



Some Reflections on F.A. Hayek's *The Sensory Order*¹

BRUCE CALDWELL

Department of Economics, University of North Carolina at Greensboro, P.O. Box 26165, Greensboro, N.C. 27402-6165, USA (bruce_caldwell@uncg.edu)

Synopsis: Though F.A. Hayek is principally known for his work in economics, he also made contributions, both positive and critical, to the field of psychology. His most important piece in the latter field is his 1952 book, *The Sensory Order*. This paper attempts to locate *The Sensory Order* in relation to some of Hayek's other works. The origins of Hayek's interests in psychology, as revealed by an early student paper that provided a starting point for his later book, is noted. We then examine what may have motivated Hayek some 25 years later to return to psychology. Finally, the larger role that the book came to play in Hayek's overall system is explored.

Key words: history of thought, psychology, scientism, institutionalism, behaviorism, physicalism, spontaneous complex orders.

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1. Introduction

Friedrich A. Hayek is well known for his work in economics, but he also made contributions, both positive and critical, to psychology. His interest in the field dates back to his days at university, and he even considered for a time making it his profession. Though he ultimately chose economics, almost a quarter of a century later Hayek would pull out a paper on psychology that he had written as a student and use it as the starting point for what would ultimately become his book, *The Sensory Order*. Hayek thought *The Sensory Order* a work of considerable importance. Even before it was published, he had written to John Nef (whose colleague on the Committee on Social Thought he soon would become) about it, describing it as 'the most important thing I have yet done' (letter to John Nef, 6 Nov 1948). He was clearly very disappointed that the book did not get much of a reception, and indeed it has only been in the last decade or so that anyone has paid it much attention. Yet intriguingly, for the rest of his life Hayek would continue to assert that it was an essential part of his larger contribution (e.g., Hayek 1994, pp. 138–139).

Hayek was also highly critical of various approaches within psychology. His original student paper contained a critique of the psychological theory propounded by Ernst Mach, a polymath Viennese scientist whose theories in a variety of fields were dominant when Hayek was a student. In later work, he disparaged the behavioral approach to psychology endorsed by Wesley Clair Mitchell, one of the

founders of American institutionalism. In his famous 1937 paper, 'Economics and Knowledge', he stated that we must investigate various 'empirical propositions' about how learning takes place if we are to understand the implications of the dispersion of knowledge, but went on to add that, 'I do not mean to suggest that there opens here and now a wide field for empirical research. I very much doubt whether such investigation would teach us anything new' (Hayek [1937] 1948, p. 55). And behaviorism was once again a target in *The Sensory Order* and in the methodological essay that preceded it, 'Scientism and the Study of Society'.

The goal of the present paper is to make sense of Hayek's varying positions on psychology by examining the origins of *The Sensory Order* and its role in the development of Hayek's thought. I begin by examining what motivated Hayek to produce his early student paper. I then try to show why he returned to it 25 years later. To accomplish the latter, I must describe some of the issues that concerned him during the intervening years. My narrative links the writing of *The Sensory Order* to Hayek's early reaction to Wesley Clair Mitchell's institutionalism and to his later critique of 'objectivism' in the 'Scientism' essay. *The Sensory Order* came to take on a much larger role in his later work both as an example of, and as an impetus for the discovery of further examples of, how complex spontaneous orders could exist in a variety of sciences, both natural and social. I conclude the paper with some remarks on a related field, that of experimental economics, one that I think that Hayek misjudged. My historical account will show that his misjudgment is understandable, but also that it was a mistake given the later development of Hayek's own thought.

2. Hayek's student paper

Hayek enrolled at the University of Vienna in November 1918, immediately upon returning from his war service, and for the first 2 years he split his studies between law and psychology. He wrote a paper that would provide his initial working material for *The Sensory Order*, one titled 'Beiträge zur Theorie der Entwicklung des Bewusstseins', during the spring or summer of 1920. The winter before Hayek had spent a few weeks in Zurich working in the laboratory of the brain anatomist Constantin von Monakow, tracing fiber bundles of the brain (Hayek 1994, pp. 63–64), an experience that may have stimulated him to write the paper. In the fall, Hayek put his work on psychology aside in order to prepare for some law exams, and it lay in a desk drawer for a quarter of a century. An initial translation, which includes Hayek's contemporaneous two-page summary of the paper, was provided in 1991 by Grete Heinz for the *Collected Works of F.A. Hayek* project (Hayek [1920] 1991). The translation, titled 'Contributions to a Theory of How Consciousness Develops', forms the basis of the remarks that follow.

