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Wissenschaft als Messung



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My primary academic activity while at the Wissenschaftskolleg was finishing a philosophical book on causes and capacities. A good deal of the research for the book was carried out while I was in Berlin, and five of the six chapters were written there. The book is titled "Nature's Capacities and their Measurement"; it should be published by Oxford University Press in the spring of 1989. I spoke frequently with colleagues at the Kolleg about topics and problems in the book, especially Norton Wise, Lorraine Daston, and Lorenz Krüger, and they helped to shape the final ideas. The other principal influences on the work on capacities were David Pearce and Gottfried Seebass, both philosophers from the Freie Universität, as well as the other members of Seebass's seminar on causality, which I attended throughout the second semester.

The book deals with problems for causation set by David Hume, but still troubling to the natural and social sciences: What place can be found for causes or capacities in an empiricist world? Hume answered, "None". The source for the concept of causation is not to be found in the world, but rather in our own psychological processes. Only regularities are given in nature. Bertrand Russell made similar claims with respect to modern physics. According to Russell, physics uses only functional laws; talk of causation plays no role at all. This is a familiar theme in the social sciences as well, where it is typical to measure correlations — indeed to measure far more sophisticated statistical associations than mere correlation; yet it is commonly argued that any attempt to draw causal conclusions from these statistical measures is entirely misplaced.

Nature's Capacities argues against these Humean theses. Not only do

we need causes, but the far stronger notion of capacity is also essential to our contemporary scientific world picture. Yet the book is firmly in the empiricist tradition. It is concerned with measurement and with testing, and it endorses the stringent empiricist demand that no scientific hypothesis should be admitted without testing. To many this may sound like conventional scientific method, but in fact it is contrary to contemporary philosophic orthodoxy, which maintains that hypotheses cannot be tested severally. All that can be tested are grand wholes — complexes consisting of entire theories plus hosts of auxiliary assumptions borrowed from other domains; and even then the most a test can do is to refute the whole, but never to confirm it. It is also contrary to much contemporary scientific practice. Especially striking is modern physics where much theoretical innovation is driven by the needs of the mathematical structure and not directly by the phenomena.

The principal claims of the book can be summarized in three slogans: Science is measurement; Capacities can be measured; and Science cannot be understood without them. The primary focus is on probabilistic causation, and much of the discussion of my second thesis concerns how to infer from statistical data to causal conclusions. The discussion of the third thesis is somewhat round about. The most immediate way to construct the world which is pictured by a scientific discipline is to look at what the received theory in that discipline says. *Nature's Capacities* does that to some extent, especially in physics where an example involving lasers is used to argue that Russell was wrong and physics does talk about causes after all. But looking to the claims of theory is not the only way to tell what the scientific world consists of. One must also look to see what kinds of things are presupposed by the methods that the science uses and the uses to which it can be put. This is a lesson that was stressed throughout the year at the Science and Culture seminars at the Kolleg, especially by Norton Wise and Tim Lenoir, and I have taken it to heart in *Nature's Capacities and their Measurement*. One of the recurring themes in the book is that neither the methods nor the applications of much of modern science make sense except in a world where causes and capacities are at work. Since empiricists ought to put method and application at the core of their epistemology, *Nature's Capacities* urges a divorce of traditional empiricist epistemology from traditional empiricist metaphysics. Empiricists, following Hume, would like to eschew capacities; but empiricist methodology needs them. One cannot retain the epistemological core of empiricism without giving up the metaphysics of Hume.

Besides the work directly related to the book, my intellectual activities at the Wissenschaftskolleg had three main focuses. The first were the provocative discussions and studies in the Science and Culture group,

and particularly the philosophical problems raised there about objectivity and realism. These discussions were the source of one of the two projects which I will be working on as I return to Stanford, involving a defense of a rather radical thesis about scientific laws: namely, that laws of nature are true only of human artifacts. I expect to remain in close contact with a number of members of the group for help with this project. The second distinct activity was a weekly seminar on purely philosophical questions of meaning, truth, and reference held during the spring by Lorenz Krüger, Hidé Ishiguro, my husband Stuart Hampshire, and Ernst Tugendhat of the Freie Universität. Thirdly, at the end of the year I began work on a new research topic on questions about abstraction in physics, and in particular exploring parallels between how parables function in moral or political contexts and how scientific models work. I got a lot of help and starting ideas for this project not only from colleagues in Science and Culture but also from those more centered in literature, such as Reinhard Baumgart, Philip Fisher, and Conrad Wiedemann. Altogether I feel that my work flourished while at the Wissenschaftskolleg, and the mixed disciplines of the group were a serious source of new ideas and a great stimulus to the imagination.