

Mirowski, Philip. 1994. *Natural Images in Economic Thought: Markets Read in Tooth and Claw*, New York: Cambridge University Press. xiii - 618 pages.

Reviewed by John C. Moorhouse, *Department of Economics, Wake Forest University*

This lengthy, interdisciplinary volume contains twenty essays first presented at a conference at Notre Dame University in September 1991. The avowed purpose of the volume is twofold: to explore how images from the natural sciences, principally but not exclusively physics and biology, have influenced the development of economic theory and to determine, in specific historical contexts, what claim economics can make to being scientific.

There is validity in the editor's claim that one of the major contributions of the volume lies in the authors' use of the language of metaphor to communicate across four fundamental views of the relationship between the Natural and the Social. These views are identified by Philip Mirowski as: 1) The Natural and the Social are identical; 2) the Natural and the Social are disjunct but individually lawlike; 3) the Natural is objectively stable, whereas the Social is patterned on it but is not stable, and 4) the Natural and the Social are both unstable and hence jointly constructed as mutually supportive. That post-modernists subscribing to position (4), including Mirowski, are represented in the discussion is another contribution adduced by the editor to this collection of essays (p.11).

A subtext of the book is a debate about whether or not the appropriation of ideas and concepts (metaphors and analogies) from the natural sciences contribute to the development of economic theory. There is no question that economists have borrowed and applied ideas from the realm of the Natural. Particularly influential has been 19th century classical mechanics (Moorhouse, 1976 and Mirowski, 1989). In many cases, some reviewed in the book, the transfers are simply inappropriate, with the derivative economic analyses running the gamut from misleading to bizarre. While much of this "economics as social physics" and "economics as biology" has not withstood scientific scrutiny and has not survived, except in the intellectual history of economics, some of the authors are more sanguine than the editor about the interdisciplinary usefulness of fundamental concepts.

Twenty-one authors are represented in the volume. Eleven are economists, five are historians of science including one specializing in the social sciences; two are philosophers of science, and one each is a political philosopher, a historian whose research centers on "the cultural and political resonances of objectivity," and a banker turned student of post-modern literary criticism.

The book is divided into five parts. Part I is a two chapter introduction, including one defining metaphor and analogy. The latter is heavily influenced by D. McCloskey's views on the "rhetoric of economics." The four chapters of Part II discuss the use of metaphors from physics and the application of formal mathematics in economics. Mistitled "Uneasy Boundaries Between Man and Machine," Part III includes chapters on the circulatory system within the body as a metaphor for the circulation of money within an economy and the idea of evolution in economics. Of the three chapters, two have nothing to do with a mechanistic view of economics.

Part IV deals with the influence of ideas from biology on economic thought. The ideas run from the holistic image of the economy as an organism to that of evolution. The less written about an economy as a living biological entity the better. The two strongest chapters deal with evolution and Hayekian spontaneous order. Both are well-done critiques. Part V contains four essays including Mirowski's summary of his position; a history of the 19th century treatment of economics by the British Association for the Advancement of Science and the divorce of statistical analysis and formal mathematical modeling in economics, and a comparison of Aristotle's and Hayek's theories of social order.

The final chapter, by David C. Moore, is wholly out of place in the volume and has the distinct air of having been tacked on. Its subject is feminist accounting theory via post-modern literary criticism. The most charitable interpretation for its inclusion is that feminist accounting theory provides, in the editor's mind, an example and a critique of a constructed reality. Because there is no difference between fact and fiction (Is that a fact?), accountants should be understood as generating texts not reflections of a "natural" economic reality. There is, after all, no order independent of the observer. Further, the essay explains how accounting marginalizes women because it measures GNP in such a way as to exclude non-market goods and services. I thought that that old canard had died 50 years ago. (See *any* economics textbook covering GNP published in the 20th century). Accounting also denigrates women because it is based on "the controlling, hierarchical, systematizing style that is masculine" (p.596). On page 597, the reader learns that a careful etymological tracing of the verb 'to account' from the Latin through High German to modern English demonstrates that "accounting and castration are inextricably linked." It is hard to resist taking off on this piece and wasting more scarce journal space.