While a full summary of the paper is not in order, it can perhaps be noted that it contains at least two important theses that would appear again in Hayek's more mature work. The first is his explanation of how an external stimulus causes a

physiological response in a network of brain cells that results in the emergence in our consciousness of a sensory experience. Hayek hypothesized that, at the earliest stages of a human's development, a network of connections forms among the individual's brain 'ganglion cells'. Prior to the person ever having any sensory experiences, external stimuli cause certain pathways of firings in this network to be activated. Then, throughout an individual's lifetime, new linkages get formed, some getting strengthened while others are weakened. Our sensory experiences are the direct result of the pattern of firings among this vast network of cells. When certain pathways are activated, the person has a specific conscious experience. Our consciousness of some sensation, then, is simply the outcome of the pattern of firings that the stimulus creates.

In explicating his theory, Hayek noted the paradoxical role of memory, which is a second theme in his later work. The creation of linkages allows us to have an experience and to remember it. Indeed, Hayek defines consciousness in terms of memory: to be conscious of something means that we are able to remember it in the future. But the linkages themselves are also a product of physiological 'memory' within our brain of past pathways of firings. This physiological memory permits experience, or as Hayek puts it, 'One might almost say that each individual thinks with his past' (Hayek [1920] 1991, p. 9).

Most important for our purposes, Hayek stressed that his theory, if accepted, challenged certain other prominent psychological theories of the day. A standard view of his time (referred to by Hayek as the 'doctrine of psycho-physiological parallelism') posited a parallelism between a stimulus and the related state of consciousness. Hayek's theory denies the existence of this sort of one-to-one correspondence between an external stimulus and the experience of a sensation. When something becomes part of our consciousness, it assumes a position in relation to all of our past impressions. Because each person has had different experiences, each experiences stimuli in a unique way. Indeed, an individual's experience of a given stimulus must as a result change over his lifetime, as new linkages are added (ibid., pp. 2-5).

Of the various theories that his own relativist approach challenges, Hayek picked out the 'absolutist' theory that Ernst Mach had developed in *The Analysis of Sensations* for special attention. Hayek notes that his own '...relative theory of sensory experiences in which the quality of consciousness associated with a stimulus is not intrinsic to this stimulus,' challenges the absolute theory of sensory experience, which prevails today' (ibid., p. 14). He goes on to say, 'The "dogmatic-atomistic concept of sensory experience" that has held sway until now must be swept aside and with it the assumption that there exists a sensory experience pure and simple that represents a basic psychic process. This assumption rests on the unwarranted identification of sensory experience with the specific stimulus that is supposed to activate it, the physiological element, which is the only component that can be simple or pure. All that we have just explained speaks against this conception of sensory experience as a constant element of consciousness processes' (ibid.).

For a second-year university student to challenge Mach's theory was quite ambitious. Mach had died in 1917, but his naturalist philosophy of science was all the rage in post-war Vienna. In its founding documents a decade or so later, the Vienna Circle of logical positivists would count him as a major precursor. Hayek, then, was attacking the theory of a leading positivist philosopher of science. Given his later antipathy to positivism, it is tempting to see in his critique of Mach the fledgling arguments of the antipositivist critic who would later emerge.

I think, though, that such an interpretation would be mistaken. Both Hayek's later reminiscences and the text of his paper suggest that, though critical of Mach's position, Hayek was working fully within the Machian, hence positivist, tradition. Like many of his peers, the youthful Hayek was taken with positivism.² Mach was a natural draw for a variety of reasons. In the post-war period a goodly number of professors at the University began to take a natural science-oriented approach to their subjects. Joseph Schumpeter had used Mach's philosophy of science in defending a Walrasian approach to economics in his 1908 book, *Das Wesen und der Hauptinhalt der Theoretischen Nationalökonomie*, a book that all the young economists had read.³ Mach's philosophy was popular among those on the political left (especially the Austro-Marxists), but it also provided even moderates with a scientific buttress against the worst sorts of unbridled metaphysics that informed many then-popular approaches to the study of society. (Hayek had direct experience with one of the latter in the person of Othmar Spann.⁴) As Hayek (1982, p. 287) would later put it, Mach was 'an only recently dead physicist to whose writings turned most of the young scientists, who then arrogantly regarded all non-positivist philosophy as absurd nonsense'.

