

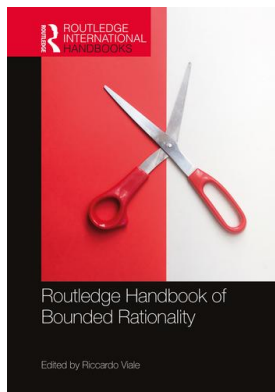
This article was downloaded by: 10.2.97.136

On: 22 Mar 2023

Access details: *subscription number*

Publisher: *Routledge*

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: 5 Howick Place, London SW1P 1WG, UK



Routledge Handbook of Bounded Rationality

Riccardo Viale

Bounded rationality as the cognitive basis for evolutionary economics

Publication details

<https://test.routledgehandbooks.com/doi/10.4324/9781315658353-37>

Richard R. Nelson

Published online on: 29 Oct 2020

How to cite :- Richard R. Nelson. 29 Oct 2020, *Bounded rationality as the cognitive basis for evolutionary economics from: Routledge Handbook of Bounded Rationality*

Routledge

Accessed on: 22 Mar 2023

<https://test.routledgehandbooks.com/doi/10.4324/9781315658353-37>

PLEASE SCROLL DOWN FOR DOCUMENT

Full terms and conditions of use: <https://test.routledgehandbooks.com/legal-notices/terms>

This Document PDF may be used for research, teaching and private study purposes. Any substantial or systematic reproductions, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The publisher shall not be liable for an loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

BOUNDED RATIONALITY AS THE COGNITIVE BASIS FOR EVOLUTIONARY ECONOMICS

Richard R. Nelson

A foundational feature of modern evolutionary economics¹ is its commitment both to a Schumpeterian perspective on modern capitalist economies as dynamic systems,² always evolving, with change being driven largely by innovation, and to the proposition developed by Herbert Simon and his colleagues that the behaviors of human and organizational actors should be understood as boundedly rational.³ The way the presumption that economic actors are boundedly rational is employed in evolutionary economics is consistent in a broad sense with the way that concept has been used in other arenas of research and writing, but the contexts and modes of behavior treated go significantly beyond the more conventional orientation. The objective of this chapter is to explain why and how the presumption of individual and organizational bounded rationality has been used in evolutionary economics.

Innovation, continuing unpredictable change, and bounded rationality

The evolutionary economics described in this chapter is based on a perspective regarding what is going on in the economy that is very different from that presented in today's standard textbooks. The overarching difference is that evolutionary economists see continuing change, largely driven by innovation, as a central characteristic of modern capitalist economies. Evolutionary economists are Schumpeterian in that basic sense. This means that innovation, and operation in contexts where innovation-driven change is going on, are fundamental aspects of what economic actors do and the contexts in which they operate. Of course, economic sectors and activities differ in the pace and character of change. In many parts of the economy, innovation is rapid and continuing and the context for economic action taking is almost always shifting and providing new challenges and opportunities. And while in some activities and sectors, the rate of innovation is more limited, attempts at doing something new are going on almost everywhere in the economy, and so too change that can make obsolete old ways of doing things. This is a very different perspective on the nature and context for economic action taking than that described in the standard economics textbooks.

Proponents of the neoclassical economic theory that provides the intellectual scaffolding for the conventional view of what economic activity is all about never explain or rationalize how

economic actors come to be able to choose courses of action that are optimum for them, given their objectives and the context in which they are operating. It is highly relevant to our discussion here, however, that almost no formulation of that theory of behavior mentions attempts by economic actors to do something that has not been done before, or the difficulties they face when they are operating in contexts that they have not previously experienced. While in evolutionary economics not all situations are of these sorts, many of the most important are. And this has led us to develop a version of Simon's bounded rationality as our basic assumption about the cognitive strengths and limits of economic actors, and our theory of how they behave.

The perspective on economic behavior as mostly "boundedly rational" has the particular attractiveness for economists of being consonant with the traditional economic theory of behavior, going back to the days of Adam Smith, that sees economic actors doing what they do with purposes in mind and in many contexts at least a rough understanding of the consequences of following various courses of action. I believe that, treated with care, and recognizing human fallibility, this broad theoretical perspective has shown considerable explanatory and predictive power. The problem with the full-blown rational behavior theory of neoclassical economics is that it does not recognize these caveats, and they are particularly germane in contexts important to evolutionary economics.

The proposition that human rationality is bounded highlights that there are limits to the reasoning power of the human mind as well as of the knowledge and information actors can master and work with. As Simon has stressed, the contexts for human action very often are too complicated or subtle for actors to understand and take into account adequately the wide range of factors bearing on what they should be doing. I would like to add that this general argument is quite open to recognition of significant differences across contexts in the strength of human understanding.