The uneven quality of the chapters and space constraints preclude reviewing each of them. Nonetheless it seems desirable to discuss several of the more serious essays. Sharon E. Kingsland begins Chapter 9, on the influence of Alfred J. Lotka's on economics, by observing that there is a strong affinity between economics and ecology. Both are concerned with the allocation of scarce resources among competing ends. Lotka employed systems of differential equations to model biological evolution and then attempted to construct analogous models to explain the dynamics of economic systems. Although the synthesis was never completed, Lotka's approach to the formal modeling of dynamical systems influenced Paul Samuelson and Herbert Simons, both future winners of the Nobel prize in economics. Of interest is that Samuelson is the consummate neo-classical economist, while Simon has remained a lifelong critic of neo-classical analysis.

Chapter 12, by Margaret Schabas, and Chapter 13, by Camille Limoges and Claude Menard, both deal with the influence of Darwin's theory of evolution on Alfred Marshall. The evidence is mixed. While Marshall wrote that "the true mecca of economics is biology," his theory of the representative firm, which allows him to characterize industry equilibrium, clearly rejects the notion that economic and biological competition are akin. Yet contrary to Marshall, product and species differentiation coupled with spatial and temporal differentiation are devices for reducing or avoiding competition in both economic and ecological systems. They are means of surviving. It is precisely this rich

differentiation that is sacrificed by Marshall in order to maintain the notion of a well-defined industry.

Because such differentiation does not fit neatly within static neo-classical models of equilibrium based on perfect information, it is criticized by economists as the basis of anti-consumer market power. Marshall avoided this implication, that differentiation leads to monopoly, not by turning to concepts of dynamic competition borrowed from biology, but by assuming that all firms are identical (the representative firm model) such that no one firm had any competitive advantage over any other. In Marshall, this represents the triumph of the equilibrium analysis of physics over the richer, if theoretically messy, dynamics of biology.

In Chapter 14, Neil B. Niman argues that, while the use of biological analogies is not without difficulties, they promise several benefits. First, they enrich the description of economic agents and events by permitting economists to move beyond the representative agent to a more complete taxonomy of decision-makers. Second, biological evolution can contribute to the development of a theory of economic dynamics. Niman contrasts the theory of evolution based on genetic mutation and natural selection with that of economics wherein genes are identified with ideas, rules, conventions, and contracts, and market competition is interpreted as the process of natural selection favoring that set of ideas leading to better product design and relatively (not perfectly) efficient production. The market process also favors superior competitive strategies involving advertizing, marketing, product service, and distribution. The latter represents economic behavior routinely condemned by neo-classical economics. From this perspective, adaptation operates at all margins and not just those of received theory. Much of this is familiar to students of Austrian Economics (Moorhouse, 1997). I would quibble with Niman's insistence that the unit of analysis should be the firm, but nevertheless find his essay insightful.

By contrast to Niman, Alexander Rosenberg finds little in the theory of evolution that is useful for economics. In essence, he argues that the insinuation of evolution into the domain of economics represents apologetics for neo-classical economics. In this, I think Rosenberg wrong. Economic evolution is about change: learning, shifting tastes and technology, discovering, decision-making in the face of imperfect information, and imitating success. Such elements of change are assumed away in neo-classical analysis so that economic behavior can be modeled as a constrained optimization problem, the solution of which defines equilibrium. One implication of this approach is that the maximizing behavior of neo-classical theory is reversible. In principle, re-establishing the initial economic conditions of the problem generates the original equilibrium. But learning-by-doing, for example, undermines the notion of reversible economic behavior. Furthermore, as Alchian argued in 1950, not only is maximizing behavior impossible in the face of imperfect information, it is unnecessary. Relative superiority is sufficient to survive the rigors of competition. Thus evolutionary theory is the antithesis of the equilibrium analysis at the heart of neo-classical economics.

Rosenberg is on sounder ground when he argues that the incorporation of evolution into economics would deny the latter the status of being a predictive science based on empirical analysis. The puzzle is that Rosenberg interprets this as a serious limitation.

Ludwig von Mises and F.A. Hayek long ago explained why economics is not a predictive science and that statistical analysis represents history not scientific prediction.