Hayek's embrace of a scientific worldview is also evinced by his announced goal in his summary statement to explain 'consciousness phenomena' with a theory that is physiologically based and that therefore integrates the study of consciousness 'into the world view of the natural sciences' (Hayek [1920] 1991, p. 1). In later reminiscences, Hayek reflected further that his particular project was stimulated by '...skepticism about Mach's phenomenalism, in which pure, simple sensations are the elements of our entire sensory perceptions. ... I had the revelation that Mach's concept of "simple and pure sensations" in his sensory psychology was actually meaningless. Since Mach had qualified so many of the connections between sensations as 'relations', I was finally forced to conclude that the whole structure of the sensory world was derived from "relations" and that one might therefore throw out altogether the concept of pure and simple sensations, which plays such a large role in Mach' (Hayek 1982, p. 174).

In labeling Mach's reference to sensations 'meaningless', Hayek was using logical positivist language to accuse Mach of inconsistency. His point was that the theory of sensations violated Mach's own methodological dictum that reference to superfluous theoretical entities must be eliminated. In his student paper, then, Hayek was presenting an immanent criticism of Mach's theory. Intriguingly, Hayek would use the same sort of argumentative strategy in *The Sensory Order*, where he would argue that a specific scientific position (in the later case, behaviorism)

and the philosophical doctrine that provided its underpinnings (physicalism) are incompatible with what natural science tells us about the place of the mind in the larger physical order.

3. The intervening years

Indeed, this provides the clue for why Hayek went back to his student essay when he began to write what would become *The Sensory Order*: it would be useful in his attempts to undermine behaviorism and physicalism. But why did he want to do so? To understand his reasons, we must review some of the things that happened in the intervening period.

In 1921 Hayek received a law degree, then in 1923 a second degree in political economy. While working on the latter he met Ludwig von Mises, with whom he worked at a temporary government agency. Mises quickly became his mentor. Mises was known as a monetary theorist, and with an article published in 1920 had initiated the German-language socialist calculation debate. One of his opponents in this debate was Otto Neurath, whom Mises had known (and disliked) since before the war, when both had been in Eugen Böhm-Bawerk's famous economics seminar.⁵ Neurath was soon to become known as the expert on the social sciences within the Vienna Circle, and was the perfect embodiment of the union of positivist social science and socialist economics that the Austrians would soon become famous for opposing.

In his writings on 'war economy', Neurath called for a continuation of war-time central planning during peacetime. He also advocated a moneyless (his phrase was *in natura*) economy, one in which all production would be centrally determined based on needs as revealed by officially collected statistics. Neurath made his arguments using positivist rhetoric about how the 'war economy' approach was truly scientific, in contrast with standard economics, which by making reference to such unobservable entities as 'utility' and 'value', was mere metaphysics, and hence meaningless. Mises, who found Neurath's economic proposals preposterous, replied in his 1920 article that market-formed monetary prices were necessary for production managers to have information about relative scarcities and thereby to plan production rationally, that (as Mises provocatively put it) rational calculation under socialism was 'impossible' (Mises [1935] 1975).

The aversion that Austrian economists like Mises felt towards a positivist approach in social science had historical antecedents. Thirty years earlier the Austrian economists had fought a methodological battle against another foe, the German historical school. Historical school economists like Gustav Schmoller also opposed standard economic theorizing, touting instead the careful collection of detailed statistics as the first step towards understanding the intricacies of any particular economy. Brought up within the Austrian tradition, and then interacting with Mises, first while at their job and later as a member of the Mises Circle, Hayek came to learn the intricacies of these debates within the social sciences. His

own contributions would come later, but would also include a response to a new foe, the American institutionalists.

Soon after finishing his second degree, Hayek went to the United States for a 15-month visit. While there he met Wesley Clair Mitchell, and attended his history of economic thought class. Mitchell's reading of the history of economics, a shortened version of which may be found in Mitchell ([1924] 1930), would have immediately reminded Hayek of the German historical school version. The German account began with the claim that the classical economists had made some good observations about how the British economy of their day worked, but (under the influence of Enlightenment thought) they had been too quick to generalize, mistakenly thinking that they had come up with a *general* theory of how all economies operated. Ricardo and his followers were criticized in particular, both for their abstract method and for their willingness to claim as general truths what the historical school economists thought were country-specific economic proposals (e.g., concerning the benefits of free trade).

Mitchell provided much the same account about the past, one that he updated to include a critique of the marginalist movement. In Mitchell's opinion, marginalism was not much of a change from the old classical approach, and in particular contained the same, erroneous view of human behavior. What was needed instead was a firm scientific psychological foundation for economics. In Mitchell's mind, this was provided by behaviorism, which he considered an objective science of human behavior. Once economics embraced modern psychological underpinnings, it was a natural next step to begin the study of institutions, because institutions affect behavior. As Mitchell himself put it: "Institutions" is merely a convenient term for the more important among the widely prevalent, highly standardized social habits. And so it seems that the behavioristic viewpoint will make economic theory more and more a study of economic institutions' (Mitchell [1924] 1930, p. 25).

