

## Hayek the Neoclassical Font: A Review Essay on *Hayek's Challenge*

*Hayek's Challenge*, by Bruce Caldwell, Chicago and London:  
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**Abstract** Caldwell sets out to answer the question: what can neoclassical economists of the late twentieth/early twenty-first century, learn from Hayek's writings? His reply constitutes an intellectual tour de force of the neoclassical approach. If neoclassical economists read only one book on Hayek, this would have to be it. Caldwell is not just sympathetic and open, his objective is nothing less than to demonstrate to neoclassical economists, clearly and trenchantly, just how much they have to gain from certain of Hayek's writings. He succeeds remarkably.

**Keywords** *Hayek's Challenge* · Neoclassical economists · Neoclassical framework · Methodology · Hayek · Austrian economics

In *Hayek's Challenge*, Bruce Caldwell sets out to answer the question: what can neoclassical economists of the late twentieth/early twenty-first century, learn from Hayek's writings? His reply constitutes an intellectual *tour de force* of the neoclassical approach. If neoclassical economists read only one book on Hayek, this would have to be it. His object is nothing less than to *demonstrate* to neoclassical economists, clearly and trenchantly, just how much they have to gain from certain of Hayek's writings. He succeeds remarkably, if oddly painting Hayek into the image of a font of modern neo-classical economics.

To appreciate Caldwell's real achievement, it is necessary to remember the boundaries and hence the content of the neoclassical framework. We begin, of course, with the natural sciences, the neoclassicals' (ever-advancing) sheet anchor intermediated via the philosophy of science. Natural scientists study various aspects of the natural world, and they have had overwhelming success in this endeavor. For such study, scientists develop theories and engage in empirical investigations. In short, their focus is the natural world. They do not focus on being scientific.

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Philosophers of science then examine and discuss the philosophical standing and features of these scientific theories. These continuing philosophical reflections issue in a varying range of changing conclusions. This variety is mirrored faithfully in neoclassical theorizing as well, since neoclassical economics is also scientific.

A major philosophical conclusion is the unity of the sciences whereby the philosophical characteristics of natural science theories are also manifested in social science theories. Thus whatever conclusions philosophers of science reach with respect to the former are also their (automatic) conclusions about the latter, including, of course, neoclassical economics. Philosophers have developed philosophical criteria for assessing whether scientific theories are progressing or not. These same philosophical criteria tell us how neoclassical theories are doing, thus through the intermediation of the philosophers of science, the theorizing of the natural sciences pulls neoclassical theorizing along in its wake.

Neoclassical theorizing further manifests its scientific character through empirical exercises. It is from the natural sciences, of course, that the nature of these empirical exercises is derived. For the purpose of putting a theory through its paces, a shopping list of the requisite empirical and quantitative data is obtained. The theory then works through the data so gathered, utilizing quantitative techniques. All this is, of course, part of being scientific. In the natural sciences, ever-increasing knowledge of the natural world is obtained through these scientific techniques, i.e., this manner of theorizing. This same method and techniques mean that more knowledge is obtained about the economy. Thus neoclassical theorizing demonstrates just how scientific it is through such empirical work. Logically, this scientific framework permits only two alternatives: either one proceeds scientifically *or* one follows along lines that are un-, non-, or even anti-, scientific.

The resulting world of neoclassical theorizing is made up of a vast number of discrete, self-contained, self-sufficient theoretical boxes—e.g., utility theory, trade theory, monetary theory, capital theory, balance-of-payments theory, the theory of industrial organization, *et hoc genus omne*. In this neoclassical world, certain issues are prominent and at the forefront; other issues are regarded as insignificant; and its scientific character keeps many others outside altogether.