Chapters 16 and 19 both deal with Hayek's concept of social order. Geoffrey Hodgson, argues, in the former chapter, that Hayek's methodological individualism is a suspect basis for a theory of social order. Briefly, Hodgson makes a distinction between ontogenetic change (development of the individual with a given set of genes) and phylogenetic change (evolution of the genetic makeup across a population). He then associates methodological individualism with ontogenetic evolution and the cultural and institutional evolution of Hayek's social order with phylogenetic change. Thus, he asserts, a fundamental inconsistency mars Hayek's theory. Moreover, Hayek's methodological individualism, a form of reductionism, offers no logical stopping point according to Hodgson. Why should individuals be the unit of analysis? Why not further reduce the problem to the 'electro-chemistry' of the brain and further downward? The final alleged inconsistency is that Hayek's analysis is based on purposive individuals whose interaction leads to a social order bereft of an identifiable purpose.

For Hayek the ideas and beliefs held by individuals governing preferences, design, production, and distribution are the genes of the economic system. Because *individuals* are capable of learning, new information and a changing economic environment generate new ideas and beliefs that in turn lead to changes in patterns of consumption, production, and distribution. The individual initiates economic evolution manifest at the systems level. As Lumsden and Wilson observe (1981, p.206), "Culture is in fact the product of vast numbers of choices by individual members of society."

For Hayek, self-organizing and self-replicating social structures evolve through natural selection that tests rival rules, customs, and traditions. Along with self-interest, altruism, social distinction, habit, and conventions endure because they have survival value. They endure because they reduce transaction costs and facilitate the peaceful interaction of goal seeking individuals. The profit and loss system, embedded in a legal order respecting private property and contracts, is just one example of a market process that selects against inefficiency and error.

What emerges is a spontaneous social order - the result of human action not human design. This order has no overarching purpose other than to enlarge the opportunity of individuals to achieve their own goals. Hayek points to such fundamental institutions as the moral order, the legal system, language, money, and the market as examples of evolving structures that are not the product of human design (Hayek, 1973). Hayek's view of the social order, grounded as it is on the ongoing problem of coordinating the fragmented and often tacit information held by individuals, is one of social evolution based on adaptation and natural selection among competing rules, conventions, customs, and social institutions. It is the epistemological function of the market process that Hayek celebrates. In my judgment, Hodgson largely fails to identify any fundamental contradictions between Hayek's methodology and his theory of social order. Yet Hodgson's contribution is well-worth reading carefully.

Murphy's chapter, "The Kinds of Social Order," is a deconstruction project consistent with the theme of the book, namely, "that few metaphorical appeals to nature will bear critical scrutiny and that all analogies break down if pushed far enough" (p.536). Again Hayek's theory of social order is the subject of the essay. The point of departure of social order is the subject of the essay. The point of departure is the observation that, "It is both surprising and unfortunate that Hayek never refers to Aristotle's nature, custom, and stipulation trichotomy: surprising because Hayek was (for an economist) a formidable scholar, and unfortunate because Aristotle's theory of social order is far superior to Hayek's" (p.537). The superiority of Aristotle's theory stems from his treatment of nature, custom, and stipulation as a circle of "interdefinability" (p.542). In other words, all socio-economic institutions, such as the market, simultaneously exhibit elements of the natural, customary, and designed. Institutions are nested in a progressive hierarchy running from the natural to the stipulated (rationally designed). By contrast, Murphy opines, Hayek treats the three categories as mutually exclusive. If for no other reason, this makes the Aristotelian view more fertile. The other limitation of Hayek is that his analysis of exchange is treated as if it were strictly a market phenomenon. Murphy argues that there are many alternative institutional arrangements competing with the market.

