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The Laboratory as a Discovery Process?

Vernon Smith, Hayek, and Experimental Economics

Ian Irwin
Bowling Green State University
Andrew Yuengert
Pepperdine University

In *Rationality in Economics*, Vernon Smith argues that experimental methods establish the ecological rationality of markets, thus confirming Friedrich Hayek's assertion that market competition fosters emergent norms and institutions that are preferable to constructivist order. In making this argument, Smith must contend with Hayek's brief dismissal of the value of experimental market demonstrations. Hayek's doubts can be explained by his skepticism of the concept of economic efficiency. In experiments, ecological rationality is operationalized as efficiency, but Hayek rejects efficiency for two reasons. First, even though experiments do not fully specify institutions and equilibrium concepts, their specification of the commodity space, preferences, and technologies obscure the function of competition, which is to elicit this information. Second, Hayek argues that preferences evolve, rendering efficiency-based normative arguments for markets problematic. Consistent with this evolutionary framework, Hayek's arguments for competitive order do not invoke efficiency. Instead, he argues that markets promote human initiative and that widespread human suffering will result from the abandonment of competitive order in those countries that rely on it.

Vernon Smith's pioneering work in experimental economics has given economists an important set of practical tools for comparing human behavior with theoretical models of it and has generated important insights into market-based and strategic interaction.[1] Crucial to Smith's work is a distinction between two kinds of rationality: constructivist and ecological. "Constructivist rationality" is the rationality implied in the calculus of optimization subject to constraints, applied to complex social systems. "Ecological rationality" is the logic of norms, practices, and institutions that emerge in competitive environments without

conscious planning. The distinction between constructivist and ecological rationality allows Smith to describe the emergence of undesigned norms and behaviors in markets, as well as the unintended but nonetheless desirable outcomes of market interactions. The distinction is drawn explicitly from F. A. Hayek's evolutionary, information-based defense of market order, in which the distinction is foundational.[2] Smith does not just borrow the distinction, however; he offers his experimental work as empirical *support* for Hayek's ecological insights, and thus as an important confirmation of Hayek's assertion that the ecological rationality of the practices and institutions that result from market interactions cannot be predicted or brought about by constructivist planning.

The claim that Smith's work constitutes empirical support for Hayek's theoretical work runs up against an intriguing counterargument: Hayek's skepticism about the possibility of demonstrating the value of spontaneous order in controlled circumstances as expressed forcefully in the article, "Competition as a Discovery Procedure."[3] In *Rationality and Economics*, Smith documents and grapples with Hayek's skepticism but classifies Hayek's rejection as a failure to fully appreciate the early promise of an unfamiliar new field of economics.

In this article, we suggest that Hayek's dismissal of experimental methods is due to more than a failure to appreciate the potential of an innovative new economic method. Our alternative explanation begins with Hayek's claim that experimental methods are "of little interest." This peculiar dismissal suggests that experimental methods do not serve the particular purpose that motivates Hayek—to explain why "competition is important."[4] Hayek contends that experiments could not advance normative arguments in favor of a reliance on evolutionary order.

To make this argument, we will have to distinguish ecological rationality as it is operationalized in experimental economics and "ecological rationalism" as it is described in Hayek's work. The concept of economic efficiency plays a central role in laboratory demonstrations of ecological rationality. Efficient outcomes can be specified and known in advance in the laboratory, and institutions and practices that emerge in laboratory settings are ecologically rational to the extent that they conform to known efficient outcomes. Moreover, because in economics the efficiency of an institution or practice recommends it as a policy choice, the discovery of ecologically rational institutions in laboratory markets is at least an implicit argument for reliance on markets as a matter of policy.

In contrast to Smith, Hayek avoids arguments for markets on the basis of economic efficiency. In Hayek's analysis, institutions and behaviors are ecologically rational because they have evolved in ways that allow agents to strive for their goals in a world of scattered information that cannot be aggregated and that can only be coordinated in markets. Hayek intentionally stops short of the quantita-

tive concepts needed to define efficiency for two reasons. First, the information needed to identify efficient outcomes could only be revealed by competition, so theoretical (and experimental) methods that specify efficient outcomes in advance are likely to obscure the most important role of competition. Second, the preferences on which efficiency is premised evolve in Hayek's description; this evolution makes efficiency comparisons across time problematic.

The key to Hayek's dismissal is his insistence that what is to be discovered in a competitive system cannot be captured by the concept of efficiency. Because Hayek does not rely on efficiency arguments, his advocacy of markets necessarily invokes outcomes other than efficiency. Hayek instead relies on the negative argument that the abandonment of market order would lead to population collapse and human suffering and the positive argument that markets allow greater scope for human freedom and striving.

The potential disagreements between Hayek and Smith are not simple hair-splitting. A deeper understanding of the role of efficiency in the laboratory and Hayek's critique of efficiency offers important insight into the achievements of experimental economics and the limitations on what it tells us about markets.

Hayek's Skepticism and Smith's Puzzlement

In "Rationality in Science," chapter 13 of *Rationality in Economics*, Smith tackles Hayek's peremptory dismissal of laboratory experiments. Having spent the previous twelve chapters outlining the emergence of ecologically rational behaviors in experiments, Smith turns his attention to the development of new theories in economics. This process, he argues, is emergent, not constructivist: "the failure of all philosophy of science programs to articulate a rational constructivist methodology of science … does not mean that science is devoid of rationality."[5]

Laboratory experiments are an example of an emergent scientific practice that could not have been predicted by mainstream economic methodology and whose promise was not at first fully appreciated. Smith gives the examples of two prominent economists who failed "to see the function of laboratory experiments in economics."[6] He names only one of these economists: Friedrich Hayek.[7]