However, I would propose that, to address the range of phenomena of particular interest to Schumpeterian economists, several distinctions and factors need to be highlighted much more than they have been to date in the literature on bounded rationality.

First, it is important to distinguish between choice contexts which are familiar to the economic actor and who responds to them more or less automatically by taking actions that have sufficed before in this kind of context, and contexts that induce the actor to engage in serious contemplation of alternatives. And where action taking is preceded by conscious deliberation, it is important to distinguish between contexts where the actor's attention is focused on courses of action the actor has followed before, perhaps in another context, and perhaps others well known in his community, and those that involve trying to do something new. Schumpeterian and evolutionary economists of course have a special interest in the latter – that is what innovation is all about – but innovation only can be understood in juxtaposition to more routine behavior, and more generally action taking that involves doing the familiar.

Second, particularly for understanding the kinds of phenomena that most interest Schumpeterian economists, it is important to recognize that actors differ in the capabilities that they bring to various choice contexts. They differ in their knowledge and experience, and in the skills they possess. For these reasons they may differ significantly in what they do in contexts that, to an outside observer, may look basically the same. And some will do better than others will. I note that this aspect of behavior – differences in capabilities – has received little attention from either main line economists, or scholars working with the theory that economic actors are boundedly rational. Yet differences in capabilities obviously are of central interest to Schumpeterian and evolutionary economists.

A third important limitation of most of the writings on economic behavior, including those oriented by the assumption of bounded rationality, that needs to be remedied is the failure to

relate the perceptions of individual actors about the contexts they face, the courses of action that they understand and are competent to employ, and their judgments about which of these actions are appropriate and likely to be effective, to the beliefs and understandings and know-how of the broader community of which the actor is a part. This can and has been raised as a criticism of modern psychology in general. And it is hardly recognized in behavioral economics.

I want to argue that it is especially important that Schumpeterian economists clearly recognize the social and cultural context of action taking. We are centrally interested in how modern capitalist economies have become so productive, and the sources and mechanisms of future progress. When one observes powerful and complex methods being used by individuals and organizations to achieve their ends, it is almost a sure thing that the heart of the knowledge base of what they are doing is shared by their professional peers, and is acquired by individuals only as they are part of this broader community. And almost always powerful knowledge, common to professionals in a field of activity, has been achieved through a lengthy cultural learning process.

To return to the general theme, under the perspective on economic behavior and cognition I am describing here, economic actors are assumed to be boundedly rational. When in contexts that call for them to do something, they proceed with some notions about the outcomes they would like to see happen, a perception of at least some actions they might take that seem plausible, and some thoughts on which of these might be most appropriate. But the contexts they face differ widely, and they go about generating the actions they actually take in different ways in different kinds of contexts.

In contexts where change is relatively slow, actors are likely to respond to the requirement to do something by following patterns of behavior that they have used successfully before. In other situations, the context is different from what the actor has faced before, or while the context may be familiar, for various reasons the actor may want to consider a range of options before doing anything. Simon himself made this distinction in a number of his analyses, and this also is a distinction made by Daniel Kahneman (2011).⁴ Sidney Winter has reminded me that John Dewey ([1922] 2002) presented a similar view of behavior, with perhaps more emphasis on the role played by emotion and anxiety in some contexts.

I note that Kahneman puts less weight than do I on the argument that routine behavior often is highly effective. Also, he seems to presume to a greater extent than do I that active deliberation is highly likely to come up with an effective course of action. It may or may not. I would propose that the chances are better that it will when the actor's own experience or the knowledge the actor has of what others have done effectively includes actions that will be effective in this context. Where dealing with the problem induces or requires a quite new attack on it, the chances of speedy success are slim. With continued effort and cogitation, success may be achieved through trial and error learning. But it may not.

Innovating is a rational activity, in that those who try have particular objectives in mind and draw as best they can on the knowledge they have. But that rationality surely is bounded.

Routines

The range of actions that need to be taken even over a short period of time by an economic actor often is far too great for that actor to be able to think carefully before taking each required action. However, where the environment for action has been relatively tranquil, actors generally have had time to learn the kinds of action that works in that context and what doesn't. The argument above is that most of the actions one observes in such contexts should be understood as actors following routines that have in the past yielded satisfactory outcomes, and are

triggered relatively automatically by circumstances under which action along these lines seems appropriate.