The superiority of Aristotle's theory is illustrated by contrasting the analyses by a number of scholars of the division of labor with that of the Aristotelian tripart categories, wherein the division of labor is natural, customary, and stipulated. Without elaboration, in Murphy's hands the Aristotelian position becomes a grand tautology capable of explaining (describing?) any social phenomenon *ex post*. I wonder if the theory yields any implications capable of falsification. In addition, Murphy seems to deny the universality of economic theory. Economists purport to explain a broad array of social phenomena independent of persons, places, or time periods. Of course, customs, conventions, and institutional arrangements differ across societies and time, but that alone does not deny the universality of economic theory. As examples, the laws of demand and supply explain the failings of central planning and the changing bride price among certain tribes in southern Kenya. They are as applicable to explaining 18th century trade patterns as to explaining intertemporal prices in today's futures market. Moreover, economic theory holds out the promise of explaining the evolution of the very social institutions that Murphy maintains define the different socio-economic settings requiring multiple theories.

Finally, in Chapter 17, Mirowski sums up his view, along with that of other deconstructionists, that the natural sciences can be reduced to "norms, coalitions, and self-interested strategies" (p.452). According to Mirowski the boundary between the natural and the social is negotiable, depending on the identity and (political?) purpose of the analyst. Social scientists, particularly economists, seize upon the supposed unity of the natural sciences in an effort to impart the impression of unity in the social sphere. To affect this appropriation, economists employ a juridical model based on analogical reasoning.

Mirowski writes, "It seems to me that concrete examples of this game of metaphorical musical chairs in the history of Western science are legion; they grace so many narratives in the history of science that someone should produce a catalogue of them someday"

(p.453). He then goes on to offer several examples ranging from the Animal Trials of Falaise, France in 1386 to the Presidential Commission appointed to study the Space Shuttle Challenge disaster in 1986. The purpose of the latter was less to find an explanation for the crash than to provide a juridical restoration of a sense of order. "The purpose of this quasi-judicial body was not to bring scientific method to bear on the problem, but rather to reconfigure the threatened boundaries of the Social and the Natural by relegating the offending phenomenon to its correct category" (p.468).

This is not the place to mount a defense of Western science or the utility of applying fundamental concepts across widely different disciplines. Can economic theory be improved, generalized, and made more insightful by employing concepts developed in the natural sciences to analyze complex systems? For those of us who believe in order independent of the observer, the answer must be a qualified "Yes." Consider the following concepts shared by economics and ecology: scarcity, production, efficiency, specialization, competition, product and species populations, spatial and temporal distribution, and evolution. Must economics be hermetically sealed off from ecology in such a way to deny itself an appreciation of how these ideas aid in the understanding of complex systems? In paraphrasing Claude Menard, in Chapter 3, I. Bernard Cohen states, "... if a 'conceptual transfer' arising from analogy is 'to be fertile', the analogy must 'leave room for the decentralization of the original idea', so as 'to preserve an appreciation of the radical differences between the original concept and the object of comparison'" (p.68). I can add nothing to Menard's view.

Does the volume accomplish its twofold purpose? The uneven quality of the essays means that the first goal, exploring how images from the natural sciences have influenced the development of economic theory, is only partially accomplished and the latter goal, determining the scientific status of economics, not at all. This should not surprise readers acquainted with Mirowski's work. He does not approve of contemporary economics. Not only is the discipline's status as scientific problematic, Mirowski doubts that "any extant economics is a viable intellectual project" (p.10). As a post-modernist, he asserts the instability of the Natural and the Social, the contextual construction of economic reality, and the danger of employing Natural metaphors in economics. Those are the themes of the conference. Nevertheless, I recommend this volume to anyone interested in a lively debate about the intellectual cross-pollination between the natural and social sciences. Many of the essays are provocative.

Two final comments. First, the subtitle of the volume is "Markets in Tooth and Claw" and it is illustrated on the front cover by Henri Rousseau's *The Repast of the Lion*. If the editor is attempting to be ironic here, he succeeds because as a metaphor for economic competition, it is a poor one. For what is illustrated is predation a phenomenon more often found in the political arena than the marketplace. Like economic competition, ecological competition is non-confrontational, as between wildebeest and gazelle competing for grass on an African savannah.

Second, Mises and Hayek have addressed many of the fundamental issues covered in this volume and while Hayek's work is the subject of two papers, where he is seriously under-estimated if not misrepresented, Mises is mentioned only twice and then only to be

held up to ridicule (pp.409, 557). One of the authors identifies Mises as a neo-classical economist! The volume is diminished by its neglect of Austrian economics.

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