Smith begins his treatment of Hayek's dismissal by describing the intellectual contributions that won Hayek the Nobel Prize: "his theoretical concept of the price system as an information system for coordinating agents with dispersed information in a world where *no single mind or control center possesses, or can ever have knowledge of*, this information."[8] After summarizing Hayek's contribution, Smith turns his attention to Hayek's article "Competition as a Discovery

Procedure," a brilliant paper that nevertheless documents Hayek's blindness to the promise of experimental economics. Here Hayek asserts that laboratory experiments are of little interest:

> The only reason we use competition at all has as its necessary consequence the fact that the validity of *the theory of competition can never be empirically verified for those cases in which it is of interest.*… [I]n principle we could … conceivably verify the theory in *artificially created situations in which all the facts that competition is to discover are known to the observer in advance*. In such a situation, however, the outcome of the experiment would be *of little interest*, and it would probably not be worth the cost of conducting it.[9]

Smith is puzzled by this anticipatory rejection of experimental methods. He cannot understand how Hayek can describe the experimental method so clearly, yet "fail completely to see how such an experiment could be used to test his own proposition that competition is a discovery procedure, under the condition that neither the agents as a whole nor any one mind *needs to know* what each agent knows."[10] Note that this description of Hayek's contribution changes from Smith's first description of it from a context of information *that no single mind can ever possess* (see the first quotation in this paragraph above) to a context in which the information *can be known to the experimenter* but does not *need to be known* by the agents in the model.

Smith professes that he finds it "astounding that one of the most profound thinkers in the twentieth century did not see the demonstration potential and testing power of the experiment he suggests."[11] By the time Hayek made the remarks quoted above, Smith had already conducted laboratory tests of what he came to call the "Hayek Hypothesis" that he describes as "strict privacy together with the trading rules of a market institution (the oral double auction in this case) … sufficient to produce *efficient competitive market outcomes*."[12]

Smith's specification of the Hayek Hypothesis represents a further change in his characterization of Hayek's insight, adding to it the concept of efficiency. In his first description of Hayek's contribution (the first one quoted in the previous paragraph), he emphasizes that there are facts that no one mind *can* know. In Smith's second description of Hayek's contribution (the third one quoted in the previous paragraph), he emphasizes that no one in the market *needs* to know. In this last description, the facts that are not known to the agents in the experiment but that *can* be known by the experimenter are just those values necessary to identify the efficient outcomes of exchange. As Smith modifies Hayek's Nobel insight so that it can be tested in a laboratory, he must jettison Hayek's assertion that the facts that competition elicits cannot be known.

In identifying this subtle change in Hayek's hypothesis as it is tested in the laboratory, we are not minimizing the substantial contributions of experimental methods that are amply documented in Smith's work. Nevertheless, this difference in approach, combined with differences in the practical goals of Hayek's political project and Smith's empirical one, holds a key to understanding the nature of Hayek's objection and sheds light on the practical limits of experimental methods as policy arguments.

To begin to trace Hayek's dismissal of experiments, we begin with his use of the term *of little interest*. Hayek does not reject experiments because they are somehow wrong or false but because they are uninteresting—that is, of little use in bolstering normative arguments in favor of market order. His opening discussion makes it clear that he is concerned with normative questions, with the desirability of competition as a matter of policy. Hayek's positive project of explaining the information-coordinating properties of competition is of interest because it sheds light on the normative issues. He charges economists with "[investigating] competition primarily under assumptions which, if they were actually true, *would make competition completely useless and uninteresting*."[13] He goes on to assert that "wherever we *make use of* competition, this can only be justified by our not knowing the essential circumstances that determine the behavior of the competitors."[14] He concludes the opening section with two reasons why competition is "important": "only because and insofar as its outcomes are unpredictable and on the whole different from those that anyone would have been able to consciously strive for; and that its salutary effects must manifest themselves by frustrating certain intentions and disappointing certain expectations."[15]

Hayek's analysis of competition is motivated by his desire that policymakers "make use of" it and appreciate its "importance" and "salutary effects." Economic analyses that do not shed light on what is "useful" about the operation and effects of competition are consequently "useless and uninteresting," according to Hayek. Thus, experimental demonstrations are of little interest because they do not advance normative arguments for a policy reliance on competitive order.

Ecological Rationality and Efficiency in Smith

To see the normative shortcomings of experiments as Hayek saw them, we must outline the role of the concept of efficiency in Smith's laboratory tests of the Hayek Hypothesis and Hayek's rejection of the concept. For Smith, the achievement of efficiency in the laboratory is evidence of ecological rationality. Moreover, because efficiency is a necessary condition for market order to be normatively

desirable, the discovery of efficiency in laboratory experiments is normatively significant. Hayek, however, was skeptical of efficiency as a policy goal (for reasons we will explore below) and did not rely on efficiency as an argument for markets. Therefore, the attainment of efficiency in a laboratory was of little interest in arguing for markets.

Smith defines constructivist rationality as "the deliberate use of reason to analyze and prescribe actions judged to be better than alternative feasible actions that might be chosen."[16] In its purest form, it is the rationality employed in the optimization of fixed objective functions subject to constraints. It is the comparison of institutions designed by constructivist methods and institutions, which emerge from evolutionary processes, that motivated Hayek's work.

To describe alternative, evolutionary processes, Smith employs a second concept: ecological rationality. Ecological rationality "refers to emergent order in the form of the practices, norms, and evolving institutional rules governing action by individuals that are part of our cultural and biological heritage and created by human interactions, but not by conscious human design."[17] Any practice, norm, or institution that emerges in markets and in culture may make little sense within a constructivist framework and cannot be predicted by constructivist analysis but is nevertheless reasonable—it serves the purposes of economic agents within the evolutionary environment.[18]

If certain emergent orders are ecologically rational, this does not necessarily imply that they are normatively desirable. One must *demonstrate* ecological rationality and *argue for it as a matter of policy* in different ways. One establishes the existence of ecological rationality by showing the mutual fit of norms, behaviors, and institutions within specific market settings—their effectiveness in serving the purposes of individuals. To establish the desirability of ecological processes as a matter of policy, one must invoke some property of the ecological system as a whole that can be compared to constructivist alternatives. Smith relies on the same property of evolutionary systems—efficiency—both to establish the existence of and to normatively argue for ecological rationality. As we will see, Hayek's skepticism of efficiency as a normative recommendation of emergent order can account for his skepticism of laboratory methods.

