

# Rationality in economics

- 1 **The rationality principle**
- 2 **Neo-classical rationality**
- 3 **Neo-classical rationality and the rationality principle**
- 4 **Rule-following and choice**
- 5 **Rule-following, skill and expertise**
- 6 **Decision making in economics and management**

## Overview

Rationality is a notion at the heart of both economics and business research. In their descriptive models, economists postulate that people behave rationally; and, in their normative models, many consultants and academics insist that business people ought to make rational decisions. But rationality is not an unambiguous concept, and it is certainly not uncontested as an economic postulate or a business goal. In this entry, a discussion of the meanings of rationality in economics is analysed in order to provide a framework for understanding the uses of – and limits to – the concept.

## 1 The rationality principle

As a point of orientation, a discussion of Karl Popper's well-known *rationality principle* should be raised (for an excellent discussion of Popper's principle and the debates surrounding it, see Caldwell (1994)). This will provide a framework and a language with which to discuss both rationality and the methodology of economics. According to Popper's principle, one should analyse social processes by assuming that agents act appropriately or reasonably in the situation in which they find themselves. This reflects a version of *situational analysis*, also known as *single-exit* modelling. Imagine attempting to predict which exit an agent will take from a sports stadium (Latsis 1976). An agent with free will could in principle choose any exit. But the structure of the situation postulated may will a typical and reasonable agent to use the exit nearest his or her seat.

Popper views situational analysis as an antidote to *psychologism*, the view that one can explain all social processes solely by reference to the psychological states of individuals (Popper 1966, 1967) (see ORGANIZATION BEHAVIOUR, HISTORY OF). Unlike psychology, economics and kindred social sciences are not about explaining the behaviour of individuals; rather, they are about how individual behaviour leads to larger social patterns and institutions – ‘the unintended social repercussions of intentional human actions’ (Popper 1966: 95) – an idea that goes back at least to Adam Smith and the Scottish Enlightenment (see SMITH, A.). Moreover, for Popper, one benefit of situational analysis is that knowledge of the agent's situation can compensate in large measure for detailed knowledge of the agent's psychology: the ‘logic of the situation’ may largely dictate behaviour, and the psychology –or even the ‘rationality’ – needed to make sense of the agent's actions (as one element in the explanation of unintended social phenomena) may be ‘trivial’ (Popper 1966: 97).

## 2 Neo-classical rationality

Popper contended (e.g. 1966: 97) that situational analysis is in fact the method of economics. I return to this claim below. What is indisputable, however, is that there has long been in economics a tendency to see rationality as a logical rather than a psychological principle. (It was probably Lionel Robbins's *Nature and Significance of Economic Science* (1932) that fully ensconced in the minds of economists the idea that their science is about the logic of means and ends rather than about the psychology of utility.) Given a framework of means and ends, the agent's behaviour reflects the solution to a logical problem of allocation. It was not a difficult leap to associate this logical problem with the mathematical problem of optimization, a leap that Walras and his followers had in fact already made. The English School, including Jevons and Edgeworth, also thought in terms of mathematical optimization, but their approach was underpinned by utilitarian psychology.

The neo-classical rationality assumptions are well-known, and it may seem unnecessary even to repeat them. I propose, however, to recast my description in a rather idiosyncratic way that will help

highlight certain criticisms on which I want to focus below. The basic neo-classical model, I argue, combines the following four elements:

- self-interest;
- omniscience ('complete information');
- conscious deliberation (or an 'as if' equivalent);
- the representative agent.

The first two of these are much discussed; the third and fourth elements are less often noticed.

