

1992 "Elizabeth A. Lloyd, *The Structure and Confirmation of Evolutionary Theory*," *Nôus* 26(1): 132–135.

Review of: Elisabeth A. Lloyd, *The Structure and Confirmation of Evolutionary Theory* (New York: Greenwood Press, 1988), viii + 235 pp., \$37.95.

This work is written for two audiences: philosophers without previous knowledge of evolutionary biology, and persons possessing some knowledge of population genetics and other aspects of evolutionary biology. The first three and eighth chapters lay out the semantic approach to understanding the structure and confirmation of theories, according to which (1) a theory is a model or set of models, (usually) a set of mathematical objects standing in certain mathematically representable relations, and (2) confirming a theory amounts to confirming empirical claims stating that a (kind of) natural system is isomorphic in certain respects to a given model or set of models.

Lloyd thus sides with Patrick Suppes, Bas van Fraassen, Frederick Suppe and others in her general approach to understanding theories and their confirmation, and against logical positivist approaches which view theories as axiomatized sets of statements, holding that the semantic approach is more descriptive (thus prescriptively charitable) in having greater flexibility ("the theory can be characterized more or less formally, without first defining a set of theorems"), a more precise role (providing a family of models to be used to represent empirical phenomena), and realist/anti-realist neutrality with respect to interpretations of "theoretical" elements of the model.

The specific controversies in biology to which this work is addressed in chapters four through seven are those over the status of evolutionary theory. Critics have held that, under the hypothetico-deductive (H-D) account of theories, the presence of laws of nature (strictly universal statements incorporating some sort of physical necessity) in a theory is an important mark of its status and the status of its explanations as "scientific," and that evolutionary theory lacks reference to laws of nature.

J.J.C. Smart, for example, has held that the theories of biology do not contain laws in the strict sense because they contain implicit references to the planet Earth, whereas laws in the strict sense apply everywhere in space and time and may be expressed without reference to particular entities. Biological explanation is thus of a kind with historical explanation, given implicitly or explicitly in terms of historical narratives or stories about particular entities and their descendants, not in terms of covering laws such as those found in Newtonian physics. Karl Popper and Thomas A. Goudge have agreed with him. On the other hand, Michael David Ruse holds that Mendel's laws and other components of evolutionary theory can be understood in terms of the H-D View, as a set of relatively immature "H-D sketches" embodying just as much necessity as physical laws but lacking the full formulation that would give their statement the power to support rigorously deductive inferences. David Hull takes a different tack, holding that evolutionary theory contains statements of natural law only where they refer to kinds of species or other units.

Lloyd thus sets for herself the task of sorting through this controversy, in particular with respect to the explanations of population genetics, and of exploring the relative merits of the axiomatic approach and the semantic modeling approach as appropriate for appraising the status of given theories. Specifically, she aims at evaluating the strengths of these competing views for dealing with the problem of rendering a philosophy of biology that is attentive to biological theory, the problem of adequately addressing the role of mathematical models in biological theories, and the special problems of theory confirmation and event prediction that arise for biological theories.

Lloyd's execution of this task is clear, methodical, and, as it does not utilize detailed mathematical examples, accessible to those whose knowledge of population genetics is nontechnical. Moreover, the argument for understanding theoretic confirmation as comprising fit between model and data, independent testability of aspects of the model, and variety of evidence (range of application of a model as well as degree of support for individual applications) is compellingly illustrated with a variety of concrete examples as case studies from practicing scientists.

I have two critical observations to make of this work, both arising out of my impatience for further like applications to other fields, such as history and psychology. Such are available elsewhere, although not in Lloyd's precise formulation. Somewhat more of the resources of the semantic approach are communicated, for example in Paul Thompson's *The Structure of Biological Theories* (Albany: SUNY Press, 1989) (although he indulges more actual mathematical formulation than does Lloyd), and it is interesting to note that some of Lloyd's more general theses were anticipated, in an assessment of the hegemony of behaviorism in psychology, by Donald D. Jensen as early as 1970 ("Polythetic Biopsychology: An Alternative to Behaviorism," in James H. Reynierse, ed, *Current Issues in Animal Learning: a Colloquium* (Lincoln: Univ. of Nebraska Press), pp. 1-29.

Second, Lloyd does not address the thorny question of demarcation between disciplines and the disservice done to the advance of knowledge done by intellectual and institutional compartmentalization. Evolutionary explanations abound in numerous other fields, and the clarification of structures and problems common to fields as academically diverse as biology, history, psychology, and letters could be an exciting corrective to the tendencies of disciplines toward intellectual isolation – certainly a proper role for philosophy, and one entirely in keeping with Lloyd's views on the nature of theoretical confirmation. Under the stimulation of Lloyd's work and that of other proponents of the semantic approach, the

philosophical structure of historical and other theories alleged not to conform to the ideals of science hopefully will receive renewed critical attention.