I suggest that individual or household shopping for the kinds of items bought relatively regularly largely involves following routines. In my recent paper with Davide Consoli (Nelson and Consoli, 2010) we propose that much of household behavior can be understood in terms of the routines they use. And of course a quite extensive empirical and theoretical literature exists, arguing that firm behavior largely involves the following of established routines.⁵ In our earlier work, Sidney Winter and I used the term “routine” to characterize these aspects of firm behavior. Here I am using it to denote the relatively automatic behavior patterns of any economic actor.

The fact that little conscious thought is involved in the invoking and execution of a routine does not imply that routines are crude ways of doing things. The routines a store has for reordering stock and for setting prices may be quite elaborate, even though once in place they are carried out routinely. The operation of highly sophisticated technologies largely involves the use of routines. Many of the routines used by economic actors are very powerful and highly effective in meeting their objectives.

Also, routines need not be rigid. Indeed, viable routines generally have a reasonable amount of flexibility built into them to enable them to adjust to the kind of variable circumstances that are to be expected in the broad context where they are operative. Household shopping routines need to be sensitive to what is and is not available at the store, and to some degree to prices. Firm pricing routines need to take costs into account. But my argument is that in established shopping routines, these adjustments generally are made relatively routinely. There may be some conscious consideration of alternatives, but so long as the context remains in the normal range, wide search and intensive deliberation are highly unlikely. Similarly, the pricing routines of firms almost always are sensitive to costs, with much of that sensitivity, if not necessarily all, built into a formula used relatively routinely.

Elsewhere (Nelson, 2013), I have used the term “adaptively responsive” to denote the sensitivity of routines to broadly experienced and thus anticipated variation in the details of the context that invokes their use. My proposal is that most routines that are used for a significant time are adaptively responsive.

Economists of a neoclassical persuasion would be inclined to argue that routines persistently employed by an economic actor must be, in some sense, optimal. Proponents of the view that the rationality of economic actors is bounded would point out that the fact that behavior is reasonably effective, given the actors goals, and adaptively responsive to common variations in context for action taking, do not imply optimality. However, that an actor continues to use a particular routine indicates that the results are “satisfactory” in the sense that doing things in a significantly different way is not being actively considered.⁶ On the other hand, of course, some of the actions that are carried out routinely by some actors are clearly clumsy, and some likely even counterproductive, given the objectives they aim to reach. An important challenge for evolutionary economics is to illuminate the conditions under which routines are effective, and those where they often are not.

From one point of view, to explain or predict what an economic actor does in a domain of activity marked by the use of routines, it is sufficient to identify and analyze the routines that are in use. And this is exactly what is done in studies like those reported in the classic book by Cyert and March (1963), *A Behavioral Theory of the Firm*.

But for the theory of behavior to have depth, it is important to understand why the routines in use are what they are. I have argued that the neoclassical mode of answering that question – to propose that they are optimal – is not convincing if one holds to a theory of bounded

rationality, and wants an explanation, not simply a purported characterization, of observed behavior. Under evolutionary theory such an explanation needs to be posed in terms of learning and selection processes.

Deliberating, problem solving, choosing

The proposition that much of the economic behavior one observes at any time should be understood as actors following routines is not meant to play down the role of deliberation, problem solving, and often creativity in the generation of economic activity. These more active cognitive processes are brought into play when economic actors face contexts with which they are not familiar and for this or other reasons no established response seems appropriate, or more generally where the actor for whatever reason wants to do something new. And, of course, in many cases they are involved in the genesis of prevailing routines in the first place.

This perspective is, of course, very Schumpeterian. Chapter 1 of his *Theory of Economic Development* (Schumpeter, 1934) is all about routine activity in an economic steady state. In the actual economic world as we know it, no context is as constant as the context for economic action Schumpeter depicts in Chapter 1, or is laid out in general equilibrium theory. However, evolutionary economists would argue that at any time a good portion of economic activity proceeds in contexts that are regular enough so that behavior that follows an established routine can suffice to meet the actor's objectives, at least if the routine used has a certain amount of built in flexibility.

In Chapter 2, Schumpeter describes a very different kind of economic behavior: innovation. Innovation is creative by desire or necessity, uncertain as to success, often failing, sometimes winning big. But involving thinking and problem solving in an essential way.

In recent years cognitive scientists have significantly improved our understanding of how the cognitive capabilities and practices of human beings differ from those of other higher animals; the most interesting comparisons have been with other primates.⁷ There would appear to be two basic capabilities that humans have that other primates do not. One is built in biologically. The other, while based on this, is essentially cultural.