Smith argues forcefully for policy reliance on emergent, ecologically rational order. While constructivism plays an important role in proposing new institutions and behaviors, it "is far too narrowly limited and inflexible in its ability to comprehend and apply all the relevant facts in order to serve the process of selection, which is *better left to* ecological processes that implicitly weight more versus less important influences."[19] Elsewhere he asserts that "[i]n the midst of our constructivist adventures, and separate from them, institutions have emerged

that are 'ecologically rational' and that economists would be hard put to improve upon, even if such institutions had always been an integral part of economists' perceived task."[20]

By pointing out instances where Smith makes normative claims for emergent order, we are of course not accusing him of confusing positive and normative. Nevertheless, there is a close connection in Smith's work between the establishment of ecological rationality as a positive fact and advocacy of ecologically rational emergent order as a matter of policy. Both his positive demonstrations of ecological rationality and his normative contention that evolutionary systems are often better policy choices are founded on the concept of efficiency. Because efficiency is a normative concept, it is a small step from discovering it in an evolutionary system to advocating for evolutionary order.

"Efficiency" is Pareto efficiency: Once an efficient outcome is reached, there are no further gains from exchange. It is not surprising that an economist working in a theoretical framework within which preferences and endowments are given would settle on efficiency as an indicator of ecological rationality. In the laboratory, to determine whether an outcome is efficient, the experimenter must define some metric of individual value, some measure of "better off" and "worse off." By fixing value within the confines of an experiment (by assigning monetary payoffs to agents), the experimenter can determine the efficient outcome of the experiment (and in many cases, the optimal outcome). Although this efficient outcome is not known to the experimental subjects, it is known to the experimenter.

Clearly, Smith relies on the concept of efficiency to argue for ecological rationality as a matter of policy. When an experiment yields the efficient outcome, without the knowledge of the subjects or their intent to achieve it, Smith takes this as evidence of ecological rationality. Smith cites the common-property experiments of Casari and Plott as an example: "This is a laboratory example of ecological rationality showing the capacity of motivated subjects to achieve the efficient static outcome over time by unknown dynamic mental and social processes that are not modeled in these or other studies."[21]

Of course, laboratory exchange does not always result in efficient outcomes. Moreover, given that there may be multiple efficient outcomes (a contract curve), the fact that an institution is ecologically rational does not imply that it is optimal policy. Nevertheless, because efficiency is considered a necessary condition for normative desirability, it is not surprising that the establishment of ecological rationality is normatively significant in Smith's work.

Experimental Methods and Hayek's Critique of Constructivism

Hayek is skeptical about efficiency on both practical and normative grounds. On practical grounds, the concept gave rise to the mistaken impression that the information needed to calculate efficiency could be known to one mind; on normative grounds, the evolution of preferences rendered efficiency comparisons across time problematic and uninformative. These objections explain Hayek's judgment that Smith's experiments were of little interest.

Hayek, Evolutionary Rationalism, and Arguments for Evolutionary Order

Although Hayek does not use the term *ecological rationality* (instead coining the term *evolutionary rationalism*),[22] Smith's constructivist/ecological distinction is based on Hayek's constructivist/evolutionary distinction. Like Smith, Hayek refers in his writings both to the ecological rationality of emergent order in markets and to the reasonableness of reliance on emergent order as a matter of policy. However, because Hayek rejects the efficiency metric (which connects demonstrations of ecological rationality to normative arguments in Smith's work), he must separate his analysis of the ecological rationality of emergent order from his policy arguments in its favor.

When Hayek contrasts constructivist and evolutionary rationalism, his description of evolutionary rationality accords with Smith's ecological rationality. The rules that men follow in the course of their social interactions are not formulable—not justifiable in constructivist terms—but are nevertheless adapted to meet the needs of the economic actor who

> is successful not because he knows why he ought to observe the rules which he does observe, or is even capable of stating all these rules in words, but because his thinking and acting are governed by rules which have by a process of selection been evolved in the society in which he lives.[23]

The existence of evolved institutions that are adopted without systematic constructivist reflection, yet whose adoption is nonetheless reasonable, is foundational to Hayek's analysis of competitive order.[24]

Hayek is not content, however, to identify examples of ecological rationality. The purpose of his research and writing is to argue for reliance on emergent order as a matter of policy. The introductory remarks of *The Fatal Conceit* refer to the "conflict between advocates of the spontaneous extended human order created

by a competitive market and … those who demanded a deliberate arrangement of human interaction by central authority," and it asserts that "order generated without design can far outstrip plans men consciously contrive."[25] Likewise, in the second volume of *Law, Legislation, and Liberty*, Hayek plainly advocates for the desirability of emergent order: "the maintenance of a spontaneous order of society is the prime condition of the general welfare of its members."[26] Hayek speaks the language of advocacy, in which policy should rely heavily on ecologically rational order.[27]

Hayek's Critique of Neoclassical Equilibrium Method

The difference between the normative desirability of the ecological order demonstrated in Smith's laboratory and the normative arguments of Hayek can be traced to Hayek's critique of neoclassical method. Although experimental economics as a whole constitutes an important critique of neoclassical methods, experimental methods are nevertheless grounded in neoclassical theory and thus remain vulnerable to Hayek's critique.