### Hayek the Leading-Edge Neoclassical Scientist

Caldwell surveys major fields of neoclassical economics to show that certain of Hayek's writings do not just contribute to, but indeed can lead, neoclassical theorizing. The first five chapters of the book set the scene. Then, in chapters 6–13, Caldwell sets out systematically and comprehensively, what neoclassical economists can gain from this selection of Hayek's writings, which he shows, is a *very* great deal indeed. Caldwell compares these selected writings with those of Hayek's major contemporaries on the same topic (e.g., Hutchison on methodology). He also relates them to new developments in neoclassical theorizing (e.g., complexity theory). As he proceeds, Caldwell brings in and comments on virtually every significant item in the secondary literature on these selected writings; and he traces through the various lines of development in this literature. Chapter 14 provides a summing-up and assessment. In chapter 15, Caldwell sets out his own views on Hayek's relevance

and importance to neoclassical economics. Caldwell feels Hayek is especially significant in indicating the path forward: how neoclassical theorizing can remain scientific without the albatross of falsifiability, along with pointers toward new areas of theorizing. Finally, there are four appendices: two examine various views on how far Hayek can be said to have changed direction in the 1930s, and one reviews the different interpretations made of Hayek's essays on "Scientism and the Study of Society." The fourth is a translation of Gustav Schmoller's review of Menger's *Principles*. The whole is expressed with Caldwell's characteristic lucidity. It is an exceptional piece of work. All future *neoclassical* writings on Hayek will have to be measured against it.

Caldwell begins with the necessary preliminaries to what he finds in Hayek to commend so strongly to Neoclassicals. These preliminaries are what the Neoclassicals can find in Menger, the *Methodenstreit*, and Mises and their respective significance to the development of neoclassical/scientific economics. As noted, Caldwell puts Hayek at the leading edge in key areas of neoclassical theorizing; Hayek has developed, over his lifetime, his own unique vision of what doing scientific economics means (pp. 12, 9). Menger is mostly, but not entirely, at the beginnings of this science; while Mises is nearly, but not quite outside the pale. Thus Hayek has a far greater and a very different potential for the neoclassical than the other Austrians who are usually grouped with him.

Caldwell sensibly rejects the notion held by twentieth-century economists that theory is identical with mathematical formalisms (p. 20). In other words, there are *other* ways of being scientific which are demonstrated throughout. Thus Carl Menger's ideas are perhaps on the cusp of science, but "to a modern reader," many of Menger's discussions (in his *Principles of Economics*) would seem more "like simple common sense...hardly the stuff of real science." Menger's work still has "certain other" scientific attributes. For one thing, it is extremely systematic. And Menger feels he is "making a scientific contribution" because he derives "laws" from individuals' attempts to maximize utility (p. 21). Thus Menger's formulations, though early, nevertheless do contribute to a number of issues within the neoclassical framework.

Useful goods are scarce, so choices have to be made (Menger's starting point). Various "laws" then follow (e.g., the value of inputs derives from their capacity to produce consumption outputs [p. 21]). Furthermore, the economizing activity of individuals, unimpeded by governments, leads to unintended and beneficial results, such as the development of trade. Money then emerges as the "most marketable" amongst traded commodities. The prices of goods depend on subjective evaluations, not on their costs of production. This allows all prices to be brought under the one explanatory umbrella (pp. 25–26). Monopoly defeats itself: monopoly prices induce suppliers to enter the market and consumers to search out substitutes (pp. 23–25).

In his discussion of marginal utility, Menger aims not at mathematical precision, but according to Caldwell, to explain social phenomena. Menger is concerned with "propositions about real-world economic phenomena [that are not] easily incorporated into mathematical models." In reality, there are transactions costs; "production takes time and the future is uncertain"; agents' plans are based on beliefs about the future, beliefs that may be erroneous (p. 31). Economic progress occurs as people learn more about their real needs and the actual capacity of goods to satisfy those

actual needs: “A thing is a good...because the causal relation between the thing and a need truly exists” (p. 33). Thus the number of “imaginary” goods declines. With social progress, people learn how to plan better for their future consumption (pp. 33–35).

Thus Menger works out whatever follows “from the logic of economizing activity” (p. 21). He terms this methodology “empirical” which moderns find confusing, since they would see Menger’s opponents, the younger German Historical School, as also pursuing empirical methods (pp. 21–22). In sum, Menger invokes the invisible hand; holds that competition emerges naturally; and that “beneficial social institutions” develop naturally from “the economizing actions of individual agents” (p. 34). Thus Menger’s systematic approach and his aim: “to discover the...laws governing economic phenomena”—render the *Principles* a “scientific treatise” (pp. 21, 20). Thus (*pace* Caldwell) the neoclassical inquirer finds only familiar, early themes in Menger’s *Principles*, an early attempt at being scientific.

