OBJECTIVITY SANS INTELLIGIBILITY: HERMANN WEYL'S SYMBOLIC CONSTRUCTIVISM

Abstract

by

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The general topic of this dissertation is the relation between concept formation and the demand that scientific theories should provide an objective and intelligible account of natural phenomena, that is, an account that justifies their mind-independent reality and, at the same time, renders them understandable. More particularly, we consider the view of the mathematician and theoretical physicist Hermann Weyl, that this twofold demand cannot be satisfied, for it pulls science in opposite methodological directions, one driven by Husserl's pure phenomenology, the other by Hilbert's axiomatic formalism.

According to Weyl, scientific understanding requires wholly contentual reasoning and the phenomenological method of concept formation, that is, that concepts be introduced by abstraction from experience. Scientific objectivity requires partly non-contentual or purely symbolic reasoning and the method of formal axiomatics, that is, that concepts be freely created or introduced as mere symbols by stipulating, under certain constraints, fundamental theoretical principles.

This view, which we call *Weylean skepticism*, is important not only because it was propagated by one of the most influential scientists of the twentieth century, but also because it indicates how the tension that Weyl saw between objectivity and intelligibility can be dissolved.

We criticize, first, the attempt at dissolving this tension by adopting Husserl's pure phenomenological approach to scientific objectivity, which recently re-emerged in the literature. On this approach, contentual reasoning is indispensable for objectivity, which entails, as Weyl emphasized, that scientific concepts without contentual significance must be eliminated. We argue that Weyl realized that the phenomenological approach fails to account for objectivity, since it also entails the elimination of hypothetical elements, and so collapses into phenomenalism, which can support only intersubjectivity.

Secondly, we analyze Weyl's formal axiomatic approach to objectivity, and examine the requirement of categoricity, i.e., that a scientific theory, as a system of symbols, may provide objective knowledge only if its contentual interpretation is univocal up to isomorphism. But we argue, on the one hand, that this requirement fails to be satisfied in quantum physics, and that recent attempts at addressing this failure render theories unable to account for natural phenomena that they were designed to account for. On the other hand, we suggest that objectivity without categoricity commits one to a modal dappling of the world, that is, to the view that the structure of the real world spans many physically possible worlds.

Finally, we argue that the alleged tension between objectivity and intelligibility can be dissolved through a formal axiomatic approach to understanding. Against Weylean skepticism, we submit that the conditions under which purely symbolic reasoning may render natural phenomena understandable are expressed by the notions of simplicity and control. While the former can be conceived of as syntactic elegance, the latter obtains if one shows, by contentual reasoning, that the deviation from actual observations of results based on purely symbolic reasoning is smaller than experimental error.