Hayek's principal critique of planning invoked what he called the "synoptic delusion": "the fiction that *all the relevant facts* are known to some one mind, and that it is possible to construct from this knowledge of the particulars a desirable social order."[28] Determined planners, under the influence of this delusion and the equally questionable conviction that "human institutions will serve human purposes only if they have been deliberately designed for these purposes,"[29] assiduously seek to replace the evolutionary order of the competitive market with deliberately designed, planned institutions that cannot replicate the function of competition.

According to Hayek in "The Use of Knowledge in Society," ambitious planners are (sometimes unwittingly) encouraged in this project by neoclassical economists.[30] Neoclassical method proceeds by constructing models whose assumptions—about preferences, information, technology, and rational behavior—make efficient outcomes theoretically identifiable. Once the efficiency set (the contract curve) is established, theoretical equilibria can be compared against already-identified efficient outcomes to evaluate the welfare properties of various market structures.[31] Neoclassical models of markets, by identifying equilibrium allocations *in theory*, give the impression that there are multiple ways to achieve those equilibria *in practice*: through competition, redistribution, or planned production and distribution.[32] In "Competition as a Discovery Procedure," Hayek puts the matter succinctly: "[economists] have investigated competition primarily under assumptions which, if they were actually true, would make competition

completely useless and uninteresting. If anyone actually knew everything that economic theory designated as 'data,' competition would indeed be a highly wasteful method of securing adjustment to these facts."[33]

Experimental Method

Because experimental economics does not fully replicate the neoclassical approach, it serves as an important critique of equilibrium theory; within the constraints of the laboratory one can still observe the emergence of behaviors that are ecologically rational. Nevertheless, because experimental economics draws on neoclassical theory to structure its laboratory experiments and makes use of efficiency as a metric of ecological rationality, it is vulnerable to Hayekian skepticism about its usefulness in bolstering normative arguments for spontaneous order.

Charles Plott, in "Equilibrium, Equilibration, Information, and Multiple Markets," outlines and justifies the experimental approach. His work, along with Smith's discussion of the contributions of experimental methods in *Rationality in Economics*, illustrates how experimentalists can challenge neoclassical theory but still fail to avoid Hayek's critique. Plott begins by outlining the four-component parameter space of theoretical models: "a commodity space, preferences over that commodity space, a subset of the commodity space called a feasible set of outcomes, and institutions."[34] These four components combine to generate a set of efficient outcomes. An equilibrium concept is then imposed on the model to generate predictions.

According to Plott, the aim of experimental economics is to specify the parameter space of a model and to test its predictions without imposing equilibrium solutions. The experimenter specifies the commodity space by determining what is to be traded. Preferences are "induced" on the commodities "by assigning a function $U^i(x)$ to individual i that maps the outcomes of the process to dollars taken home by individual i who has a quantity x."[35] The feasibility set is determined by the specified production possibilities and the endowments given to experimental subjects. Institutions are the rules under which exchange and communication can occur—for example, the continuous double blind auction[36] or the multiple unit double auction.[37]

Smith describes the contribution of his experimental method in terms that emphasize his ability to fix preferences and calculate the efficient outcome of exchange in the experimental setting: "Because the experimenter assigns all the private values and costs in the economic environment created for the experiment, we can determine the equilibrium predicted to obtain and evaluate its optimality

or efficiency."[38] This fixing of preferences within the narrow world of the laboratory is the foundation for what Smith calls "a laboratory example of ecological rationality."[39]

The contributions of experiments to our understanding of human behavior in exchange are substantial because they do not impose an equilibrium concept but allow it to emerge (or fail to emerge) in the laboratory. It is the ability to observe in a laboratory the development of institutions to handle uncertainty and foster coordination that is the astonishing contribution of experimental methods in economics.[40] Because experimenters do not construct these institutions, instead allowing them to emerge, experiments can be at least a partial demonstration of ecological rationality. It is conceivable that Hayek would have seen the value of the partial relaxation of the theoretical model of competition in the laboratory. Nevertheless, in fixing commodity spaces, preferences, and even institutions (partially), experimentalists run up against Hayek's critique that these things are themselves evolutionary products of markets. Against the fixing of the commodity space, Hayek notes in *The Constitution of Liberty*, "which goods are scarce … *or which things are goods*, or how scarce or valuable they are, is precisely one of the conditions that competition should discover."[41] Against the fixing of the feasibility set, Hayek, in "Competition as a Discovery Procedure," emphasizes the unknown nature of production possibilities and the emergence of this knowledge in competition: "how much more important competition must be wherever the primary objective is to discover the still unknown possibilities."[42] Likewise, even the incomplete specification of the institutions of trading in experiments (to allow the full development of institutional practices and rules of thumb to emerge in the experiment) obscures the ways that the most basic rules of exchange (the continuous double blind auction, for example) emerge in competitive environments.[43]

As important as the evolution of the commodity space, the feasibility set, and institutions are to Hayek's account of competition, the particular focus of this article is the fixing of preferences in experimental economics, and how it renders experimental demonstrations of ecological rationality less normatively significant to Hayek. There is abundant evidence that Hayek believes that preferences themselves ought to be listed among the factors that evolve in market competition.