Mitchell believed that once the unrealistic assumptions about 'rational economic man' made by mainstream economists were replaced by the findings of behavioral psychology, the scientific study of institutions would naturally follow. Just as had been promised by positivists like Neurath, all the metaphysical references to subjective states by economists would be ended. Though there were clear differences between the institutionalists, positivists and members of the German historical school, it is understandable that when Hayek heard Mitchell's take on the past history of, and present prospects for, the profession, he did so with an uncomfortable sense of *déjà vu*.

We see Hayek beginning to react to all of this in some of his writings in the late 1920s. For example, in a footnote to a paper on American economics first published in 1925, he said in reference to institutionalism that '...This approach represents an extension of a general trend in American economic research in recent times. Under the influence of objective (behaviorist) psychology, which has gained prominence in the last few years, economics has increasingly turned away from purely theoretical research focused on understanding economic behavior and now

seeks to construct a picture of the typical course of all economic phenomena, with generous statistical backing. This school of thought, which is usually designated as the "institutional school" because of its special attention to concrete manifestations of economic life, has been particularly successful in the field of business cycle research, in which Wesley Clair Mitchell is the leading American scholar and is generally recognized as the pioneer of this new trend' (Hayek 1999, p. 102, note 25). The first chapter of his book, *Monetary Theory and the Trade Cycle* (Hayek [1933] 1966) contained a methodological screed against a purely quantitative approach to the business cycle that seems directly aimed at what Mitchell was advocating.

Further developments took place in the 1930s. In 1931, Hayek took a position at the London School of Economics, and among other projects soon was introducing his English audience to the socialist calculation debate. By the later 1930s, this had blossomed into what Hayek would later dub the Abuse of Reason project. The centerpiece of the latter effort was the essay, 'Scientism and the Study of Society', a paper that would lead directly on to *The Sensory Order*.

4. The 'scientism' essay

Hayek labeled as 'scientism' the 'slavish imitation of the method or language of Science' (Hayek [1942-44] 1979, p. 24). Hayek railed against the objectivism, collectivism, and historicism of the scientific approach, contrasting it with the theoretical, subjectivist and individualist 'compositive method', in which individual intentional human action brings about the formation of larger social wholes that were no part of the design of the individual agents (e.g., *ibid.*, p. 41, 69).

Hayek criticized many different viewpoints in 'Scientism'. There were old foes like the German historical school economists, early positivists like Auguste Comte, and purveyors of the philosophy of history like Hegel and Marx. There were contemporary social theorists like Karl Mannheim and L. T. Hobhouse, natural scientists (the 'men of science') like Joseph Needham and Lancelot Hogben, and philosophers like Otto Neurath and Bertrand Russell. And there were movements, from behaviorism to the energetics movement to the sociology of knowledge. The overriding goal of the 'Abuse of Reason' project was to show how these seemingly unrelated doctrines all ended up leading in the same direction. In Hayek's mind, the widespread enthusiasm for socialism and planning among virtually all of the intelligentsia in the 1930s could not be explained simply by the economic problems of the depression. They had their origins in ideas found in the past.

Hayek's earlier psychological theory also cropped up in numerous places in the essay. For example, it underlay his description of the natural sciences, whose goal (he claimed) is to reclassify objects that we observe into new categories (*ibid.*, pp. 29-33). He claimed, too, that one of the goals of psychology is to explain why the classifications provided by our senses differ from the classifications yielded by the

natural sciences (ibid., pp. 79–82). Finally, in doing so Hayek used his theory to criticize certain ‘objectivist’ theories, like behaviorism, which take the sensory order as fundamental and unproblematic (ibid., ch. 5). Hayek did not spell out the psychological theory that might serve to ground his claims in the ‘Scientism’ essay. Providing them, and tracing out the implications of the theory more carefully, would in fact become his next major project.⁶ We come at last to *The Sensory Order*.

5. *The Sensory Order* as an attack on behaviorism and physicalism⁷

What did Hayek hope to accomplish in *The Sensory Order*? It probably was not altogether exactly clear in his mind when he began the project, but he doubtless hoped to provide arguments for three theses. The first would be to undermine both behaviorism and its philosophical companions, and to do so with arguments from natural science. The second would be to provide a foundation for the idea that for the mind, as for many social science phenomena, explaining the principles by which it operates, rather than predicting specific outcomes (e.g., predicting specific pathways of neuronal firings given some stimulus), is often the best that one can do. And finally, he may also have wanted to provide a physiological argument for why a fully reductionist program would not work, so that in explaining human action one always had to make reference to things like intentional states.⁸ But it is his first goal that will occupy us here.

