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Book Review

Rationality in economics: Constructivist and ecological forms, Vernon L. Smith. Cambridge University Press. 351 p., $70, ISBN: 978-0-521-87135-8

Rationality is a widely used, overused and misused term in twentieth century economic discourse. In this volume of essays, Vernon Smith puts human rationality in the context of larger cultural processes that shape our institutions, society, and us. Given the fog surrounding rationality, this brilliant volume has arrived none too soon. Smith questions the routine assumptions made in all aspects of economics–theoretical, behavioral and empirical – and presents the scientific enterprise of economics as an interactive dynamic social process.

Smith takes the reader on a journey of personal and intellectual discovery using ideas from Scottish enlightenment and Hayek as the guiding light to illuminate the path of his five decades in economics laboratory. The journey takes many turns before reaching some unexpected but ultimately convincing and satisfying conclusions about what we know about economics and how we learn.

At the heart of the book lie two orders of rationality – an idea of Friedrich A. Hayek which is as important but not as well known as his concept of markets as processors and aggregators of information naturally dispersed among the members of society. The constructivist rationality consists of the use of conscious analysis, reason and logic to decide by individuals and small groups. Deliberate as well as intuitive actions that arise beyond the reach of conscious reason are taken within the social environment defined by the rules and institutions, and interact in complex ways. These interactions give rise to the aggregate level outcomes and institutions. The resulting tacit knowledge and tendencies constitute the ecological order lying beyond individual self-awareness. The book is about the linkage between the two orders.

Constructivist rationality involves conscious use of knowledge and reason to make individual or small group decisions and designs to solve specific problems. Design of a bridge using information about the terrain, the traffic, the strength and cost of materials, and technologies available for assembling its components is an exercise in constructivist rationality. This is the mode of functioning we call problem solving by cold calculation, with calculation interpreted broadly to include deliberate reasoning.

While the design of a bridge might be the outcome of constructivist rationality, how it comes into being requires a more extensive, not-so-well-understood ecological rationality. A bridge is a public good with high capital cost, access roads, maintenance, etc., and emerges out of messy and long social, political, economic and technological processes. The participants in this larger process may be diversely informed of the relevant knowledge, and may have no consciously shared objective. The engineering design of the bridge is but a small step in this larger process whose outcomes are difficult to predict. Even the design may include many choices which are not explainable by deliberate reasoning. Cities, towns, and rivers are well-connected by a network of roads and bridges in some societies but not in others, and the variations in their designs are not entirely explainable by the contents of engineering and economics textbooks. This is a reminder of the existence and the importance of the ecological order of rationality.

The linkage between deliberately chosen individual actions and aggregate outcomes is not susceptible to constructivist analysis. This interaction is closer to biological evolution over a longer time scale. Actions chosen outside the bounds of our reason serve the role of random mutations in biological evolution. Some mutations survive the competition for fitness and may become incorporated into expectations, beliefs, intuition, rules and institutions that define the setting in which individuals apply their constructivist reasoning to decide and act.

Human tendency to reciprocate in small groups and exchange in larger impersonal settings, Smith suggests, is an outcome of social evolution. This tendency survived and developed because it made us more fit in the sense of allowing us to exploit the gains from specialization among people with diverse skills and information.

Recognition of two orders of rationality leads Smith to analyze how we should see and do economics. Neoclassical economics characterized impersonal social systems by competitive equilibrium among calculated actions of fully informed agents. Such actions are rational in the constructivist order but based on strong assumptions about complete information endowments. Laboratory experiments, on the other hand, show that with repeated experience in a variety of market institutions people are often able to arrive in close proximity of theoretical equilibria with much weaker information endow-

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ments. This leads to questions of how this is possible and what are the links among exchange, specialization, innovation, and emergence of tacit knowledge, intuition, and social institutions.

The ecological rationality of reciprocity had been encapsulated in the moral or religious codes in the form of the Golden Rule (treat others as you would like to be treated) early in virtually all societies. The biblical commandments against murder, adultery, stealing, bearing false witness and coveting others' property are perhaps examples of reciprocity reflected in the Golden Rule.