Hayek does not use the term *preferences*—perhaps the term was too evocative of constructivist neoclassical method. Instead, he uses a range of seemingly interchangeable synonyms: *purposes*, *aims*, *goals*, *ends*, and *goods*. However Hayek describes the goals that motivate human action, he clearly claims that they evolve. In *The Constitution of Liberty*, Hayek argues that the human

intellect itself evolves; its concepts, values, and ways of thinking adapt and change through time:

> Man did not simply impose upon the world a pattern created by his mind. His mind is itself a system that constantly changes as a result of his endeavor to adapt himself to his surroundings.[44]

> Men's goals are open, that new ends of conscious effort can spring up … even what we regard as good or beautiful is changeable.[45]

To illustrate the evolutionary nature of human values, Hayek asks what a medieval person would make of a modern economic and social environment. Not only would she have to adjust to new norms of social interaction and to a greatly expanded range of consumption and production choices, she would find that what counts as a good life, and what contributes to that life, would be different.[46]

By inducing fixed preferences in the lab, experimentalists open themselves to Hayek's critique: a theoretical or experimental treatment of competition that begins with knowledge of preferences, technological possibilities, and institutions (all necessary to identify efficient outcomes) will miss the important role that competition plays in the discovery and emergence of new preferences, technological possibilities, and institutional forms. If one takes seriously Hayek's insistence that even preferences emerge from evolutionary processes, it is not surprising that he questions the normative significance of laboratory demonstrations of ecological rationality.[47] When Smith and other experimentalists identify efficient outcomes based on specified preferences and evaluate experimental outcomes by their efficiency, they make themselves vulnerable to the Hayekian critique.

Normative Arguments for Competitive Order

Arguments When Preferences Are Unstable

If preferences are fixed prior to exchange, then the outcomes that result from exchange can be compared to the efficient outcomes to evaluate whether emergent order is ecologically rational. If preferences are not fixed prior to exchange but are themselves a product of exchange (as Hayek asserts), then any normative evaluation that uses preferences as a metric for efficiency or optimality is problematic. The problem can be stated simply: If preferences over outcomes change as a result of ecological processes, then which preferences should be used to evaluate the efficiency of the market outcome? If an outcome is ranked high in light of the original preferences but low based on resulting preferences,

then which preferences are normative? Or should some third set of preferences be used for evaluation?[48]

If preferences are included among the things that emerge from competitive order, and they emerge in unpredictable ecological ways, then normative arguments in favor of competition cannot be based on preferences. Not surprisingly, Hayek does not make preference-based arguments in favor of emergent competitive order.[49] The next section documents Hayek's nonpreference-based arguments.

Normative Arguments for Competition When Preferences Evolve

If Hayek were to accept Smith's experiments as a partial demonstration of ecological rationality, then he would remain skeptical of the normative significance of laboratory demonstration because preferences evolve in markets and the efficiency metric on which Smith argues in favor of markets is problematic when preferences are unstable. In this section, we document that Hayek, consistent with his critique, does not invoke efficiency when arguing for markets.

Hayek is aware of the difficulty of evaluating competitive processes when the values motivating behavior are themselves a product of markets. He is careful to avoid arguments based on currently existing preferences. Hayek's critique of the idea of constructivist "progress" in *The Constitution of Liberty* invokes the changing nature of human values: "Since our wishes and aims are also subject to change in the course of this process, it is questionable whether the statement has a clear meaning, that the new state of affairs the progress creates is a better one."[50] Economies should be evaluated on their ability to adjust to environments that change in unpredictable ways; these changes are comprehensive, affecting the commodity space, preferences, production possibilities, institutions, and even moral norms.

Hayek goes on to claim that the question of whether we are "better off" is "probably unanswerable" and then offers a startling observation: "the answer, however, does not matter."[51] It is difficult to square Hayek's claim that it is impossible for a planner to know whether we will be better off under planning with his clear advocacy for markets over planning. Because Hayek goes on to make a nonconstructivist defense of market order, he is certainly not rejecting the possibility of arguments in favor of competition. His claim is probably more limited, a dismissal of the possibility of constructivist measures of progress based on shifting values and knowledge.

The answer to the question of whether policy should make use of and respect emergent order in markets obviously matters to Hayek. He must argue for

competitive order based on some property of that order.[52] For Hayek to argue for a free market and a free cultural order, he must appeal to some human value *that holds its value* even as human systems of value evolve. We can discern two kinds of permanent value metrics in Hayek's writings: the value of survival, and the value of free human striving.

Survival

Hayek acknowledges a role for biological evolution in society, but he ascribes a much greater role to cultural evolution.[53] Cultures evolve not through biological selection but by the learned adoption of habits, frameworks of thought, and institutions from person to person and group to group.[54] The rules and institutions that guide and order our behavior and interaction are adopted not because they advance a rational constructivist plan; they survive a process of cultural evolution, being passed successfully from parent to child and from imitated to imitator: "it is the relevance of these individual wishes to the perpetuation of the group or the species that will determine whether they persist or change…. [T]hese values are created and altered by the same evolutionary forces that have produced our intelligence."[55] Hayek does not commit the naturalistic fallacy, assuming that rules and institutions that survive evolutionary processes are thereby good or desirable.[56] Neither does he claim that cultural evolution produces an increase in happiness: "There is no reason to suppose that the selection by evolution of such habitual practices as enabled men to nourish larger numbers had much if anything to do with the production of happiness, let alone that it was guided by the striving after it."[57]

Hayek does not recommend the process that resulted in the industrial order of the twentieth century on the grounds that it survived a process of cultural evolution. As evidence of its evolutionary success, Hayek appeals to the historically large population that it currently sustains. The survival of the current system is not the argument for it, *per se*. However, the material well-being of the billions who depend on the system as it has evolved is at risk, according to Hayek. It is not the survival of the system that recommends its continuance; it is the survival of the population that this system currently supports.