Other animals share with humans the ability to solve problems by doing different things until they find something that works, and then carrying over what has been learned to subsequent experiences with situations like that. But humans have the ability, that even other primates have to a far lesser degree, to in effect reflect on a context or a way of doing something (perhaps something they have observed others doing) even when that context is not present or that action not being actually implemented, in effect, anticipating future situations and actions.⁸ Thus, the kind of deliberation we are considering here would seem to be a capability that is largely unique to humans.

And humans are unique in having the capacity for cumulative collective learning. While the cutting edge of progress generally has been discovery or trying out of a new method by an individual actor, major advances over time have depended on the spread across the community of what has been learned, and the further building on that by others.⁹ The development of shared language has been essential for this to happen to any major extent. There is no question that the ability of humans to reflect and gather and process relevant knowledge prior to action is an important capability in its own right. However, I would argue that, in the absence of strong cultural know-how that has been developed over time through collective learning on which that capability can draw, what human reflection can achieve on its own is modest.

In my view, Schumpeter draws too sharp a line between innovating, and the imitative responses by followers to the innovations of others. The latter also requires ability to

conceptualize a way of doing something that is new for the particular actor, and often involves considerable uncertainty.

However, what is a new situation or new activity for a particular actor will tend to be conceived very differently if that actor knows about and can draw on the experience of other actors, than if the actor is all alone, as it were. Much of what actors do that is new to them is invoked by their knowledge of the experience of others. The abandonment by an actor of an old routine and the adoption of a new one may be induced simply by knowledge that others are doing something different and doing well, as contrasted with any compelling evidence that the old routine is not yielding satisfactory results. While direct imitation often is not easy, and the efforts of one economic actor to do what another is doing may achieve something somewhat or widely different, at any time a shared body of know-how provides the basis for the range of activities used in a field, and is the reason why one generally observes a certain amount of similarity in what the various actors are doing.

Innovation and the advance of know-how

While I believe the lines are blurred not sharp, the term “innovation” as contrasted with “imitation” connotes an endeavor by an actor to do something new not only to that actor, but to the community of actors doing roughly similar things. Empirical research shows clearly that innovators, like imitators, almost always draw heavily on know-how, and more general knowledge, possessed by their peer community. And a large share of innovation is based on and aims to improve artifacts and processes that are in use, often used by the innovator. But innovators are reaching beyond what has been done before. And if they are successful, what they have achieved sooner or later becomes part of the knowledge base shared by that community. That is, know-how in an area of economic activity advances over time through an evolutionary process driven largely by the innovation going on.

The principal difference between the orientation of evolutionary and Schumpeterian economists, and that of today’s more orthodox orientation to the study of economics, is our focus on innovation. Our argument is that what makes economic activity today so effective in meeting a wide variety of human wants is that the means we have available to achieve our ends have become so powerful as the result of cumulative innovation. It is not because economic decision makers are so effective. Human economic decision making remains, as it always has been, often mechanical, sometimes creative, but in these cases often mistake-ridden. Human rationality is bounded.

While there has been considerable research over the years by scholars of management on what makes firms successful, there is little evidence that firm managers today are more effective than firm managers were a half century or a century ago. The failure rates of new firms, and of new ventures by established firms, remains high. Business management remains an art, in which luck is an important factor determining success.

The situation is similar regarding household purchases and other decisions regarding how they spend their money. It is not for naught that we have in place a number of regulatory agencies justified explicitly by the proposition that households often have limited understanding of what they are buying. Wesley Clair Mitchell’s *The Backward Art of Spending Money*, published in 1912, rings as true today as it was then.

However, boundedly rational human actors can achieve remarkably good outcomes, if the know-how they have to work with, the means they know how to use, are good enough.

And where powerful know-how is available, and one observes highly effective human action going on, the principal reason is not so much that someone or some organization has effectively

thought through the background problem and surmised, or calculated, a good way of doing things in that context, but rather that there has been a lot of collective learning going on generally over a considerable period of time that, cumulatively, has led to the development of ways of doing things that work reasonably, or even extraordinarily, well. Thus, a key part of the theory of behavior and cognition that we need is a theory of how collective learning occurs.