In terms of the neoclassical framework, Caldwell shows the *Methodenstreit* is also shot through and through with neoclassical concerns; it is also however, something of a damp squib. Here, the Historical School opposed the classicals’ *laissez-faire*, hence its members also opposed theory in general and the assumption of self-interest. Menger wished to show that both were legitimate (p. 74). Hence he now moved on to bigger things, of which “diminishing marginal utility...was only a small part” (p. 73). Menger demonstrates theoretically that “individuals, acting in their own self-interest, give rise to social institutions” that have unintended effects, and that are often “benign” (pp. 73–74).

In his *Investigations (Investigations into the Method of the Social Sciences with Special Reference to Economics)*, Menger supports abstraction, as a method of scientific analysis, against the Historical School. All sciences abstract from reality and so each theory focuses on a particular aspect of a phenomenon. Indeed Caldwell notes that this is precisely what distinguishes a “theoretical treatment of a subject” from an historical one (p. 68). Menger then moves from this reasonable generalization to defend a “specific” position that “economic motivation and self-interest” are dominant motives, so to abstract on their basis is to capture perhaps “the most important side of human life” (p. 69). It is this “special side of life that theoretical economics isolates” (Caldwell affirms Menger is saying). In sum, Menger is addressing the all-important neoclassical question whether self-interest is the correct abstraction (i.e., does it clarify rather than obfuscate the phenomenon?). In effect, Menger says “yes” and this then raises the familiar neo-classical problems that are still being discussed: the justification of the claim that “self-interest” is so overwhelmingly important; what is acceptable “evidence” for and against this claim; definition of the content (e.g., is it narrow or broad); is it a psychological phenomenon or a general category (p. 69). Thus for Caldwell, discussion in this area by Menger moves along familiar neoclassical lines.

In dealing with social institutions, Menger’s sole target is the organicist approach. According to Caldwell, “Menger concedes” that spontaneous social structures *are* “analogous to a body’s organs,” but there are also *designed* structures that “are best studied” pragmatically. Furthermore, self-interested actions also generate “benign...institutions” as law, language, money, markets, etc. Caldwell feels that Menger thus demolishes his “organicist rivals” brilliantly and that the “atomistic approach” can

explain undesigned institutions theoretically *and* provides a better explanation (pp. 71–72). Thus, theory enters where “previously” only “historians and organicists” were found before (p. 73).

Similarly, the issues between Schmoller (i.e., empirical work, data collection, and sifting of facts) and Menger (i.e., theory) are pre-eminently neoclassical. According to Caldwell, Schmoller saw Menger as simply redistilling, for the *n*th time, the “abstract theories of the old dogmatism” (p. 75), but that the two were closer together in neoclassical terms than they thought. Rather than rejecting theory altogether, Schmoller “thought that...extensive additional data collection” was needed to make “more universal generalizations.” Current theories had a limited coverage (p. 76), and Menger, far from rejecting “empiricism,” thought strongly that his theories “identified essential elements of...reality” (pp. 75–76). Thus Caldwell feels “a debate on the actual disparities” between the two “would...have been worthwhile” (p. 77), but instead they “wasted energies” in hardening their positions and in mutual rudeness (pp. 77, 75–76). Thus their common views were obscured.

Caldwell finds several common views. Both relied on some sort of “acting man” in their thinking. The Historical School’s man had complex motives, while the Austrians’ man lay between this and the neoclassicals’ “passive automaton.” Both groups opposed positivism and Marxism (p. 77). Both regarded “the origin of social institutions” as a key economic question; the Germans investigated the issue historically, the Austrians, theoretically. Both followed Friedrich Carl von Savigny in one respect: he denied that institutions rationally designed for one society, could be transplanted into another and both “felt that institutions grow organically.” The Germans felt such institutions reflected a peoples’ or nations’ characteristics while the Austrians considered that institutions reflected “a specific set of cultural or social norms and values,” and both were, initially, suspicious of democracy (p. 78). These issues, it will be noted, are already neoclassical (“motives”) or else quite conformable to neoclassical thinking—fitting in easily as extensions or complements.