Why was Hayek so keen to defeat behaviorism? There were a number of reasons. As we have seen, behaviorism was the psychological theory that Mitchell hoped would replace the means-ends framework utilized by economists. Furthermore, with its insistence on restricting itself to the study of observable relationships between stimuli and responses, behaviorism could also be viewed as the counterpart in the science of psychology to the physicalist doctrines propounded by Otto Neurath. Finally, behaviorists and their physicalist counterparts were insistent that theirs were the only truly scientific approaches to the study of the social. If Hayek could come up with a plausible theory that could undermine the foundations of both of these doctrines, he would have accomplished much. If his argument relied on a physiologically grounded (read, again, *scientific*) psychological theory, he could have the added pleasure of reinforcing his claim in the ‘Scientism’ essay that behaviorists and physicalists were not the real scientists after all, but only scientific pretenders. So there was a lot more at stake in *The Sensory Order* than might at first appear evident. I think that this explains why Hayek was willing to risk trying to contribute to a wholly different field.

The Sensory Order can indeed be read as a thoroughgoing critique of behaviorism.⁹ Hayek mentioned the doctrine repeatedly in the text, beginning in the first chapter, where he offered a five-page critique. He defined behaviorism as the view that ‘psychology can entirely dispense with any knowledge of the subjectively experienced mental qualities, and that it ought to confine itself to a study of bod-

ily responses to physical stimuli' (Hayek [1952] 1967, p. 26). If Hayek's accounts of the existence of the physical and the sensory orders, and of the workings of the sensory order, are correct, they pose a number of problems for this view.

First, behaviorism either denies or disregards the very existence of the two orders. Behaviorists usually describe external stimuli in terms of their phenomenal attributes rather than their physical attributes. This is tantamount to assuming that the physical and the phenomenal world are one and the same. Behaviorism thus treats 'the problem of mind as if it were a problem of the responses of the individual to an independently existing or objectively given phenomenal world; while in fact it is the existence of the phenomenal world which is different from the physical world which constitutes the main problem' (ibid., p. 28).

Next, behaviorists insist on dealing only with observed stimuli and observed responses because they consider references to mental states to be unscientific. But if Hayek's theory is correct, the phenomenal order that we experience is *itself* a product of our nervous system. As such, behaviorists of necessity make reference to qualities that depend on mental events for their existence, thereby violating their own principles.

Third, by dealing only with observed stimuli and responses, behaviorists think that they are eliminating all interpretation from science. But if Hayek's theory is correct, selection, evaluation and interpretation take place at every step in the creation of the sensory order. For Hayek, every act of classification was, in effect, an act of interpretation: 'It will be the central thesis of the theory to be outlined that it is not merely a part but the whole of sensory qualities which is in this sense an "interpretation" based on the experience of the individual or the race. ...the whole theory of the formation of sensory qualities...is no more than an extension and systematic development of the widely held view that every sensation contains elements of interpretation based on learning, an extension by which the *whole* of the sensory qualities is accounted for as such an interpretation' (ibid., p. 42, emphasis in the original).

Behaviorism also depends on there being a clear and unambiguous connection between a stimulus and a response. Hayek's theory, on the other hand, emphasized that there are multiple steps between them. External stimuli create initial impulses, but these create additional following impulses. In addition, the external stimuli interact with the internal environment, the pre-excitatory state of the organism, which may affect the sorts of impulses that are produced. As a result, a sensory impulse ends up being multivalent, 'capable of producing various different sensations, and ... which sensation it will produce will depend on what other impulses occur at the same time' (ibid., p. 93). In a like manner, responses depend on which additional impulses are received by the organism, and can be modified by them. And indeed, behavior itself can create additional impulses: 'Behavior has to be seen in a double role: it is both input and output of the activities of the higher nervous centers' (ibid., p. 90).

If one accepts Hayek's theory about the sensory order, then, it does indeed provide a set of arguments that, taken together, pose severe problems for physicalism

and behaviorism.¹⁰ With the benefit of hindsight this might not seem very impressive, as neither doctrine has many defenders today. It should be remembered, though, that behaviorism was the dominant psychological theory when Hayek wrote, even if the cognitivist revolution was just around the corner. Furthermore, logical empiricism (the heir to the logical positivism of the Vienna Circle) held a similar status within the philosophy of science. Hayek was not responsible for the overthrow of these positions, but to his credit, he did identify at least some of the weaknesses that would ultimately lead others to abandon them. But still we may ask, if this is all that Hayek did with *The Sensory Order*, why did he continually grant it such elevated status in his later reminiscences?