### **Self-interest**

The assumption of self-interest has come under intense criticism, traditionally from outside economics, although increasingly from within as well. The main line of criticism tends to rest on a misidentification of self-interest with narrow selfishness. There is at least one other strand of criticism of the assumption of self-interest, one in which self-interested behaviour is contrasted with some kind of rule-following behaviour. For example, Sen (1976) uses language that suggests he is contrasting what is in the end rule-following behaviour with 'rational egoism'. But, as we will see in detail below, rule-following (or non-deliberative behaviour generally) is not opposed to self-interested behaviour but rather to case-by-case behaviour. One can follow rules that serve one's purposes or are even in one's narrow interest. Nor is it necessarily the case that following ostensibly altruistic rules leads to altruistic outcomes: as Douglas Heckathorn (1991) has shown, there exists an 'altruists' dilemma,' analogous to the more-famous prisoners' dilemma, in which following apparently other-regarding rules makes all parties worse off. In Smith's theory of the wealth of nations, individuals constantly strive to better their conditions. But those agents are not neo-classical optimizers, and indeed arguably follow a model of behaviour closer to the one I will advocate below. Although Smith insisted that 'it is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest' (Smith 1976a, I.ii.2: 27), his was not a brief against unselfish motives. As the *Theory of Moral Sentiments* makes even more clear, Smith's agents even possess something very like a conscience. Smith's argument (in both works) is that, under the right institutional constraints, decentralized action leads to beneficial unintended social results – namely economic growth – *even when* such action is narrowly self-interested. In a complex world of dispersed and localized knowledge, it is difficult to anticipate the eventual effects of our behaviour on others, which means that other-regarding behaviour is far from sufficient to guarantee desirable outcomes, and may in some cases actually lead to undesirable outcomes.

### **Omniscience**

Obviously, the issue of unintended consequences is related to the second assumption above, namely omniscience. In neo-classical theory, this assumption usually goes by the title of 'perfect information', a term that ought to suggest that it is a limited conception: information can be perfect only against some standard. In the end, neo-classical agents are perfectly informed not in general but in respect of a particular structure set out for them by the analyst. The Arrow–Debreu general-equilibrium theory is the best known example of this, in which highly simplified agents are required to know all the utilities and production possibilities of all other agents (see ARROW, K.J.). That's a lot to know – an impossible amount, as many have pointed out – but it is also a lot to know about a very little. These same agents are not required to know, for example, which new production possibilities might be invented in the future, at least unless these possibilities are already known to the analyst and laid out as contingencies. In general, then, the perfection of the information agents must possess is relative to the situations in which those agents find themselves. As I have long argued (Langlois 1984), economics tends to forget that real people can be uncertain or ignorant not only about specific particular pieces of information within a known and given structure but also about the very nature of the problem situation they face. In neo-classical theory, agents are assumed to have perfect *structural knowledge*, that is, to know and be certain of the structure of the economic problem they face. When agents are ill-informed or uncertain in this theory, what they lack is *parametric knowledge* (or information), that is, they lack perfect information about the value of some parameter (like the true willingness to pay of a transacting partner).

## Conscious deliberation

It is perhaps controversial to say that the agent in neo-classical theory is represented as consciously deliberating. As we saw, the method of situational analysis makes it possible to place most of the weight of explanation on the agent's situation, leaving little for deliberation. None the less, it is certainly the case that, in 'appreciative' theorizing (Nelson and Winter 1982: 46) and undergraduate instruction, economists depict agents as consciously considering their options and choosing among them. Moreover, as economics has moved beyond simple situational logic into the realms of mathematical optimization, the problems that agents are represented as solving are no longer trivial or their solutions obviously implied in the situation. How do agents solve these problems if they do not deliberate? And if they do deliberate, then psychology is on the table as a necessary part of economics, and we should work harder to understand how agents 'really' think.

The only alternative to is argue, with Milton Friedman (1953), that agents do not actually deliberate but none the less behave 'as if' they did (see FRIEDMAN, M.). Although embraced by practitioners as a justification of the *status quo*, Friedman's argument is typically scoffed at by students of economic methodology. And rightly so, perhaps. But the possibility of an 'as if' justification does suggest that we might in the end call upon the structure of the agent's situation, in some manner yet unspecified, to substitute for explicit deliberation. I will take up this strand again below.

## Representative agent

Since Marshall, most economists have taken for granted that the agent of theory is a 'representative' one (see MARSHALL, A.). But there has been comparatively little discussion of the nature and status of this assumption, which is in fact at crux of many recent evolutionary critiques of neo-classical theory (an exception is Kirman 1992). Because the object of our study is not agents for their own sakes but agents only as links in an explanatory chain, we need to abstract from real individuals to create artificial individuals who none the less retain some of the typical features of real individuals (Schütz 1943; Schütz and Luckmann 1973). But there are many ways to do this; and typification does not commit one to the assumption that all agents in the population are identical.