As Caldwell sees it, a “separate Austrian *School*” was created by the disputes and intransigence of the *Methodenstreit* while “Schmoller’s ostracism promoted unity” (p. 80). Thereafter, the Austrians really became known through Eugen von Böhm-Bawerk and Friedrich von Wieser, who helped to transform Menger’s wider analysis into a narrower marginalist one. In this, they possibly benefited from the rise of marginalism “in England and Lausanne” (p. 127). Thus, the School became identified with marginal utility, capital theory, and anti-Marxist arguments, not the analysis of social institutions (pp. 81, 82) and therefore “Menger’s efforts were an utter failure” (p. 74).

Mises now enters the scene as a member of Böhm-Bawerk’s seminar, which also included Joseph Schumpeter, Otto Neurath, Rudolf Hilferding, and Otto Bauer. Böhm-Bawerk was already a well-known critic of Marx’s value theory which had led to modifications on the Marxist side. The debate was carried forward during the first year of Böhm-Bawerk’s seminar. Additionally, the Austro-Marxists adopted the new, positivist argument to defend the “scientific” nature of socialism (pp. 102–05). Mises’s views on economic calculation and method develop through responses to the issues raised in the writings of Schumpeter and Neurath.

In his first book (published in 1908), Schumpeter examined many standard neoclassical issues. Like the Austro-Marxists, he also adopted an instrumentalist

view of scientific theory, from Ernst Mach and Henri Poincare. He therefore plumped for the “truly scientific approach” exemplified in the Walrasian general equilibrium framework (p. 109). These equations perfectly represented the “functional relations” and “mutual interaction” that existed amongst “objective [economic] entities” such as “prices and quantities” (pp. 109–10). Thus “Schumpeter...used Mach’s theory of science to clarify and defend the Walrasian approach” (p. 110).

An instrumental theory need not be realistic. Thus, with “a given social phenomenon,” its “historical study” and its “theoretical treatment” are “quite clearly...distinct.” In short, “[t]heory and history...occupy separate domains,” without any conflict. Instrumentalism also allowed the dispute over the “truth” of Marxist and subjective theories of value, to be simply by-passed (p. 110). Instrumentalism further by-passed the ontological dispute between the Austrians and Vilfredo Pareto. The former held that subjective value theory referred to “Aristotelian essences” (Menger) or psychological states (Wieser). Pareto defended indifference curves because they eliminated all metaphysical “reference to unobservable states.” Instrumentalism didn’t need to raise such questions; it merely asked, How well does the theory work? (p. 111). We may note that Schumpeter thus emerges as a clear and significant forerunner to neoclassical discussions in these areas.

Even before 1914, Neurath argued that a war economy had to be run centrally. During the war, he was a very senior economics official in the War Ministry. After 1918, he argued the war had shown the economy *could* be run as a single enterprise and it *ought* to be so organized to achieve justice. Money was “uncontrolled and disorderly.” And so, under “full socialization,” economic calculation would be in terms of physical quantities. This would mean “scientific economic management” (pp. 114–15).

“Mises, the monetary theorist,” made clear the intimate links between “two apparently unrelated subjects” (p. 117). Entrepreneurs, faced with “innumerable possible” factor combinations engage in “a self-interested search” for the “best” such combination, the one which minimizes their costs. This benefits society as resources are guided to “their most highly-valued uses.” But it is also difficult as there are multiple factors and production takes time all during which all sorts of changes might occur in supply and demand. In a market economy, factors have money prices “that reflect their relative scarcity.” But “under socialism” the state owns all factors and “there is...no market for them.” So “[s]ocialist managers” would have no price signals to tell them about the relative scarcity or abundance of factors (p.116) and so they could not calculate and avoid waste (p. 117). This is the standard neoclassical picture: motives, plus a single isolated firm, duplicated, and reduplicated.