Vulgar representations of the "economic man" or the "standard social science model (SSSM)" often caricature, even invert the ideas of Adam Smith, David Hume and their Scottish contemporaries. It is not without irony that Adam Smith has been so reviled by those who believe that the rediscovery of his insights centuries later is somehow original:

> We suffer more ... when we fall from a better to a worse situation, than we ever enjoy when we rise from a worse to a better. Security, therefore, is the first and the principal object of prudence. It is averse to expose our health, our fortune, our rank, or reputation, to any sort of hazard. It is rather cautious than enterprising, and more anxious to preserve the advantages which we already possess, than forward to prompt us to the acquisition of still greater advantages.Adam Smith (1959, 1982, p. 213).

Scottish thinkers saw reciprocity as the basis of human sociality and exchange as the basis of social and economic order whose fitness arises from exploitation of gains from specialization. To them, unintended good of others could follow from doing well for oneself, and doing good for others does not necessarily require deliberate action to further the perceived interests of others. In Mandeville's (1705, 1924, 2005) verse:

> ...Thus every part was full of Vice,
> Yet the whole Mass a Paradise; ...

The so-called SSSM puts Mandeville and Smith's proposition on its head by asserting that it requires, justifies and promotes selfish behavior. Since "A implies B" does not mean "B implies A", such interpretation confuses sufficient with necessary conditions. Markets economize on the need for virtue but do not denounce it. Indeed, they depend on virtue; otherwise the costs of monitoring and enforcement would become unbearable.

Smith draws major implications for theory, behavioral and experimental economics, and for economics as a science, from this two-orders-of-rationality perspective.

Under Smith's interpretation, the laboratory evidence from ultimatum games is consistent with the ecologically rational evolution of human reciprocity because such behavior generates gains from exchange in a world of dispersed skills and information. In contrast, the behavioral economics literature, focusing on the constructivist order of rationality, attributes such evidence as support for other-regarding preferences that lead individuals to take others' welfare into account in choosing their actions.

In their recent work Dana, Daylian, and Dawes (2006) report that about fifty percent of the agents who committed to pay positive amounts in dictator games, when given the opportunity, exited the game with $9 ($10 less a $1 exit cost), leaving the receiver with nothing. This evidence is inconsistent with the other-regarding preferences but is not inconsistent with reciprocity as a social norm that we would rather follow than violate. By exiting the game, the dictator avoids a reciprocal relationship that might have influenced his/her giving behavior.

Broadly speaking, behavioral economics has presented deviations from the predictions of the subgame perfect equilibria in public goods, ultimatum, dictator and other games as evidence that people are not rational. Smith, on the other hand, interprets these same observations as evidence that constructivist rationality coexists with ecological rationality and our social norms and expectations tend to evolve towards yielding collectively rational outcomes in personal and impersonal interactions. While behavioral economics focuses on the unexplained variance as the failure of SSSM – the half empty glass, so to speak – Smith focuses on understanding what economics can explain – the half full glass – with such remarkable simplicity.

Experimental economics developed to examine the properties of market institutions of a given design, and expanded to assess theories and policy proposals. Smith conducted his first experiment in 1956 (published in 1962); it revealed that the "double action" market he had devised after stock exchanges rapidly and reliably approached the theoretical equilibrium defined as the point of intersection of the demand and supply functions (based on reservation costs and values privately given to the small number of sellers and buyers, respectively). While Smith knew this point of intersection, the participating traders knew only their private costs or values, the rules of the game, and the mapping from market outcomes to personal rewards. In contrast, the extant economic theory attributed variously to economists since Jevons, required perfectly foreseen conditions of demand and supply to achieve the equilibrium.

Smith's experiment proved to be so influential because it showed that in specific market institutions, equilibrium can be attained under far weaker informational conditions upon repetition. Subsequent experiments designed to compare the performance of double auctions under private and complete information found that the latter is neither necessary nor sufficient for achieving equilibrium; complete information, if anything, interfered with achievement of equilibrium. Half-a-century later we still have no constructivist derivation of how and why this happens – a marvelous illustration of Hayek's ecologically rational order. Ironically, even years after such experiments had been reported, Hayek not only remained unaware of the work, he came close to suggesting an experimental test and then, like most of his distinguished contemporaries – Joan Robinson, Milton Friedman and Paul Samuelson – shut the door on the possibility by denying their value:

> ...The necessary consequence of the reason why 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 the conceptual models, and we might conceivably test it in artificially created real situations, when the facts that 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, 1978, 1984, p. 255).