## 3 Neo-classical rationality and the rationality principle

Many writers (e.g. Latsis 1976; Caldwell 1994) have agreed with Popper that the method of situational analysis is the method of (neo-classical) economics. And there is no disputing that much of economics does in fact fit under this rubric. But it is also quite arguable that an equal or larger part of what goes on in economics is *not* situational analysis *à la* Popper.

As I have argued elsewhere (Langlois 1990; Langlois and Csontos 1993), the part of neo-classical economics that does *not* fit with situational analysis is that part of the canon to which most critics direct their attentions. An economic agent who is modelled as maximizing a foot-long Lagrangean is arguably not acting reasonably within the logic of the situation. Indeed, an agent who, faced with a complex situation, follows rules or heuristics of some kind is clearly acting far more reasonably and far more plausibly.

This is not to say that all conceptions of rule-following behaviour accord with situational analysis. Some approaches can indeed be seen as a version of what Popper called psychologism. This includes to some extent the original programme of behaviouralism put forward by Herbert Simon (1955, 1959) (see SIMON, H.A.). Like the neo-classicist, Simon implicitly sees it as an easy matter for the agent to understand the structure of the problem situation he or she faces; the hard part is to find the correct solution. Interpreting the neo-classical model as one of conscious deliberation, Simon points out that agents cannot in fact solve such problems: agents are 'boundedly rational.' (Actually, of course, it is not their rationality at all but their computational ability that is bounded.) In analogy with the functioning of digital computers, he proposes as an alternative seeing agents as following 'heuristics' or rules with which they are effectively programmed *ab ovo*. For example, agents may 'satisfice,' which means abiding by a programmed rule very like the one followed by the thermostat on your wall.

Again, however, some conceptions of rule-following are quite consistent with situational analysis, as are some 'maximizing' conceptions. These latter fall under the rubric of what we may call 'soft' rational-choice models. What I have in mind here is the kind of rough-and-ready price theory captured in, say, the late Paul Heyne's *The Economic Way of Thinking* (1999). This is the neo-classical economics of simple partial-equilibrium analysis: of scarcity, of opportunity cost, of supply and demand. It is the neo-

classical economics that reminds us there is no free lunch. Soft rational choice is the baby that critics shouldn't throw out with the bathwater, even if there does remain a considerable amount of neo-classical bathwater worth draining.

#### 4 Rule-following and choice

One significant development in economic theory that begins to address some of the concerns of critics is the New Institutional Economics (Langlois 1986b, 1992) (see INSTITUTIONAL ECONOMICS). Although this body of work does not obviously necessitate new behavioural foundations for economics, and in some minds is understood as a logical development of neo-classical theory (Eggertsson 1990), it none the less points to an important situational (and perhaps motivational) factor in economic explanation: the following of rules. At the most fundamental level, the notion of an institution itself refers to a rule-like regularity of behaviour (for example, to Schotter (1981: 11), a social institution 'specifies behaviour in specific recurrent situations, and is either self-policed or policed by some external authority'). Such institutions can be simple, like a convention or norm of conduct (drive on the right, be honest in dealings with trading partners), or they can be complex systems of rules of conduct, like a culture or perhaps even a business firm.

One aspect of such institutions is that the rules that comprise them must enter into the situations in which agents find themselves. In this guise, institutions can enter into rational-choice models as side constraints that delimit what is otherwise deliberative choice. But the interaction between rules and individual behaviour is actually a two-way street. Not only do rules constrain action, but economic action can in turn explain the origins of the rules: institutions emerge as the unintended results of individual action, and this is a process that we can explore theoretically. The most influential models in this area portray institutions like norms and conventions as emerging through a process of the repeated play of certain kinds of 'games', such as the coordination game or the prisoners' dilemma (Sugden 1986; Rowe 1989). Over time, the agents will hit upon strategies that are 'evolutionarily stable'; and these strategies, which are relatively simple bundles of rules, become institutionalized: 'institutionalization occurs whenever there is a reciprocal typification of habitualized actions by types of actors' (Berger and Luckmann 1966: 51). I habitually expect the typical driver coming toward me to stay on the right, and other drivers habitually expect the same of me.

