



**Review: [Untitled]**

Reviewed Work(s):

*How the Laws of Physics Lie.* by Nancy Cartwright  
Henry E. Kyburg Jr.

*Noûs*, Vol. 24, No. 1, On the Bicentenary of Immanuel Kant's Critique of Judgement. (Mar., 1990), pp. 174-176.

Stable URL:

<http://links.jstor.org/sici?sici=0029-4624%28199003%2924%3A1%3C174%3AHTLOPL%3E2.0.CO%3B2-B>

*Noûs* is currently published by Blackwell Publishing.

---

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/about/terms.html>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/journals/black.html>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

---

The JSTOR Archive is a trusted digital repository providing for long-term preservation and access to leading academic journals and scholarly literature from around the world. The Archive is supported by libraries, scholarly societies, publishers, and foundations. It is an initiative of JSTOR, a not-for-profit organization with a mission to help the scholarly community take advantage of advances in technology. For more information regarding JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

Leibniz's most explicit arguments are based on the Principle of Sufficient Reason. Mates does offer a non-boring line of defense on Leibniz's behalf (pp 146ff). It leans heavily on continuity and (so far as we can tell) a transitive similarity relation, which isn't so happy. At best the argument concludes that we need world-bound individuals because there is no natural, plausible way of dividing the attributes of an individual non-trivially into the accidental and the essential: by envisioning small changes, we eventually have Adam as an elephant (or anyway as a two-ton coarse-haired beast with a trunk). Does this jibe with Leibniz's Kripke-Putnam doctrine in the *New Essays*, where a natural, plausible, non-trivial division of attributes is just below the surface?

These remarks are meant to reflect the richness of this first-rate book on Leibniz. But perhaps it is, by some lights, *too much* a book on Leibniz: it is a pity that Mates should discuss body and space without mentioning Descartes, or contingency without mentioning Spinoza. Mates does splendidly at expounding and criticizing Leibniz on his own ground, but the newcomer could easily come away with the impression that Leibniz worked in a vacuum.

The book has a bibliography and a usefully short index of names and topics. There are relatively minor typographical errors on pp 66, 77, 90, 94, 194, and 238.

Nancy Cartwright, *How the Laws of Physics Lie* (Oxford: The Clarendon Press) 1983.

HENRY E. KYBURG JR.

UNIVERSITY OF ROCHESTER

The nine essays in this volume live up to the sparkle of the title. They all hammer on the same theme: the 'theoretical' entities of physics and their causal interactions are as real as anyone could want them to be; the laws that are alleged to characterize their behavior are largely fictions. Put succinctly: "I believe in theoretical entities. But not in theoretical laws." (p. 99)

The theme of the volume is not so much *that* the laws of physics lie, but *how* the laws of physics lie. I think hardly anyone thinks that the laws of physics, as they are currently taught, embody the truth, the whole truth, and nothing but the truth. "But those aren't *the* laws of physics," someone might say. "They just represent our current best guesses." This response misses the point. It is not that physics isn't finished; it is that the fundamental laws don't *attempt* to embody truth about the world: "fundamental laws do not govern objects in reality; they govern only objects in models." (p. 18)

Nor do we adopt theories because they provide an explanation of the phenomenological laws for which we have relatively direct evidence. "Inference to the best explanation," on Cartwright's view, is a myth, except in the case of low-level causal explanations. For such an explanation to work, the objects and relations that yield the causal story must exist.

What function *do* theories serve? They pick out the kinds of models that our causal stories are to employ if they are to be successful. Their fundamental laws provide a framework, in which, through a series of additions and approximations and idealizations, phenomenological laws can be discerned. Cartwright makes a good case for this view of theories. It is made in part through the heavy use of examples from quantum mechanics and other scary parts of physics, so that much of what she writes is of direct relevance to the foundations of quantum mechanics as well as to the general question of the significance of theories and fundamental laws. In many cases the physics is beyond me, but the thesis comes through clearly.