The vulnerability of the institutional framework on which the current population is maintained is a constant theme of *The Constitution of Liberty* and *The Fatal Conceit*. In *The Fatal Conceit* Hayek neatly combines a disavowal of the naturalistic fallacy with a claim that the human stakes of competitive markets are high:

> [The free moral order] is able to sustain more from discoverable resources (and indeed in that process discover more resources) than would be possible by a personally directed process. And although this morality is not "justified" by the fact that it enables us to do these things, and thereby to survive, it does enable us to survive, and there is something perhaps to be said for that.[58]

Elsewhere in the same work Hayek refers to "the human suffering and death that would follow the collapse of our civilization,"[59] and sums up his argument for markets with an appeal for civilizational survival: "neither socialism nor any other known substitute for the market order could sustain the current population of the world."[60]

According to Hayek, the stakes are high in deciding whether or not to entrust our collective fate to emergent order: the potential collapse of the economic and social order.[61] This reason is entirely negative: We are entirely dependent on markets for our continued well-being in ways that we cannot fully specify. This argument is incomplete, unless it is accompanied by a positive argument that there is something desirable (apart from survival) in the continued maintenance of a large population dependent on emergent order in markets.[62] This positive argument is made necessary in part because the claim that civilization will collapse if free competition is restricted may seem too extreme to some who argue that changes in the balance between state and market do not lead inexorably to socialist takeovers and that the state of affairs achieved by such changes may be justified even if the population is smaller and material conditions less opulent.

Striving, Opportunity, and Initiative in Hayek

Hayek's more positive arguments, for the quality of life in an emergent order, are as important as his negative arguments. In his analysis of markets, Hayek argues that an important value of markets is that they provide significant liberty of action. In *The Constitution of Liberty*, Hayek asserts the value of the ability of an individual to "follow one's own plans," or to achieve "his own individual purpose."[63] The value he places on liberty is not based on any particular judgment about the worthiness of an individual's plans or purposes; Hayek consistently refuses to make such judgments because the basis for these judgments is itself an evolutionary product in his analysis. Nevertheless, Hayek does appear to put value on the striving itself—on the application of the individual exercise of reason to achieve the individual's purposes. Hayek suggests as much after he claims that the answer to the question of whether we are better off is unanswerable. There is a certain satisfaction among humans in "striving," in which each human being "enjoys the gift of his intelligence."[64] He invokes the value of striving

soon thereafter in a rebuttal to those who are critical of the idea of progress: "All the desired advances in education and health, the realization of *our wish that at least a large proportion of the people should reach the goals for which they are striving*, depend on the continuance of progress."[65]

In *The Fatal Conceit*, Hayek confirms the value of human striving after purposes. In his description of a desirable system of competition, he asserts that, among the imperfect options available to us, competition secures the greatest opportunity for any randomly chosen person: "the self-ordering process will secure for any random member … a better chance over a wider range of opportunities available to all than any rival system could offer."[66] The value Hayek places on opportunity and striving implies that freedom and responsibility are important values served by emergent order in markets. These values suggest the capability approach of Amartya Sen and the opportunity criterion of Robert Sugden as promising normative frameworks.[67] Neither of these approaches is a perfect normative fit to Hayek's evolutionary framework however.

In the capability approach, normative evaluation is based on human capabilities, defined as the ability to achieve goods that a person has reason to value.[68] The capability framework avoids reliance on utilitarian-based preference approaches, respecting the freedom of human beings without uncritically accepting the choices they make. What makes the capability approach potentially a poor fit for Hayek is its reliance on reason. As noted in section two, both preferences and reason are products of evolution in Hayek's theory. If changing preferences create problems for normative evaluation, changes in reason are perhaps equally problematic. Sen, in a comment on Darwinian notions of progress, addresses the status of reason in an evolutionary framework of which reason is a product, dismissing concerns about its usefulness: The fact that reason is a product of evolution does not undermine its usefulness. It may have been developed for a specific evolutionary purpose, but "we can use it as we like."[69]

Robert Sugden's opportunity criterion avoids the need to rely on the rationality of agents, proposing instead the value of agents as bearers of responsibility. Sugden critiques the measure of value in the capability approach—capability to achieve goods one has reasons to value—as too demanding because many people act on incoherent or unstable preferences. He goes on to argue that responsibility should take the place of reason as the ground of normative value and that responsibility requires opportunity.[70]

Because the opportunity criterion eschews reliance on rational choice, it is attractive as a framework for Hayekian evolutionary approaches. However, Hayek's relentless recasting of normative categories in an evolutionary framework calls into question even the opportunity criterion. In *The Constitution of*

Liberty, even as Hayek advocates for a system of ordered liberty, he contends that freedom is not intrinsically good; freedom is instrumentally good because it makes society flexible in its response to uncertainty, positioning us to discover and achieve emergent goods.[71] Free will and responsibility are useful constructs: "in general, the knowledge that he will be held responsible will influence a person's conduct in a desirable direction."[72]

Whatever difficulties there may be in the arguments that Hayek makes for the desirability of evolutionary order, it is clear that he does not argue for markets on the basis of preferences that are themselves products of evolution. Instead, he argues that competitive order enables the economy to sustain a large population and at the same time to allow a significant proportion of that population to freely pursue its purposes and goals. Clearly, human striving and responsibility play an important role in Hayek's normative thinking.

Conclusion

Our investigation into Hayek's apparent dismissal of laboratory methods as being of little interest gives a central role to the concept of efficiency as it is employed in the laboratory and critiqued by Hayek. To understand why laboratory demonstrations might be of little interest, we began by exploring what was of interest to Hayek: explanations of the functions of competitive order that highlight its normative desirability. Hayek wants to know how markets function, but this positive concern is part of a normative case for reliance on markets for social order. For this reason, in "Competition as a Discovery Procedure," Hayek is critical of theoretical accounts of market functioning that obscure important practical benefits of markets—namely, their ability to elicit and coordinate information.

It is in this context that Hayek quickly considers and dismisses the promise of laboratory demonstration. Because even complex experiments simplify complex phenomenon and require that the commodity space, preferences, and information be known to the experimenter, they will to some extent obscure the information functions of markets so highly valued by Hayek. Hayek's skepticism of closed theoretical models extends to laboratory models.

It is conceivable that, if Smith and Hayek had had the opportunity to discuss Hayek's concerns, Hayek might have acknowledged the contributions of experimental methods that stop short of fully specified theoretical models. The genuine unpredictability of the laboratory, its ability to document without fully explaining how agents in relatively complex, low information environments manage to achieve gains from trade and overcome agency and cooperation problems,

might have swayed Hayek to admit that it was at least an echo of the sorts of evolutionary rationalism he describes in his work.