This theory of the emergence of institutions raises two issues for the standard theory of rational choice – issues that have to do with the postulates of conscious deliberation and representativeness I have highlighted. Obviously, the evolutionary aspect of the story speaks to the issue of the representative agent. More interestingly for the moment, however, the idea that institutions are rules that somehow coalesced out of the strategies of agents brings to the fore the possibility that rules may not be (only) constraints but may actually be principles of action alternative to conscious deliberation. On the difference between rules as constraints and rules as principles of action, see Burrell (1967) and Pelikan (1992).

In some situations (like coordination games) there is no marginal incentive for agents to deviate from a convention. Thus one might argue that, once a convention is in place, agents consciously consider the convention as part of their problem situation and choose to follow it because it is, in each case, the best thing to do. The alternative interpretation, what Vanberg (1994: 13) calls *genuine rule-following*, is for the agent to abide by the convention independently of the considerations at hand in a particular case. Although it is clearly in my case-by-case interest to drive on the right-hand side in the USA, I just as clearly do not consciously deliberate the matter each time an oncoming car appears. Rather, the convention has become internalized for me: it has become a routine (Nelson and Winter 1982). Even when it is not in my case-by-case interest to follow the rule, as when I pull out of a parking lot onto a street in Melbourne, Australia, I may find myself driving on the right out of habit.

In other cases (like the prisoners' dilemma), agents may have a marginal incentive to deviate from a norm, and external sanctions are often necessary; but even in such cases, the very institutionalization of the strategy-as-rule arguably serves a kind of enforcement function. That is to say, the institutionalization of the norm serves as an enforcement function in 'routine' situations in which the pay-offs to violating the norm are not large. Sanctions thus do not *create* the norm; they exist to police unusual cases in which particular individuals may have a greater incentive to violate (Berger and Luckmann 1966: 52). If the sanctions do become the prime enforcement mechanism, then the norm itself may be out of line with relative scarcities and under pressure to change.

From one point of view, of course, the explanatory overlap is quite large between ‘genuine’ rule-following in this sense and a rational-choice view of rule-following. It is often hard to tell whether someone is behaving in a rule-like way because he or she is ‘programmed’ to do so or because, upon careful consideration, the agent always found the same course of action to be optimal. Moreover, one need only invoke information costs in order to explain why people might continue to follow rules even when it might strictly pay to violate them in particular cases. This is especially true if we consider rules in the sense of Herbert Simon, that is, as second-best procedures in the face of ‘bounded rationality’: satisficing really is optimal in a world of costly decision making.

None the less, I see two reasons to prefer the model of genuine rule following: plausibility and fruitfulness. Popper’s principle of rationality makes the first point clear. If we want to represent the agent as acting reasonably within a situation, and if that situation is one of complexity and uncertainty, it may well be more plausible to see the agents as following some kinds of rules – at least in preference to seeing the agent as consciously maximizing. Moreover, whenever a fully compelling explanation would require a relatively rich description of behaviour, psychology is on the table. And a programme that stresses rule following might be desirable not so much from the point of view of an alternative model of behaviour as from the point of view of a research programme seeking more plausible accounts of human cognition and motivation. One such research programme moves in the direction of what we might call the *expertise* model of rationality (Langlois 1998), often understood in an explicitly evolutionary framework. Related examples of this approach include Choi (1993), Denzau and North (1994), Koppl and Langlois (1994), Lane *et al.* (1996), and Vanberg (1994). The reason why rule-following programme is desirable is not because rule following is always more compelling than conscious deliberation but because approaches from rule following (broadly construed) are blossoming nowadays in the literature of cognition, whereas the model of choice as conscious deliberation now appears to be a dead end rather than a starting point for further inquiry.

