

Letter to *Physics Today*

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Biographical Note

Jean Bricmont is professor of theoretical physics at the University of Louvain, Belgium. **Alan Sokal** is professor of physics at New York University.

Two recent articles in *Physics Today* — by N. David Mermin¹ and Mara Beller² — have taken issue, at least implicitly, with our critique of the abuse of scientific concepts by some postmodernist theorists.³ In view of the interest elicited by these articles⁴, we feel obliged to respond.

Let us begin by emphasizing that we share Mermin's avowed goal of promoting respectful discussion among scholars of different disciplines concerning issues of philosophy, history and sociology of science. We admire, in particular, Mermin's debate in these pages with sociologists Harry Collins and Trevor Pinch.⁵ But if Mermin wants to defend the value of sociology of science, he should choose an example of good work in that field and popularize it among physicists. Instead, he has taken an astoundingly bad specimen — Bruno Latour's "semiotic" analysis of special and general relativity⁶ — and employed his own knowledge of physics to defend Latour's display of false erudition.

Mermin begins by warning physicists not to assume hastily that a difficult-to-understand philosophical or sociological tract is *ipso facto* a case of charlatanism. Fair enough. But when a sociologist publishes an analysis of relativity theory, shouldn't physicists at least be allowed to point out that the exposition of relativity is confused? And if we are forbidden to say that, how can the sociologist's colleagues be expected to judge?

Nor is humorous intent an adequate defense. There is a profound difference between a serious article interspersed with bursts of humor, and an article where one never knows whether or not the author intends to be taken seriously.

Mermin awards Latour an A+ for his assertion — which is not one of those we criticized⁷ — that "Einstein takes instruments (rulers and clocks) to be what generates space and time".⁸ But this assertion is not, as Mermin claims, "the essential core of relativity"; rather, it is one particular philosophical *interpretation* of that theory (a radically positivist/operationalist one). Other interpretations of special relativity are equally compatible with experiment (and in our opinion much more coherent conceptually): for example, the view in which space-time is given and all matter — including clocks, rods and ourselves — moves along world-lines according to dynamical laws. After all, if "time" were only what is "generated" by clocks, what would it mean to describe theoretically the internal workings of a particular clock? (We recognize that these are delicate issues, on which reasonable physicists and philosophers of physics can disagree. But there is no evidence that Latour understands any of these subtleties.)

Mermin's most sophisticated argument concerns Latour's "three frames". According to Latour, relativity theory is incapable of studying the transformation between two frames of reference, but requires a third frame, which is basically that of the author ("enunciator") gathering reports from delegated "observers".⁹ Of course this is nonsense: Latour has confused the concept of "frame of reference" in physics with that of "actor" in semiotics, and has confused Einstein's pedagogical strategy with the physical situation he is describing. What is Mermin's response to all this? He points out, correctly, that certain technical arguments in relativity theory involve comparing three (or more) frames of reference, and he chides physicists for criticizing Latour

without noting this fact. But this is absurd: the technical arguments alluded to by Mermin have nothing whatsoever to do with Latour’s purported “third frame that collects the information sent by the two others”.

The crux of Mermin’s argument, however, is that criticisms of Latour’s misunderstandings of relativity miss the point, which, according to his “uniquely qualified daughter Liz, who has been in cultural studies for some years”, is as follows:

Latour wants to suggest translating the formal properties of Einstein’s argument into social science, in order to see both what social scientists can learn about “society” and how they use the term, and what hard scientists can learn about their own assumptions. He is trying to explain relativity only insofar as he wants to come up with a formal (“semiotic”) reading of it that can be transferred to society. He’s looking for a model for understanding social reality that will help social scientists deal with their debates — which have to do with the position and significance of the observer, with the relation between “content” of a social activity and “context” (to use his terms), and with the kinds of conclusions and rules that can be extracted through observation.¹⁰

This is half-true. Latour, in his introduction, sets forth *two* goals:

[O]ur purpose . . . is the following: in what ways can we, by reformulating the concept of society, see Einstein’s work as *explicitly* social? A related question is: how can we learn from Einstein how to study society?¹¹

As it would be much too lengthy to analyze the extent to which Latour achieves either of these goals, we confined ourselves in our book to pointing out the fundamental misconceptions about relativity that undermine *both* of his projects. But since Mermin has raised the question, let us address it: Has Latour learned anything from Einstein that can be “transferred to society”?