Although Hayek might have given Smith his due had he seen the unfolding contributions of experimental methods, we argue that experiments would have remained of little interest to the normative arguments that motivate Hayek, primarily because of the central role of efficiency in laboratory demonstration. Hayek consistently argues that the preferences on which efficiency is based are themselves the products of evolution and, as such, are an unstable metric on which to evaluate market (or constructivist) order. Instead of relying on preference-based efficiency to argue for markets, he argues that markets are necessary to avoid widespread human suffering, and afford the widest range of freedom to the largest number of people.

Notes

1. Vernon Smith, *Bargaining and Market Behavior* (Cambridge: Cambridge University Press, 2000); Vernon Smith, *Rationality in Economics: Constructivist and Ecological Forms* (Cambridge: Cambridge University Press, 2008). Many thanks to Vernon Smith, Robert Sugden, Peter Boettke, and Paul Oslington for suggestions and comments on an early draft of this article.
2. Smith traces the roots of his work back further to David Hume, *A Treatise on Human Nature*, ed. D. F. Norton and M. J. Norton (1739; repr., New York: Oxford University Press, 2000); Adam Smith, *The Theory of Moral Sentiments* (1759; repr., Indianapolis: Liberty Fund, 2009).
3. Friedrich A. Hayek, "Competition as a Discovery Procedure," *The Quarterly Journal of Austrian Economics* 5, no. 3 (2002): 9–23.
4. Hayek, "Competition as a Discovery Procedure," 10.
5. Smith, *Rationality in Economics*, 284.
6. Smith, *Rationality in Economics*, 291.
7. For Smith's second example, see note 21 below.
8. Smith, *Rationality in Economics*, 291, italics ours.
9. Hayek, "Competition as a Discovery Procedure," 10, italics ours; cited by Smith, *Rationality in Economics*, 291–92.
10. Smith, *Rationality in Economics*, 291, italics ours.
11. Smith, *Rationality in Economics*, 292.

12. Smith, *Rationality in Economics*, 292, italics ours.
13. Hayek, "Competition as a Discovery Procedure," 9, italics ours.
14. Hayek, "Competition as a Discovery Procedure," 9, italics ours.
15. Hayek, "Competition as a Discovery Procedure," 10.
16. Smith, *Rationality in Economics*, 2.
17. Smith, *Rationality in Economics*, 2.
18. Smith, *Rationality in Economics*, 36. For a fuller description of ecological rationality, see P. M. Todd and G. Gigerenzer, eds., *Ecological Rationality: Intelligence in the World* (New York: Oxford University Press, 2012).
19. Smith, *Rationality in Economics*, 38, italics ours.
20. Smith, *Rationality in Economics*, 8.
21. Smith, *Rationality in Economics*, 5. See also M. Casari and Charles Plott, "Decentralized Management of Common Property Resources: Experiments with a Centuries-Old Institution," *Journal of Economic Behavior and Organization* 51, no. 2 (2003): 217–47.
22. Friedrich Hayek, *Law, Legislation, and Liberty*, vol. 1, *Rules and Order* (Chicago: University of Chicago Press, 1973), 29–30.
23. Hayek, *Rules and Order*, 11.
24. See also Friedrich Hayek, *The Constitution of Liberty* (Chicago: University of Chicago Press, 1960), 27, 61; Friedrich Hayek, *The Fatal Conceit* (Chicago: University of Chicago Press, 1988), 61.
25. Hayek, *Fatal Conceit*, 7–8.
26. Friedrich Hayek, *Law, Legislation, and Liberty,* vol. 2, *The Mirage of Social Justice* (Chicago: University of Chicago Press, 1976), 6. Quoted by Erik Angner, *Hayek and Natural Law* (New York: Routledge, 2007).
27. Although Hayek attempts to keep separate the evolutionary intelligibility of emergent institutions and behaviors from his arguments that such orders are desirable, he does not fully succeed. Angner, *Hayek and Natural Law* notes the disagreement over whether Hayek was advocating for markets in his analysis of spontaneous order, or whether the normative language he employed was merely descriptive.
28. Hayek, *Rules and Order*, 14, italics ours.
29. Hayek, *Rules and Order*, 8.

30. Friedrich Hayek, "The Use of Knowledge in Society," *American Economic Review* 35, no. 4 (1945): 519.

31. See Charles Plott, "Equilibrium, Equilibration, Information, and Multiple Markets: From Basic Science to Institutional Design," paper presented at Nobel Symposium on Behavioral and Experimental Economics, Stockholm, Sweden, 4 December 2001.

32. Smith, *Rationality in Economics*, 293–94, recounts an interaction with a prominent economist (unidentified) that illustrates Hayek's critique. After Smith explained the experimental method to the economist, the economist "objected that if, as the experimenter, I have sufficient information to know what constitutes the socially optimal allocation, then I did not need a mechanism. I could just impose the optimal allocation!" Smith finds this reaction to be incredible, but Hayek would have seen it as evidence in favor of his critique of neoclassical method.

33. Hayek, "Competition as a Discovery Procedure," 9. Bruce Caldwell, *Hayek's Challenge: An Intellectual Biography of F. A. Hayek* (Chicago: University of Chicago Press, 2004), 224–30, discusses the development of Hayek's opinion on equilibrium theory. Peter Boettke, "The Theory of Spontaneous Order and Cultural Evolution in the Social Theory of F. A. Hayek," *Cultural Dynamics* 3, no. 1 (1990): 73, dubs neoclassical criticisms of spontaneous order inside and outside of markets as "equilibrium criticisms," and documents Hayek's rejection of them. See Peter Boettke, *Living Economics: Yesterday, Today, and Tomorrow* (Oakland: Independent Institute, 2012) for a more general Austrian critique of the idea of equilibrium in economics.