What is not *quite* so clear to me is why one should assign any *physical* content at all to the fundamental laws and theories. To be sure, ". . . the real content of our theories in physics is in the detailed causal knowledge they provide of concrete processes in real materials." (p. 128) But when Cartwright presents her 'simulcrum' account of explanation, the theory appears as a constraint on *models*, rather than embodying any sort of direct representation of reality. The objects and relations the theory talks about, according to her, exist and are real—but we have no reason to think the theory has their properties exactly right. In short, we have little reason to regard the fundamental laws of a theory as providing more than a convenient (perhaps even inspirational!) "way of talking," ". . . we do not use Newton's inverse square law as if it were either true or false." (p. 75)

But whether or not theories are a bit more than ways of talking, they are not the sort of entities that confront experience head-on. They aren't refutable, or verifiable, or confirmable. How then, do we measure their value, quantify their convenience? If theories are so far removed from empirical endeavor as Cartwright suggests, if their function, as she also suggests, is essentially organizational, how should we judge them? How do we tell misleading superstitions from instructive fables? No detailed account is provided. But surely some lies are better than others.

Half the thesis of *How the Laws of Physics Lie* concerns the marginal importance of theoretical explanation and fundamental laws. The other half of the thesis concerns the importance of basic causal laws and the reality and importance of the objects and relations referred to by those laws. Thus the streak in the cloud chamber is caused by the charged particle; and there has to be a charged particle for this causal explanation to hold. So let us turn to the question of causality.

The first essay of the volume, "Causal Laws and Effective Strategies," addresses the question of causal laws. In particular it addresses the question of *statistical* causal laws, defining them in terms of both other causal laws and non-causal laws of association. (" . . . only partitions by causally rele-

vant variables count in evaluating causal laws.” (p. 38)) Do I suspect a vicious circularity here? Yes, despite the cute argument to the effect that according to the definition of the causal relation offered, no world in which there is statistical relevance can help but have a statistical causal law. It is in the selection of properties, not merely in the selection of *causally relevant* properties, that it seems to me that the difficulties arise.

More immediate, however, is the problem of the very idea of statistical causality. This problem has been persuasively raised by David Papineau.<sup>1</sup> And when Cartwright really evokes our intuitions, it is with images of a charged particle crossing a cloud chamber and leaving in its wake the droplets whose condensation *it* caused. How this can be tied to a notion of causality according to which the causal relation holds between *classes* of events remains obscure.

But let us leave the question of statistical causation to one side. I can only applaud Cartwright’s view that what we are *doing* in experimentation is manipulating causes and observing (directly or indirectly) their effects. That is the sort of causation I understand easily: causation tied to *action*. I can pick up the rock; I can hurl the rock; I can break the window; I can turn on the machine, . . . And so can you, and so can one. The world is full of handles and levers. But this approach turns causes into *empirical*, more or less observable, relations. Exactly contrary to Hume, I can *observe*, in myself, the power that makes the cue (and hence the cue-ball) move; the power that makes the object ball move is just an inductive extension. But there is no profound metaphysical category here, nor any guarantee that causes can always be found.

Viewed in this way, statistical causation makes sense. By choosing to have the world instantiate one class of state descriptions rather than another, I can choose the reference class that determines a probability, and thus affect the probability. But in *this* sense, statistical causation is as much an epistemic matter, depending on what I know, as it is an ontological matter, depending on how the world is.

The same considerations may be applied to the choice of effective strategies: it may interest somebody to know what an effective strategy *is*. But since that depends on how one uses predicates to pick out properties and how those properties describe the world, and since there are any number of ways of doing that, the question strikes me as theological. What strikes me as *real* is the question of what I should do, *given* the way I slice up the world and *given* what I know about the slices. This is the question of what is an effective strategy for me, in my epistemic situation, believing what I have warrant to believe about specific causal relations. I suspect that Professor Cartwright thinks of herself as addressing deeper concerns.

Well, that may be as it may be. It is *at least* true that she provides detailed and extensive argument that we should re-think the role of theory and of fundamental laws in scientific experiment and engineering, and of causality (or our *knowledge* thereof) in decision theory.

<sup>1</sup>D. Papineau, “Probabilities and Causes.” *Journal of Philosophy* 82, 1985, pp. 57-74.