At a purely logical level, the answer is no: relativity theory in physics has no implications whatsoever for sociology. (Suppose that tomorrow an experiment at CERN were to demonstrate that the relation between an electron’s velocity and its energy is slightly different from that predicted by Einstein. This finding would cause a revolution in physics; but why on earth should it oblige sociologists to alter their theories of human behavior?) Clearly, the connection between relativity and sociology is, at best, one of analogy. Perhaps, by understanding the roles of “observers” and “frames of reference” in relativity theory, Latour can shed light on sociological relativism and related issues. But the question is who is speaking and to whom. Let’s assume, for the sake of argument, that the sociological notions used by Latour can be defined as precisely as the concepts of relativity theory and that someone familiar with both theories can establish some formal analogy between the two. This analogy might help in explaining relativity theory to a sociologist familiar with Latour’s sociology, or in explaining his sociology to a physicist, but what is the point of using the analogy with relativity to explain Latour’s sociology *to other sociologists*? After all, even granting Latour a complete mastery of the theory of relativity — and Mermin doesn’t go that far¹² — his sociologist colleagues cannot be presumed to possess such

a knowledge. Typically, their understanding of relativity (unless they happen to have studied physics) will be based on analogies with sociological concepts. Why doesn't Latour explain whatever new sociological notions he wants to introduce by making direct reference to his readers' sociological background?

By contrast with Mermin's article, we find ourselves in agreement with most of the points made in Mara Beller's article "The Sokal hoax: At whom are we laughing?". Beller observes, correctly, that famous physicists such as Bohr, Born and Pauli engaged at times in dubious (to say the least) extrapolations of ideas from quantum physics to politics, psychology, philosophy and religion. She also notes that these writings were sometimes treated by physicists with excessive reverence, rather than being subjected to the critical analysis they deserve. Finally, she observes, again correctly, that the popular writings of these and other physicists — in which the foundational issues associated with quantum mechanics are often grossly oversimplified — served as one source of inspiration (among many others) for postmodernist musings about science.

The only thing we find slightly irritating is that we have repeatedly met people who view Beller's article as a "response" to us or even as a "refutation" of our views. Of course, this may or may not be her intention — and Beller is in no way responsible for other people's misinterpretations of her writings — but we feel obliged to clarify this point. Beller's observations do nothing to justify the misuse of scientific concepts and terminology in the oeuvre of Lacan, Kristeva, Baudrillard, Deleuze, Virilio and others.¹³ At best, her remarks could be used to cast aspersions on our intentions (why do you criticize those people and not your physicist colleagues?). To this, we would respond that we do object to the illegitimate speculations of physicists and have done so in print.¹⁴ But one can't discuss everything in a single book; and the kind of nonsense we criticize is indeed a genre in its own right, characterized principally by name-dropping and the display of false erudition. This charlatanism is a rather different phenomenon from the hubris that leads some (usually aging) physicists to enter into the "great minds" mode and imagine that whatever discoveries they made in physics must have deep consequences for philosophy or human affairs.¹⁵

Let us also stress that in our book we have rigorously *refrained* from criticizing postmodernists for abuses related to quantum mechanics — otherwise, the book would be considerably longer — precisely because we feel that it would be unfair to criticize non-physicists on a subject where the physicists themselves are sometimes quite confused. But this excuse is inapplicable to the abuses we *did* analyze — concerning, for example, special relativity, non-Euclidean geometry and Gödel's theorem — for which there exist a variety of excellent texts at both the semi-popular and technical levels.

One of our book's principal targets is "argument from authority": the undue deference sometimes accorded to the writings of renowned intellectuals even when those writings are incomprehensible or absurd. Beller is right to point out that this quasi-religious attitude can arise in any field, even in physics. Thus, many physicists have for years blindly repeated Bohr's and Heisenberg's views on the foundations of quantum mechanics, without having a clear idea of what they meant.¹⁶ We are pleased

to note that the grip of the so-called Copenhagen orthodoxy is weakening and that physicists are beginning to consider alternative views on foundational questions with an open mind.¹⁷

Let us also observe (and this is an important point not noted by Beller) that when postmodernists do address science beyond name-dropping, they tend to take sides in scientific controversies — e.g. for Prigogine against Boltzmann, for Bohr and Heisenberg against Einstein, for Gould and Lewontin against Dawkins — mainly for emotional and political reasons, without a genuine understanding of the subtle scientific and philosophical issues involved. Their writings are full of buzzwords like “indeterminacy”, “chaos” and “emergence”, about which they furthermore tend to confuse the scientific and everyday meanings. In our opinion it is necessary *both* to criticize such sloppy thinking *and* to stress scientists’ responsibility, in their popular writings, to avoid misleading the lay reader through oversimplification or exaggeration.

More irritating are Beller’s comments on the issue of philosophical realism. She implies that Weinberg and ourselves are “naive realists”, but without providing any precise definition of that doctrine, much less any evidence that we adhere to it.¹⁸ We doubt that Beller — or any historian for that matter — would enjoy being lectured on the banal observation that “history (say, Napoleon) is not presented to us twice: once as it really is, and then through historical theories based on the best available evidence”. *Of course* we have access only to the evidence and our interpretations of it, in physics as well as in history. But who denies that? In particular, where did we or Weinberg show our ignorance of this elementary philosophical observation?