## 5 Rule-following, skill and expertise

The traditional Simonian programme of behaviouralism suffers from two problems. One of these I have already mentioned, namely the tendency to psychologism. Put differently, the model of action as rule-following behaviour programmed as in a computer can no more account for resourcefulness or creativity than can the model of the agent as a conscious optimizer over known and delimited variables. Indeed, the rule ‘maximize the specified Lagrangean’ can well be interpreted as a behavioural heuristic, albeit not a particularly plausible one (Langlois 1990). It is the possibility of creativity and resourcefulness on the part of agents that permits the method of situational analysis to explain phenomena of unintended consequences.

The second (and perhaps related) problem with the simple behaviouralist programme, however, is that it is also arguably not even a very rich or fruitful account of rule-following behaviour. The reason has to do with the formative metaphor of the digital computer, which led to a picture of behaviour as programmed and mechanical. The alternative is to see rule following as related to a more open-ended picture of cognition in which it is impossible (or at least not useful) to reduce behaviour to a set of rules with which the agent is programmed from the beginning. In this alternative, rule-following behaviour is more a matter of executing a skill than executing a programme. The distinction I have in mind has been well aired (albeit controversially) in the literature on the branch of computer science called artificial intelligence (Dreyfus 1979; Dreyfus and Dreyfus 1986). Set against an optimistic vision of computerized intelligence (typified, interestingly, by Herbert Simon), these critics assert that human cognitive processes are quite different from those of computers and, for many tasks at least, far superior. They do not deny that humans follow rules; but they do deny that, like computers, humans follow *explicit* rules. What makes human behaviour effective is the inexplicit or tacit character of human rule following: people follow rules unconsciously, in a skilful or expert fashion; and people actually perform less well when they deliberately try to follow explicit rules (let alone when they try consciously to optimize).

Let me call this critical view the *expertise* model of behaviour. One way to see the difference between this model and simple behaviouralism is the following. In the behaviouralist account, abiding by rules is a second-best option in the face of ‘bounded rationality’. Implicitly, then, one is always performing less than ideally well when satisficing or following a heuristic, where the ideal is set in terms of what could have been accomplished by explicit calculation or optimization given adequate resources. In the expertise account, (tacit) rule following can be inherently superior to deliberate action even in the ideal.

Recently, David Lane and his co-authors (1996) have mounted a major attack on rational-choice models from the perspective of expertise. What Lane *et al.* object to in their postulates of rational choice is the very notion of choice— or, rather, ‘the primacy of choice over action itself’ (1996: 45). Drawing on the literature of cognitive psychology, they argue that conceiving of situations as choices leads to an implausible model of behaviour, except perhaps in special situations. In most circumstances, action is governed by expertise, with conscious deliberation and planning entering as secondary considerations that are, however, themselves predicated on expertise.

Examples of expertise are familiar: catching a ball, flying a plane, or – to use Milton Friedman’s famous example – playing billiards. These are activities we perform without conscious deliberation, and indeed paying attention to what one is doing often degrades performance: thinking consciously about one’s performance is the mark of a novice. Skilled performers, moreover, cannot and need not translate what they are doing into explicit terms. All of this will be familiar to readers of Michael Polanyi (1958) on tacit knowledge. Lane and his co-authors direct the issue of expertise to the arena of decision making. If action based on expertise is more effective than conscious deliberation in most situations, then we ought to see *economic* action as a matter of skilled performance rather than deliberation.

Although Lane *et al.* are perhaps the most strident in pushing the expertise view of behaviour, they are by no means alone. Several other recent contributions have put forward models of behaviour that draw on many of the same sources and paint a strikingly similar picture (Choi 1993; Vanberg 1993, 1994; Denzau and North 1994; Koppl and Langlois 1994 – the work of Holland *et al.* (1986) seems to be a unifying thread here, as it is cited enthusiastically by Lane *et al.* 1996; Vanberg 1994; and Denzau and North 1994).

## 6 Decision making in economics and management

The conception of choice as skilled action would seem at first to leave little room for genuine decision making in economics and management (see DECISION MAKING). But this is so only if we understand genuine decision making in terms of a single general-purpose model of rational behaviour. The expertise view of action suggests that there are in fact multiple processes of decision making at work in human agents. This is very much in keeping with the perspective of evolutionary psychology, which sees the human mind not as a general-purpose thinking machine (like a digital computer) but rather as a congeries of special-purpose perceptual and cognitive engines that evolved in response to a variety of concrete problems of survival (Cosmides and Tooby 1994). In effect, the brain is a kind of distributed processing system that relies on the division of cognitive labour.