6. The role of *The Sensory Order* in Hayek's later thought

To see why Hayek ultimately came to judge *The Sensory Order* as one of his most important works, we must again go back to the 'Scientism' essay. Recall that, in addition to criticism, Hayek also presented a positive account of what he called, after Carl Menger, the compositive method, something that he thought was appropriate in the social sciences. That approach implied strict limits on prediction: when dealing with the subject matter studied by the social sciences, often the best one can do is to provide a pattern prediction, or to explain the principle by which a complex social structure gets formed. Crucially, in making these claims Hayek always distinguished the sciences according to the natural science—social science dichotomy. The distinction was crucial because he defined 'scientism' as the illegitimate attempt to apply the putative methods of the natural sciences in areas they did not belong. When Hayek turned to write *The Sensory Order*, he soon began to see the mind as another example of a spontaneously forming order, analogous to the social orders that formed as the result of the unintended consequences of human action.

In the 1950s, Hayek moved to the Committee on Social Thought at the University of Chicago. He ran a seminar there in the early 1950s in which *The Sensory Order* and the 'Scientism' essay were the major readings. Hayek would later call the seminar 'one of the greatest experiences of my life' (Hayek 1983, p. 134), and he seemed particularly pleased that it attracted natural scientists from around the university. A handout from the seminar indicates that he was beginning to pay more careful attention to evolutionary theory. During this period Hayek also began exploring other fields, among them cybernetics, made popular by Norbert Wiener; the systems theory of biologist Ludwig von Bertalanffy (Bertalanffy had offered Hayek comments on *The Sensory Order* when it was still in manuscript form); communication theory; and John von Neumann's theory of automata. Finally, he read Warren Weaver (1948), whose distinction between sciences that study simple and those that study complex phenomena he ultimately adopted.¹¹

Hayek was drawing on many different resources in the 1950s. When he had tried to characterize the subject matter of economics and other social sciences in

his 'Scientism' essay in the 1940s, his basic dividing line was between the natural and the social sciences. But by the middle of the 1950s, Hayek had come to a startling observation, one fully compatible with his new readings: The complex adaptive orders that had been identified by the classical economists, by philologists and others, the sort of order that he had encountered again in his research on the brain, were in fact to be found in a variety of other *scientific* fields. He drew the conclusion that the basic dividing line among all the sciences was not between the natural and social, but between those that studied simple and those that studied complex phenomena. Evolutionary theory was Hayek's chief exemplar of the latter in his 1955 essay 'Degrees of Explanation', though he also clearly realized there (and indeed emphasized) the ubiquity of such phenomena. He also reached the conclusion that a fundamental characteristic of fields that study complex phenomena is that typically only 'explanations of the principle' or 'pattern predictions' are possible in them.

Hayek's move to the simple—complex dichotomy accomplished a number of things. His earlier distinction, based on the traditional natural science—social science division, did not fit well with the prevailing philosophy of science of the day, and in fact made it seem that the social sciences were some sort of special case, different from the other sciences, and perhaps not even a 'science' at all. In a review Ernest Nagel (1952) had explicitly criticized 'Scientism' for the argument that explanation was of a fundamentally different kind in the social sciences, and Karl Popper had done so implicitly by defending the unity of scientific method in *The Poverty of Historicism* ([1944–45] 1960, pp. 130–131). Popper and Nagel were not the sort of 'men of science' whose theories Hayek had derided in his essay, they were legitimate and influential philosophers of science whose criticisms had to be taken seriously. Hayek's new framework was much closer to the approaches that Popper and Nagel endorsed, and indeed, in both 'Degrees of Explanation' and in his later article 'The Theory of Complex Phenomena' (Hayek [1964b] 1967), Hayek would endorse much of the standard philosophy of science of his day.

Next, Warren Weaver's (1948) argument that statistical methods were inappropriate for the study of phenomena of 'organized complexity' seemed to provide an independent argument for the longstanding Austrian distrust of statistical aggregates, as well as for their criticisms of attempts to provide, as had been recommended by certain market socialists, numerical estimates for the variables in a Walrasian system of equations.

Finally (and the reason that Hayek was so keen to establish the ubiquity of complex phenomena), his new categorization scheme implied that *many other sciences confronted the very same limitations regarding prediction as economics did*, and the same necessity of resorting to 'explanations of the principle'. Both the 'many' and the 'sciences' are important: economics was fully scientific, but that did not imply that it should follow the methods of physics and other 'simple' sciences, as his positivist foes had for so long insisted. Economics was a science, but it was one among the sciences that studied complex phenomena. That is why we

can do no better than to make pattern predictions. And *that* implies limits on what social planners and other constructivist rationalists could accomplish.