Beller, in her reply to critics¹⁹, urges us to help bridge the gap between the “two cultures” by inviting sociologists, anthropologists and historians to dinner; and we are pleased to report having had many such dinners and lunches over the past few years. If we ever have the opportunity to have dinner with Beller, we would try to convince her that “a return to the Enlightenment idea of rationality” is not, as she asserts, as untenable as “a return to classical physics”. Quite the contrary: the rationality of the Enlightenment, properly understood, is the foundation of all honest inquiry and is not linked to any specific physical theory; and rationalist epistemology is in no way inconsistent with “tak[ing] into account the sociohistorical context of science and individual scientific creativity.”²⁰

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References

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- [4] Letters by P.R. Gross *et al.* and response by N.D. Mermin, Phys. Today **51**(4), 15 (Apr. 1998); letters by L.S. Lerner *et al.* and response by M. Beller, Phys. Today **52**(1), 15 (Jan. 1999). Note also that Mermin's article was republished in French translation in *Impostures Scientifiques: Les Malentendus de l'Affaire Sokal*, ed. Baudouin Jurdant (Paris: La Découverte/Alliage, 1998), pp. 194–201.
- [5] N.D. Mermin, Phys. Today **49**(3), 11 (Mar. 1996) and **49**(4), 11 (Apr. 1996); H. Collins, T. Pinch and N.D. Mermin, Phys. Today **49**(7), 11 (Jul. 1996) and **50**(1), 92 (Jan. 1997).
- [6] B. Latour, Soc. Stud. of Sci. **18**, 3 (1988).
- [7] A. Sokal and J. Bricmont, *Intellectual Impostures / Fashionable Nonsense* (Ref. 3), Chap. 6. See also J. Huth, in *A House Built on Sand: Exposing Postmodernist Myths About Science*, ed. Noretta Koertge (New York: Oxford University Press, 1998), pp. 181–192.
- [8] This assertion was quoted by J. Fujimura, Amer. Anthropologist **100**: 347 (1998) at p. 359 (note 25) to buttress her attack on Sokal by invoking the authority of a physicist: “physicist Mermin gives Latour an A+ for his understanding of relativity and chides Sokal for not understanding the ideas of Einstein discussed by Latour”. Of course, Mermin is not responsible for the distortion of his views contained in the second half of this sentence. Fujimura's article was republished in French translation in *Impostures Scientifiques: Les Malentendus de l'Affaire Sokal*, ed. Baudouin Jurdant (Paris: La Découverte/Alliage, 1998), pp. 214–236.
- [9] B. Latour, Ref. 6, pp. 10–11, 43n.
- [10] N.D. Mermin, Ref. 1, p. 13.
- [11] B. Latour, Ref. 6, p. 5, italics in the original; see also pp. 35–36 for similar statements.
- [12] Mermin concedes that “there are, to be sure, many obscure statements that appear to be about the physics of relativity, which may well be misconstruals of elementary technical points.” (Ref. 1, p. 13)

- [13] See A. Sokal and J. Bricmont, *Intellectual Impostures / Fashionable Nonsense* (Ref. 3), Chaps. 1–3, 5–6, 8–11.
- [14] For a critique of Ilya Prigogine’s writings on chaos and the arrow of time, see J. Bricmont, *Physicalia Mag.* **17**, no. 3–4 (1995); and in *The Flight from Science and Reason*, ed. P.R. Gross, N. Levitt and M.W. Lewis, *Ann. New York Acad. Sci.* **775**, 131 (1996). For a critique of the Copenhagen orthodoxy in quantum mechanics, see J. Bricmont, in *Les Sciences et la philosophie: Quatorze essais de rapprochement*, ed. R. Franck (Paris: Vrin, 1995), pp. 131–179. Note also that, in Sokal’s parody, some of the most subjectivist pronouncements of Heisenberg and Bohr are quoted with an irony that — contrary to Beller’s assertion (Ref. 2 at p. 31) — was *intended*.
- [15] This hubris was astutely analyzed in the letter of L.S. Lerner, *Phys. Today* **52**(1), 15 (Jan. 1999).
- [16] Indeed, it is unclear to us whether those views can even be formulated as a coherent and plausible doctrine.
- [17] See e.g. J.T. Cushing, *Quantum Mechanics: Historical Contingency and the Copenhagen Hegemony* (Chicago: University of Chicago Press, 1994); S. Goldstein, *Phys. Today* **51**(3), 42 (Mar. 1998) and **51**(4), 38 (Apr. 1998); J. Bricmont, in *Les Sciences et la philosophie* (Ref. 14).
- [18] For a brief exposition of our views on the philosophy of science, see A. Sokal and J. Bricmont, *Intellectual Impostures / Fashionable Nonsense* (Ref. 3), Chap. 4.
- [19] M. Beller, *Phys. Today* **52**(1), 96 (Jan. 1999).
- [20] For good accounts of the role of history and sociology of science within a rationalist/realist epistemology, see P. Kitcher, in *A House Built on Sand: Exposing Postmodernist Myths About Science*, ed. Noretta Koertge (New York: Oxford University Press, 1998), pp. 32–56; and S. Haack, *Manifesto of a Passionate Moderate: Unfashionable Essays* (Chicago: University of Chicago Press, 1998).