Attempts at innovation clearly are the key driving force. However, a key premise of evolutionary economics, amply supported by empirical evidence, is that the efforts of economic actors to venture beyond established practice almost always are associated with uncertain outcomes (see Dosi and Nelson, 2010, for a broad review). While in areas where knowledge is reasonably strong, innovative efforts are far from blind, nonetheless all areas of innovative activity are marked by failures as well as successes, and even the most knowledgeable experts sometimes turn out to be wrong. A fundamental consequence is that, while economic progress certainly depends on the creative efforts of individual inventors and innovators, it depends at least as much on the existence of a number of potential innovators holding somewhat different perceptions of the most promising routes to advance, with competition in ex-post practice being a large part of the selection process determining the winners. And continuing progress depends on the essence of what has been achieved in one round of innovative effort becoming part of the collective knowledge base for the next round.

Put more generally, the remarkable increases in human knowhow that have been achieved over the years have been the result of the work of boundedly rational human actors, operating in a dynamic evolutionary context in which at any time effective new ways of doing things are separated from the not-so-good, and brought into wider practice. And in turn this sets the stage for the next round of efforts to advance the state of the art, which in turn are subject to selection mechanisms.

A brief summing up

Earlier I noted that, since the times of Adam Smith, economists observing the behavior of economic actors in the contexts in which they had a central interest have assessed these behaviors as largely reasonably rational, given the actors' apparent objectives, and the range of options they faced.

But over the past half-century, modern neoclassical economics has transformed what had been a quite flexible view of what "rationality" means into the much narrower notion that economic actors "optimized." Evolutionary economists have not been alone in arguing that this has been a very unfortunate development. Our position is that the presumption that economic actors mostly behave rationally is a powerful and useful theoretical position to take so long as that rationality is understood as bounded. The conception of rational behavior must have room for both creativity and habit, for both insightful understanding of the situation, and biased or simply ignorant views of what is going on.

I believe that the kind of perspective on economic behavior and cognition that I have sketched here, based on the presumption that economic behavior is "boundedly rational" and recognizing important differences associated with different kinds of contexts and conditions, has the promise of doing this. It provides a much better and richer characterization of economic behavior that is for the most part purposeful and functional than the theory of full-blown optimization that neoclassical theory is stuck with. It is applicable across a much wider spectrum of conditions. And for those who care about such matters, it provides an explanation for much of economic behavior that one actually can believe.

Notes

- 1 Key references here are Nelson and Winter (1982), and Nelson and colleagues (2018).
- 2 This perspective is first laid out in Schumpeter (1934).
- 3 The most relevant references for our discussion here are Simon (1957) and Cyert and March (1963).
- 4 These two different modes of action taking were built into most of the models developed in Nelson and Winter (1982).
- 5 For a fine review of the literature on organizational routines, see Becker (2004).
- 6 This is Herbert Simon's concept of "satisficing."
- 7 Donald (1991) provides a splendid discussion of these and related matters.
- 8 There is some evidence that certain other animals have this capability, but to a very limited degree.
- 9 Other species have the capability of spreading the effective behaviors learned by one individual to others in the community, but not of building further and cumulatively from that.

References

- Becker, M. (2004). Organizational routines: A review of the literature, *Industrial and Corporate Change*, 13(4), 643–678.
- Cyert, R., and March, J. (1963). *A Behavioral Theory of the Firm*, Englewood Cliffs, NJ: Prentice Hall.
- Dewey, J. (2002 [1922]). *Human Nature and Conduct*, Minola, NY: Henry Holt.
- Donald, M. (1991). *Origins of the Modern Mind*, Cambridge, MA: Harvard University Press.
- Dosi, G., and Nelson, R. (2010). Technical change and industrial dynamics as evolutionary processes, in B. Hall and N. Rosenberg (Eds.), *Economics of Innovation*, Amsterdam Elsevier.
- Kahneman, D. (2011). *Thinking, Fast and Slow*, New York Macmillan.
- Mitchell, W. C. (1912). The backward art of spending money, *American Economic Review*, June, 269–281.
- Nelson, R. (2013). Demand, supply, and their interaction on markets as seen from the perspective of evolutionary economic theory, *Journal of Evolutionary Economics*, 23(1), 17–38.
- Nelson, R., and Consoli, D. (2010). An evolutionary theory of household behavior, *Journal of Evolutionary Economics*, 20(5), 665–687.
- Nelson, R., Dosi, G., Helfat, C., Pyka, A., Saviotti, P., ... Dopfer, K. (2018) *An Overview of Modern Evolutionary Economics*, Cambridge: Cambridge University Press.
- Nelson, R., and Winter, S. (1982). *An Evolutionary Theory of Economic Change*, Cambridge, MA: Harvard University Press.
- Schumpeter, J. (1934), *The Theory of Economic Development*, Cambridge, MA: Harvard University Press,
- Simon, H. (1957), *Models of Man*, New York: John Wiley & Sons, Inc.