I will finally add that though Hayek clearly accepted Karl Popper's ([1944–45] 1960) key idea that a theory must be falsifiable to be scientific, he also always emphasized that theories that deal with complex phenomena are necessarily less falsifiable. He put it this way: 'The advance of science will thus have to proceed in two different directions: while it is certainly desirable to make our theories as falsifiable as possible, we must also push forward into fields where, as we advance, the degree of falsifiability necessarily decreases. This is the price we have to pay for an advance into the field of complex phenomena' (Hayek [1964] 1967, p. 29). Though Hayek supported the notion of falsifiability, at the same time he always claimed that in sciences that study complex phenomena, progress is linked to a decrease in falsifiability. This, and the history that I have just provided, may help us to understand some of the curious things that Hayek had to say about experiments in economics.

7. Some concluding remarks

In this paper, I have tried to elucidate Hayek's views on psychology by tracing the history of the emergence of his major book on the subject, *The Sensory Order*. I have tried to show the very different contexts that informed the various phases of the development of his thought, from his early student essay, to his renewed interest as he wrote the 'Scientism' essay, to his decision to develop the theory more fully in *The Sensory Order*, to the role the book would play in the development of his theory of complex phenomena. In so doing I tried also to show how Hayek came to judge certain developments in psychology as unhelpful, or worse.

In conclusion, we may turn to a curious and troubling remark that Hayek made about a related field. The remark occurs in 'Competition as a Discovery Procedure', a remarkable paper about how market competition allows the discovery of new knowledge. The paper is filled with insights, but early on in the article Hayek derided attempts to establish or to test his central claim by means of experimental methods: '...the reason we use competition is that, *in those cases in which it is interesting*, the validity of the theory can never be tested empirically. We can test it on conceptual models, and we might conceivably test it in artificially created situations, where the facts which competition is intended to discover are already known to the observer. But in such cases, it is of no practical value, so that to carry out the experiment would hardly be worth the expense' (Hayek [1968] 1978, p. 180).

What accounts for this almost offhand but clearly negative remark? Given what we now know about the development of Hayek's thought, a straightforward explanation suggests itself. Hayek had by 1968 fought for so long against doctrines like behavioralism and physicalism that he may have come to associate any talk of experimentation in economics with these and similar naïve approaches to

the social sciences. In addition, he had by then hit upon the theory of complex phenomena, and it had become central to his explanation of the limits faced by social scientists in terms of prediction and falsification. Perhaps because he associated experimentation with naïve forms of testing, he rejected it outright for dealing with phenomena of organized complexity.

Though Hayek's reaction is perhaps understandable, I also think that it was mistaken. Hayek failed to see the promise of experimental methods for shedding light on the very sort of complex orders that he had taken such pains to identify.

Hayek developed his theory of complex phenomena at a very high level of generality. Indeed, it often appeared that his principal goal was simply to establish the *existence* of complex orders, and to show that they imply limits on our ability to predict, the latter (he felt) being a necessary antidote to the ambitions of constructivist rationalists. But today, when establishing the existence of spontaneous orders is much less of a concern, the central question changes to: What are the best ways to study them? As Vernon Smith (2003) has shown, there are a variety of ways that experimental methods can shed light on some of the very questions that Hayek raised, from examining how orders are formed when agents act according to certain rules in specific environments, to distinguishing the differences between what Smith calls 'constructivist' versus 'ecological' rationality, to helping answer questions that Hayek's program left unanswered, such as when cooperative versus uncooperative behavior is more likely to emerge. Similarly, the newly emerging field of neuro-economics may someday help us better to understand the functioning of another of Hayek's complex orders, the human brain.¹²

I think that had Hayek lived longer he would have taken back the passage that was quoted above. Hayek lived in a positivist age when prediction was taken as the hallmark of science, so of course he emphasized the limits we face. But Hayek was also always a scientist. If one is going to examine complex phenomena scientifically, precisely because they are difficult to test, experimental methods provide an excellent means for furthering our understanding of them. Had Hayek simply recognized that such methods might provide a scientific way to approach such phenomena, I think he would have endorsed them. He certainly had shown flexibility in other instances, for example, in his endorsement of group selection for explaining the emergence of norms that are not in the self-interest of the parties that adhere to them. In his passing criticism of experimental methods, we see how Hayek's long-standing antagonism towards certain movements in psychology blinded him to the advantages that other approaches might confer. In my opinion, it is time to rectify the error.