34. Plott, "Equilibrium, Equilibration, Information, and Multiple Markets," 3.

35. Plott, "Equilibrium, Equilibration, Information, and Multiple Markets," 4. For example, in the experiment reported in Casari and Plott, "Decentralized Management of Common Property Resources," eight experimental subjects are each given fifty dollars in resources to either keep or invest in common production, of which they get a share. By both specifying the relationship between group investment and common pool output and giving the subjects an initial endowment, the experiment effectively fixes preferences in monetary terms and identifies the efficient outcome of the experiment.

36. Smith, *Rationality in Economics*, 63–65.

37. Plott, "Equilibrium, Equilibration, Information, and Multiple Markets."

38. Smith, *Rationality in Economics*, 5.

39. Smith, *Rationality in Economics*, 5.

40. Smith, *Rationality in Economics*, 108, 263.

41. Hayek, *Constitution of Liberty*, 13, italics ours.

42. Hayek, "Competition as a Discovery Procedure," 18.

43. The unexpected and unpredictable nature of evolutionary emergence was taken up and developed more fully in the work of Israel Kirzner. See Israel Kirzner, "Entrepreneurial Discovery and the Competitive Market Process: An Austrian Approach," *Journal of Economic Literature* 35, no. 2 (1997): 60–85; Israel Kirzner, "Rationality, Entrepreneurship, and Economic 'Imperialism,'" in *Economic Organization and Economic Knowledge: Essays in Honor of Brian J. Loasby*, ed. Sheila C. Dow and Peter E. Earls (London: Edward Elgar, 1999), 1–13.

44. Hayek, *Constitution of Liberty*, 23.

45. Hayek, *Constitution of Liberty*, 35.

46. Hayek, *Constitution of Liberty*, 24. See Caldwell, *Hayek's Challenge*, chap. 13, for a fuller discussion of the evolution of rules and norms in Hayek's work. See Ulrich Witt and Naomi Beck, "Austrian Economics and the Evolutionary Paradigm," in *The Oxford Handbook of Austrian Economics*, ed. Peter J. Boettke and Christopher J. Coyne (London: Oxford University Press, 2015), 576–92, on the history and challenges of evolutionary theorizing in Austrian economics in general.

47. Hayek's dismissal of laboratory experiments is traceable to another conviction that when complex phenomena are involved an "explanation of the principle is the best that one could do" (Caldwell, *Hayek's Challenge*, 259). The exogeneity of preferences in the laboratory obscures the necessity for principle-based explanation.

48. For an argument that stable preferences can yield meaningful comparisons, see K. Bykvist, "Can Unstable Preferences Provide a Stable Standard of Well-being?" *Economics and Philosophy* 26, no. 1 (2010): 1–26. For a critique of this notion, see D. Sobel, "Full Information Accounts of Well-being," *Ethics* 104, no. 4 (1994): 784–810.

49. This critique is similar to the contrast in Paul D. Aligica, "The Market Process Theory Perspective on Capitalism," *The Oxford Handbook of Austrian Economics*, 508–26, between economic models in which the specified constituents are agents, preferences, resources, and goods, and alternative concepts of the market in which processes (discovery, exchange, creativity, change) are the fundamental units of analysis. Aligica argues that normative theory must take into account the emergence of normative frameworks as a dynamic process.

50. Hayek, *Constitution of Liberty*, 41.

51. Hayek, *Constitution of Liberty*, 41.

52. This point is made by Angner, *Hayek and Natural Law*, 73–74.

53. Hayek, *Fatal Conceit*, 19, 22.

54. Hayek, *Fatal Conceit*, 23.

55. Hayek, *Constitution of Liberty*, 36.

56. See D. G. Whitman, "Hayek Contra Pangloss on Evolutionary Systems," *Constitutional Political Economy* 9, no. 1 (1998): 45–66; Hayek, *Fatal Conceit*, 27.

57. Hayek, *Fatal Conceit*, 69.

58. Hayek, *Fatal Conceit*, 70.

59. Hayek, *Fatal Conceit*, 85.

60. Hayek, *Fatal Conceit*, 121.

61. Also, see Witt and Beck, "Austrian Economics and the Evolutionary Paradigm," 588.

62. The need for positive arguments is emphasized by M. Qizilbash, "The Adaptation Problem, Evolution, and Normative Economics," *Arguments for a Better World: Essays in Honor of Amartya Sen*, vol. 1, *Ethics, Welfare, and Measurement*, ed. K. Basu and R. Khanbu (Oxford: Oxford University Press, 2008), 50–67. Qizilbash points out the difficulties of inferring firm normative conclusions from mere evolutionary survival, even of human beings. See also Amartya Sen, "On the Darwinian View of Progress," in *Rationality and Freedom* (Cambridge, MA: Belknap Press, 2002).

63. Hayek, *Constitution of Liberty*, 13, 29.

64. Hayek, *Constitution of Liberty*, 41.

65. Hayek, *Constitution of Liberty*, 51, italics ours.

66. Hayek, *Fatal Conceit*, 85.

67. Amartya Sen, *Development as Freedom* (New York: Anchor Books, 1999); Robert Sugden, "Opportunity as Mutual Advantage," *Economics and Philosophy,* 26, no. 1 (2010): 47–68.

68. See F. Comim, M. Qizilbash, and S. Alkire, eds., *The Capability Approach: Concepts, Measures, and Applications* (Cambridge: Cambridge University Press, 2008).

69. Sen, "On the Darwinian View of Progress," 494.

70. Sugden, "Opportunity as Mutual Advantage," 54–55.

71. Hayek, *Constitution of Liberty*, 29.

72. Hayek, *Constitution of Liberty*, 75.