“Mises recognized” that prices would “reflect relative scarcities and...guide production,” “[only] when the value of money [was] reasonably stable.” And so, “[f]or Mises, sound money and freely adjusting market prices...together make a private enterprise system work” (p. 117). In short, Mises is an American conservative or a reasonably intelligent member of the Tory Party in England (i.e., just as ignorant about the *real* analytical issues).

Caldwell considers only Mises’s 1920 article. At the time, “[s]ocialization schemes were being proposed everywhere”; *Socialism* is a response. For neo-classicals, this view of the book is quite proper as the analysis there is “praxeological” and therefore in a nonscientific area, in relation to neoclassical economics.

In terms of neoclassical economic science, Mises puts a “firmer...neo-Kantian” frame around Austrian value theory (p. 119). He developed his apriorism as a contribution to the “philosophical foundations of economics” (p. 120). His “praxeological science of human action” starts from “the idea that scarcity forces all humans to act, purposefully.” Introspection provides everyone with this “basic insight.” In logical terms, the axiom is *a priori* true and apodictically certain as any correctly deduced theorems are equally certain (p. 129).

This “basic category of action” is used in “all descriptions of human action, including historical narratives” (p. 129). Contrary to Max Weber, “[f]or Mises, human action is investigated both historically and theoretically.” Theoretical investigation involves comprehending “elements that are always present in all human actions. The most basic common element is the concept of action” (p. 121).

Caldwell cites Allen Oakley’s observation of the “bewildering array of suggestions as to [Mises’s] philosophical” position. Caldwell himself objects principally to Mises’s apriorism (NB as here outlined) because it is incompatible with fallibilism (pp. 124–25, n. 20).

Menger, Böhm-Bawerk, Wieser, Mises, etc., are united by their common oppositions: to Schmoller, Neurath, Marxism, etc. (p. 126). Also note that Neoclassicals have very different things to learn from each of Menger, Mises, etc. When on the table of common oppositions this variety of dishes is set out, we have the “Austrian School” with their common range of oppositions plus the various lessons that neoclassicals can glean from these proto-neoclassicals.

Hayek, in his turn, selected some and rejected other of these items (p. 130) and what neoclassicals can gain from Hayek is vastly more, and vastly more substantive, than anything they might obtain from the other Austrian economists usually grouped with him. Thus, for neoclassicals Hayek is distanced from the other Austrians, especially Mises.

As is evident from the brief summary at the start of this essay, Caldwell covers a vast ground. In what follows, therefore, I am forced to be drastically selective.

From the 1920s to 1941, Hayek tried “to construct an inter-temporal general equilibrium model of a capital-using monetary economy” (p. 176) and was in short addressing neoclassical issues. Initially, in *Prices and Production*, “capital theory [was] prominent...in explaining the cycle.” As Caldwell sees it when the market rate of interest falls below the natural rate, more capital goods are produced relative to consumer goods. “This lengthening of the capital structure cannot...be sustained” and ultimately it contracts (p. 178). Note that in this picture, all capital goods are perfect substitutes for one another; likewise with consumer goods. Exactly neoclassical!

This formulation was widely criticized; for one, by Piero Sraffa who asked why forced saving should be unsuccessful? Frank Knight criticized the concept of the average period of production, which Hayek and others used (p. 179). So Hayek began “rethinking his views.” The 1930s saw “a long process” of adjusting his models, followed by “fresh criticism and new adjustments.” He thought “to reconstruct a more suitable capital-theoretic foundation” and then return to his original problem, “the role of money in a dynamic capital-using economy.” Caldwell found that he admitted that even with the publication of *The Pure Theory of Capital*, “the task was unfinished.” Therefore, in Caldwell’s assessment Hayek’s “efforts to

build a dynamic equilibrium model of a capital-using monetary economy never reached fruition” (p. 180). In sum, Hayek’s “unfinished” work on capital offers little, if anything, to the neoclassical economist.