Ouch! This hurts. Even great thinkers must have their lapses.

The rationale for the complete information assumption to characterize individual behavior and to derive equilibrium remains unclear. It may be necessary not so much to the agents as to the analysts themselves. In lab experiments, the agents only infrequently ask for the information not given to them, and seem to be able to trade on their private information and whatever they can glean from observation. The Market 2001 software system was developed at Carnegie Mellon University in 1989 to study Smithian double auctions permitting both human as well as algorithmic traders. It took no more than a few minutes for the human traders to learn to trade using keyboard, mouse and computer screens as input and output devices. However, in spite of their trading and programming experience, converting intuitive trading strategies into computer code proved to be a challenge for graduate students. Even after several weeks of algorithm development, the sessions populated by algorithmic traders remained distinctly different from the sessions populated by human traders in important respects. This non-equivalence of trading algorithms and the intuitive trading by their human progenitors is another illustration of the Hayekian proposition about the inaccessibility of our own decision processes through conscious reason.

Performance of double auction markets populated by multiple copies of a memory-less, non-learning, non-optimizing, and no-loss random trading algorithm (labeled ZI for zero-intelligence) came as a Hayekian shock: these double auctions, too, tended to converge to the neighborhood of competitive equilibria in prices, volume, allocations and surplus extraction. These results helped put to rest the belief that complete information and optimization by agents are necessary to achieve efficient market outcomes. The order of ecological rationality asserts itself even in the small scale double auctions Smith devised.

Smith has much to say to experimental economists. Experimentalists often seek to create "context free" environments inside the laboratory in the hope of enhancing the generalizability of their inferences to outside contexts. If experiments are to be interpreted in the larger socio-cultural context in which human beings evolved, there is little hope that we have the ability to strip human subjects of that context during an hour or two of instructions, exhortation, incentives or indoctrination. Even if we succeed in doing so, how would we know that we succeeded, and how shall we interpret the meaning of such data gathered inside the lab for the outside world? This objection does, however, allow for the possibility that some computer simulations with computational agents may allow us to gain conditional insights into institutional ecologies.

A frequently raised question about lab experiments is: Do the subjects understand the instructions? The answer depends on what is covered by the understanding. The procedures, sequence, opportunity sets, private and any common knowledge information, strategy sets, desirability of alternative strategies, and mapping from events and actions to rewards and punishments are possible candidates for subjects' understanding. While Smith appears to include strategy in the scope of understanding to be tested (p. 303) others may exclude the question about strategies from the testing protocols.

Consideration of human sociality raises questions about how we should interpret the progressive reductions in contributions often observed in public good games in laboratory. One possibility is to interpret the reduction as evidence that, upon repetition and experience, the outcomes approach the predictions of subgame perfect equilibria. The fact that the contributions exceed the equilibrium prediction at the beginning and rarely decline to zero at the end is interpreted by some as evidence for rejecting the SSSM in favor of other regarding preferences. Ecological rationality suggests that the effort spent on creating an anonymous, sterilized, controlled communication environment in the laboratory simply forces the subjects to gradually learn that they should have left their natural human sociality at the laboratory's door. When human societies address the public goods contribution problems, anonymity is discarded early on. What exactly are we trying to learn by conducting anonymous experiments on public goods? Interpreting laboratory experiments in outside contexts calls for a comparison of the two social contexts. Each person has many "selves" of which the individual self is one, and this self is not always the dominant one. To assume otherwise needs a clear rationale.

Fortunately, development of technologies of neurosciences holds considerable promise to gain new insights into anatomical and physiological characteristics of the brain, the process of learning and socialization, and their evolutionary antecedents. For the first time, we have the chance to directly observe the processes that we could only speculate about by attaching various labels with their external manifestations. Perhaps our release from Plato's cave is near.

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