Notes

1. The first version of this paper was presented at the Behavioral Research Council's Third Annual Symposium on the Foundations of the Social Sciences titled, 'Dewey, Hayek, and Embodied Cognition', sponsored by and held at the American Institute for Economic Research, Great Bar-

- rington, Massachusetts, July 18–20, 2003. In addition to comments received there, I subsequently received helpful comments from Bill Butos and Roy Weintraub, from participants at sessions at the Southern Economic Association and American Economic Association meetings, and from two referees, none of whom bear responsibility for remaining errors.
2. Indeed, Barry Smith (1990, p. 220) reports on a conversation in which Hayek recalled that he had 'seriously considered joining the Vienna circle, though he had been deflected from this path by the somewhat naïve, not to say absurd, economic views of Otto Neurath'.
 3. In his obituary for Schumpeter, Oskar Morgenstern wrote about the book's impact as follows: 'The work was read avidly in Vienna even long after the First World War, and its youthful freshness and vigor appealed to the young students. I myself remember what sort of revelation it was to me when I first laid hands on it and, like many others of my generation, I resolved to read everything Schumpeter had written and would ever write' (Morgenstern, quoted in Shionoya 1995, p. 92).
 4. Spann was the prophet of 'Intuitive Universalism'. According to this doctrine, knowledge is gained by the intuitive envisioning of the essential features of sociological wholes. These essences alone are what are durable and real. Unfortunately, they cannot be observed but only intuited. Experts who gain this ability are those who should make policy, for their policy will be that which is good for the whole. Spann opposed doctrines like liberalism and individualism because they interfered with the key insight that all values must be grasped in terms of their collective meaning. Spann's system is precisely the sort of 'nonsense' that would drive scientific-minded young men like Hayek to an interest in Mach. Hayek took a class from him, but eventually was ousted by Spann from his seminar for his habit of challenging the professor's views.
 5. Other seminar participants included Joseph Schumpeter, Otto Bauer (who would lead the Austrian Social Democrats after the war), and the Marxist theoretician Rudolf Hilferding.
 6. Over the years Hayek repeatedly linked *The Sensory Order* to the 'Scientism' essay. In his letter to Nef he said of his current research: 'The theoretical problems, on the other hand, have led me to take up a life-long interest in physiological psychology and to prepare a book on the place of the mind in the universe of nature in which I elaborate certain themes only sketched in Scientism' (Hayek to John Nef, letter of 6 November 1948, Box 55, folder 1, Hayek Archives, Hoover Institution, Stanford, California). See also Hayek (1982, p. 289, 1994, p. 126.)
 7. This section and the next draw in part on my discussion of related issues in *Hayek's Challenge* (Caldwell 2004).
 8. This is why I sometimes have labeled his approach 'scientific subjectivism'; in my opinion, Hayek was trying to provide a basis in natural science for the use of an intentionalist, subjectivist approach in the social sciences.
 9. That behaviorism was a target is evident from earlier drafts of 'What Is Mind?', which was Hayek's working title for his manuscript before it became *The Sensory Order*. In the latter, Hayek's critique of behaviorism does not begin until section 1.75, on p. 25. But in 'What Is Mind?' Hayek launches into it on p. 2.
 10. Within the text, Hayek's attacks on 'positivist' philosophers is fairly muted, perhaps because by then the more extreme forms of logical positivism were already out of favor. He makes reference to positivism in footnotes in the introductory and concluding chapters, noting that when he uses the term 'physical world' it should not be confused with the positivist notion of 'physical language' as used by Carnap and Neurath. He could not resist adding (note the word 'metaphysical', anathema to a positivist) that, 'Their use of this term rather implies a metaphysical belief in the ultimate "reality" and constancy of the phenomenal world for which there is little justification' (Hayek [1952] 1967, p. 4, 191). Both behaviorism and Neurath (or rather, 'the social science specialist of the Vienna Circle of logical positivists') are also mentioned by Hayek in his retrospective (Hayek 1982, p. 289).
 11. Weaver (1948) actually distinguished between three types of phenomena: simple, complex, and those which exhibited what he called 'organized complexity'. Hayek adopted the simple-complex

dichotomy, but what he called 'complex phenomena' corresponded to what Weaver called phenomena of organized complexity.

12. Kevin McCabe at the Interdisciplinary Center for Economic Science (ICES) at George Mason University is among those pioneering the development of neuro-economics. I first learned of this work at a Liberty Fund Conference on 'Hayek, Experiment and Freedom' held in Washington, D.C. in October 2002.

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