“Hayek’s varied insights into the ‘knowledge problem’ probably constitute his most enduring legacy in economics” (p. 338). Those theoretical economists who have developed the economics of information certainly acknowledge him as one of their forebears (p. 338). The 1930s saw problems emerging from the notion of equilibrium, especially with the assumption of perfect foresight (p. 224). Hayek first doubted whether “static equilibrium theory [could] capture certain essential features of a free market economy.” Agents did not have “objectively correct knowledge” (p. 337), but differing subjective perceptions of objective data (p. 213). Imperfect but purposeful, these fallible agents each had “access to different bits of knowledge” and these moreover were “dispersed, fragmented...often difficult to communicate” (pp. 337, 286). Hence Hayek’s new definition of equilibrium as the compatibility of plans under conditions of dispersed knowledge and subjective perceptions (p. 224).

This insight as set out in the article “Economics and Knowledge” is a major new departure in Hayek’s thinking related to his contributions to the socialist calculation debate (pp. 210–14) and it also marked a break with Mises’s apriorism. Although Hayek latter used the term apriorism in “Facts of the Social Sciences,” he seems to have meant “introspective knowledge,” which is quite neoclassical, but Caldwell is puzzled by the passage. Mises, of course meant something quite different by apriorism—fundamental axioms that are “apodictically certain and logically prior to experience” but also about the real world (p. 222).

Next, the obvious question: How is it ever possible to co-ordinate human action (p. 337; also see p. 225)? Standard economic analysis “gets things exactly backward” as it starts “with rational agents” (p. 286). Thus the conditions that give rise to the question are assumed away in static equilibrium theory (p. 337). The price system and other “social institutions that help co-ordinate actions of market participants” bring about such co-ordination as is observed. “[F]reely adjusting market prices” are produced by actions that reflect the “beliefs, plans, intentions of millions of market participants.” Market prices and competition transmit information and provide incentives for discovering “new information, products, processes” (p. 337).

In his political writings Hayek deals with a “fuller set of institutions” that create an environment offering the least hindrance to “co-ordination of knowledge” (p. 338). Thus Hayek and some new institutional economists address the same question: “What set of institutional arrangements might best assist fallible individuals to make better decisions and better use of their knowledge?” The assumption of a “*homo oeconomicus*” could not produce this question (p. 286) for a market system to work properly, it must be enclosed in nonmarket social institutions such as democracy under the rule of law “enforced and exchangeable property rights”; constitutional protection of a private individual sphere. Such notions are not found much in mainstream discussions and probably belong in discussions of growth, development, and planning. There they are more subtle and convincing than mainstream or Marxist notions (p. 348). Thus Hayek foreshadows, complements, enriches, or forges ahead of, neoclassical thinking in the areas noted. In *The Constitution of Liberty*, Hayek lays out the complex institutions and beliefs that promote the discovery, transmission, and use of knowledge. Thus individuals are allowed the best



chance of using local knowledge in the pursuit of their goals. The rule of law provides a criterion for ruling interventions in or out (p. 290).

In summary Hayek's "agent is a real human being who inhabits a specific social space [which] contains institutions that are both a product of and a constraint on" the behavior of agents. This is a challenge to standard undergraduate micro textbooks which have an "atomistic...asocial automaton" (p. 286).

In his very long essay on "Scientism," Hayek distinguishes between the natural and the social sciences, in terms of the explanatory schema they use. The essay's critical argument "for many social phenomena," including the market mechanism, was that it was only possible to explain their principle of operation. In short, in the social sciences, only pattern predictions could be made, not more specific ones. The essay contained a strong criticism of behaviorism (i.e., it was also concerned with psychology (pp. 271, 340, 341). According to Caldwell, the distinction between the natural and social sciences made the latter into "some sort of special case." Ernest Nagel criticized "Scientism" for arguing that explanation in the social sciences "was of a fundamentally different kind," while Popper defended the unity of scientific method. These criticisms came from "influential and legitimate philosophers of science" that had "to be taken seriously" (p. 304). Hayek found an answer after his investigation into theoretical psychology. Caldwell feels Hayek "probably did not realize at the time" how important an influence it would be on his thought (p. 341).

