers to hold will generally coincide with those of other persons in the same community, and the words "true" and "false" are the language in which the preferences are expressed. Sokal and Bricmont consider this position ambiguous: either it falls into radical skepticism (there is no reality beyond our inadequate perceptions), or it itself relies on the external reliability of science. When Sokal believes that he has taken his morning coffee, then that is not the expression of a preference, but an attempt to record a fact. He might have broken his pattern and taken morning tea. If he forgot this switch to tea, then his belief is wrong. The tea bag may remain as evidence, if it has not gone out with the garbage.

Scientific Truth

Who could doubt such conclusions of common sense? Even a postmodernist might agree with the fact that Sokal took his morning coffee, or tea. Perhaps language is in some circumstances an innocent tool for describing a world of subjects and objects. But is this so common? The use of language in many spheres of life is as much instrumental as descriptive. An advertiser wants Sokal to change to another brand of coffee. A neighbor offers tea and conversation simply to affirm friendship. An activist (cited in the Sokal parody) has a political purpose: "to develop *strategic* theories—not true theories, not false theories, but strategic theories."

The concept that there are multiple uses of language is quite acceptable in philosophy of science provided that there is some way to insulate the truth-telling function of language from its other uses. However, this is difficult, precisely for the reasons that Sokal and Bricmont describe. In their view, "historians, detectives, and plumbers—in fact, all humans—use the same methods of induction, deduction, and evaluation of facts that physicists and biochemists use." Modern science is only more systematic and precise. Furthermore, they agree with Feyerabend when he claims that "the idea that science can and should be organized according to fixed and universal rules is at the same time utopian and pernicious."

If one judges the epistemological basis of science by the standards of physical science and mathematics, then the lack of fixed and universal rules is troubling. Can there not be a decent general theory of truth in science? The idea is not absurd. The logical positivists made an attempt to find such a theory; the fact that it failed does not say that it was not worth the effort.

Truth in mathematics is a somewhat different story. The logician Tarski gave a precise definition of truth for sentences in a formalized language interpreted in a universe of mathematical objects. However, Tarski then proved that the criterion for truth in a language cannot be formalized in the language itself. (See Smullyan's book [Sm] for an elementary but precise treatment.) This seems un-

promising for a general theory of truth, even though there have been attempts to supersede the Tarski analysis [BE]. Of course, a theorem about truth in formalized mathematical languages is not directly relevant to other areas of discourse, and linguists debate the extent to which the semantics of natural languages resembles that of mathematical logic [H]. In any case, if it is difficult to characterize truth in the limited context of mathematics, then it may be even more difficult in empirical sciences. What if only some principle of pragmatic functioning is attainable? Is this enough to ward off relativism? Could there be but one universal truth: universal rules are impossible?

Mathematical practice does not require a complete characterization of mathematical truth. The notions of axiom system and mathematical proof already provide a rich and useful system. However, even here the foundations are obscure. In the *Social Text* article [S1] Sokal says, with humorous intent, that mathematicians "are often content to work in the hegemonic framework of Zermelo-Fraenkel set theory—but this framework is notoriously insufficient for a mathematics of liberation." Indeed, this framework is arbitrary, and some mathematicians have proposed both serious critiques and alternatives. To cite only one example, there are category theorists who do not regard the category of sets as privileged; it is only one category among many. In particular, certain categories of "variable sets" provide new settings for constructions of analysis and geometry [MR]. A recent text [LS] promotes the categorical point of view at the level of the general reader or beginning student.

Truth in Quantization

The major gap in the Sokal-Bricmont book is that it avoids dealing with the status of quantum mechanics. If Sokal had chosen a different area of physics, would he have been able to pull off the hoax? Though there are numerous scientific absurdities in the *Social Text* article, its heart is the confusion over the foundations of quantum mechanics. This confusion is a major weak point in modern physical science. Numerous popular writings about science exploit this obscurity, but the book does not address this issue. Writers who confuse velocity and acceleration are comparatively easy targets.

When Sokal and Bricmont briefly mention quantum mechanics, they recommend the recent book of Albert [A] as an introduction to nonspecialists. This is an excellent book, but the ideas are hardly comforting to Sokal and Bricmont's view that modern science is an extrapolation of common sense. Albert concludes his book with an interpretation of quantum mechanics due to Bohm and with another interpretation that he calls the "many-minds" theory. According to Albert, "what a 'many-minds' theory takes physics to be ultimately about is *what observers think*; and it entails that there will be frequently not even *matters of fact* about *where things go*." (The italics are in the original.) The Bohm theory and the many-minds theory are incommensurable. Thus, again according to Albert, "questions about the structure of space and time, and questions about whether the world is deterministic (which were supposed to be the two central questions of the physics of this century, and which both happen to be questions on which these two theories radically disagree with one another), are the kinds of questions which there can't ever be scientific answers to. Period." Is this an extrapolation of common sense? No, it is scientific authority in full retreat. What kind of hegemony is that?

Clearly quantum mechanics is one of the greatest successes of science. Yet something remains to be said before the full truth is known. (See Wick's recent book [W] for a fuller account of the quantum quandary.) One can take Sokal [S1] entirely seriously when he says that "images of the future mathematics must remain but the haziest glimmer: for, alongside these...young branches in the tree of science, there will arise new trunks and branches—entire new theoretical frameworks—of which we, with our present ideological blinders, cannot yet even conceive."

References

[A] David Z. Albert, *Quantum mechanics and experience*, Harvard Univ. Press, Cambridge, MA, 1992.

[BBH] Barry Barnes, David Bloor, and John Henry, *Scientific knowledge: A sociological analysis*, Univ. of Chicago Press, Chicago, 1996.

[BE] Jon Barwise and John Etchemendy, *The liar: An essay on truth and circularity*, Oxford Univ. Press, New York, 1987.

[H] Randy Allen Harris, *The linguistics wars*, Oxford Univ. Press, New York, 1993.

[LS] F. William Lawvere and Stephen H. Schanuel, *Conceptual mathematics: A first introduction to categories*, Cambridge Univ. Press, New York, 1997.

[MR] Ieke Moerdijk and Gonzalo E. Reyes, *Models for smooth infinitesimal analysis*, Springer, New York, 1991.

[Sm] Raymond M. Smullyan, *Gödel's incompleteness theorems*, Oxford Univ. Press, New York, 1992.

[S1] Alan D. Sokal, *Transgressing the boundaries: Towards a transformative hermeneutics of quantum gravity*, Social Text **46/47** (1996), 217–252.

[S2] Alan D. Sokal, *A physicist experiments with cultural studies*, Lingua Franca **6** (4) (1996), 62–64.

[W] David Wick, *The infamous boundary: Seven decades of controversy in quantum physics*, Copernicus (Springer-Verlag), New York, 1996.