*The Sensory Order* tackled behaviorism head on. Behaviorism wanted to eliminate mental phenomena and interpretation from the study of human behavior, and treat the latter simply in terms of physical stimuli/responses. They sought to extend their views to social phenomena (pp. 270–71). For Hayek the mind was another spontaneously organizing complex structure (p. 346, also p. 341) and he worked out the actual complexity of the brain. The central nervous system is a "giant classification mechanism." The "mind" is "a vast network of interconnected neurons" (p. 264). Networks interconnect with other networks, classifications move into higher levels, and there is "a huge increase in the complexity of the system" (p. 266). Such networks are formed continuously. Gradually the organism builds up an imperfect "map" of relations amongst classes of external events. Within this, "models" are built of existing situations, models that help to evaluate and classify new impulses at many levels. Thus these "models" are checked and revised continuously (pp. 268, 269).

Consequently an explanation of the principle is all that is possible here: mental events can never be explained as fully as "the rest of the physical world" (p. 276). The situation is not mechanistic, however: people are as individual as snowflakes; they differ in their response to stimuli (pp. 268, 269). There is also much evidence for purposive behavior. An essential aspect of this is using models to try out a possible range of outcomes, from which the preferred one is selected (p. 270). This means that "knowledge based on introspection" can be used "to explain and to some extent predict" what others might do (p. 277).

The classical economists and philologists [sic] had identified "complex adaptive orders." Hayek also "encountered [such orders] in his research on the brain." Hayek now discovered they "were...found in...other *scientific* fields"—they were ubiquitous. In "the study of complex phenomena...only 'explanations of the principle' or 'pattern predictions' are possible" and; this is "a fundamental characteristic."

Hayek's "chief exemplar" was evolutionary theory (p. 304). Caldwell finds that "pattern prediction" describes pretty well what microeconomic theory is capable of (p. 383).

Economics was severely limited in the predictions it could make. Hence "Hayek was...keen to establish the ubiquity of complex phenomena." This meant "*many other sciences*" were just as severely limited; they too were forced into "explanations of the principle." Hayek now decided to abandon the old, traditional distinction, "natural science/social science" (p. 305). He now distinguished between the sciences that studied simple phenomena, and those that studied complex phenomena (p. 304). He did this "to preserve the scientific status of economics." This "new distinction" made it clear that the social sciences were "*fully scientific*"—they were amongst those that dealt with complex phenomena (p. 305). The distinction also fitted better with "the unity of scientific method" (p. 311). Here Hayek provided a "new framework" which endorsed "much of the standard philosophy of science of [the] day," although there still remained some important differences with Popper (pp. 304–05.) Summarizing Hayek, Caldwell says: Theories about complex orders are "less falsifiable"—they "forbid fewer events." Caldwell then quotes Hayek, who says: Advance into these fields means a necessary decrease in falsifiability. That is the price of advance (p. 310).

And so, as Caldwell sees it, Hayek "remained to the end a believer in science. His specific goal was to provide foundations...[in] natural science (and...physiological psychology) for...economics and the social sciences" (p. 260). Caldwell feels Hayek has provided "a scientific foundation for...an interpretive...social science." Hayek's "explanation of the principles" for the mind shows that two individuals in the same environment would nevertheless form different mental maps so their knowledge and beliefs would also differ and it is our abstract mental maps that determine our observations. "We always interpret from the standpoint of a theory." Thus the insistence that "all observation is theory-laden" has a "neurophysiological foundation" (p. 277).

In *The Sensory Order*, Hayek used new terms, "rules" and "order." These new terms continue through *The Constitution of Liberty*, into the discussion of "cosmos" and "taxis" in *Law, Legislation, Liberty*. The last appearance of these terms, together with "evolutionary themes," is in that work's Epilogue, with its reference to "learnt rules" that provided a sort of model of the environment (pp. 313–14).

## Conclusion: Hayek the Neoclassical Scientist

I have had to leave aside many significant issues in Caldwell's work. But I hope I have shown how Hayek is placed squarely within the boundaries of neoclassical economics. Therefore his intellectual affiliations are those of any neoclassical with the same extensive interest in the philosophy of science and of economics; these affiliations are with scientific contemporaries and contemporaneous philosophers of science. Hayek addresses only neoclassical issues and he provides intellectual leadership in significant new areas. He is intent on discussions in the philosophy of science and on scientific theorizing and the only reality he deals with is scientific–neurological. His thinking is as isolated from what people actually do (and have done, over the millennia) as that of any other scientist, neoclassical or otherwise.