Under conditions of routine, rules substitute for conscious deliberation because case-by-case choice becomes unnecessary and inefficient. As in Smith’s account of the division of labour, agents are made expert by repetitive action. With practice, they act with less and less deliberation, thereby narrowing their choices and freeing up conscious attention for other uses, including innovation (Berger and Luckmann 1966: 51). Alfred North Whitehead remarked that it is:

a profoundly erroneous truism, repeated by all copy-books and by eminent people when they are making speeches, that we should cultivate the habit of thinking what we are doing. The precise opposite is the case. Civilization advances by extending the number of important operations which we can perform without thinking about them. Operations of thought are like cavalry charges in a battle – they are strictly limited in number, they require fresh horses, and must only be made at decisive moments.

(Whitehead 1911: 61)

It is in this sense, as Lane *et al.* suggest, that rule-following behaviour is a *prerequisite* for economic calculation – a necessary condition for the economic way of thinking that soft rational choice posits. Economic choice as we normally think of it can happen only in a stable and predictable world in which most of the cognitive load is being carried by rules and routines. Joseph Schumpeter recognized this long ago. He assailed the idea that, because of habit and custom, economic behaviour is culturally relative, insisting that ‘we can depend upon it that the peasant sells his calf just as cunningly and egotistically as the stock exchange member his portfolio of shares’. But, as Schumpeter is quick to add, ‘this holds good only where precedents without number have formed conduct through decades and, in fundamentals, through hundreds and thousands of years’ (Schumpeter 1934: 80).

Of course, Schumpeter was far more interested in situations of innovation and structural uncertainty. In such situations, following specific and well-adapted rules is not only ineffective but likely quite dangerous. Ronald Heiner (1983) has argued that rule following is precisely the appropriate response to situations of unpredictable change. Because of limited competencies, agents become unreliable in using their full repertoire of actions, and sometimes take the wrong action. Agents will do better by limiting their repertoires in the face of uncertainty. And, since their actions will vary less than those of agents who attempt to wield a full repertoire and try to choose the best action on a case-by-case basis, these agents will appear to be rule followers. Heiner's theory accords with the well-known findings of Robert Axelrod (1984), who discovered that, in a computerized round-robin tournament, those programs did better in surviving a repeated prisoners' dilemma situation that followed relatively simple solution rules rather than attempting to optimize or to behave in a complex way. Using a model based on Heiner's, I have tried to show (Langlois 1986a) that agents are likely to follow rules *both* in situations of uncertainty *and* in situations of routine. It will also be the case that the kinds of rules followed in routine situations will be different from those followed under uncertainty. In routine situations, the agent's actions will be highly specialized and concrete, whereas under uncertainty the rules will be more general and abstract in order to be more likely to be appropriate in a wide range of possible future states (Langlois 1986a).

One alternative to rule following is conscious deliberation. But in truly novel situations, it is generally impossible to survey exhaustively all possible consequences of a decision.

Here the success of everything depends on intuition, the capacity of seeing things in a way which afterwards proves to be true, even though it cannot be established at the moment, and of grasping the essential fact, discarding the unessential, even though one can give no account of the principles by which this is done.

(Schumpeter 1934: 85)

This kind of intuition Schumpeter associated with the figure of the entrepreneur, as did Frank Knight, who spoke about the entrepreneur's faculty of judgement, by which he meant the ability to assess a person or a situation under conditions of genuine uncertainty (Langlois and Cosgel 1993).

If much of economic action thus consists in either the following of rules or the use of non-deliberative cognitive processes, are we left to believe that much of decision making is irrational – or at best arational? This is so only if our definition of rationality constrains us to see 'rational' as meaning the successful solution of a process of optimization. Rule following and entrepreneurial judgement are rational modes of decision making, even in Popper's sense. The sociologist James Coleman (1990) applied the term 'rational' to Max Weber's category of charismatic authority, a concept that underlies Schumpeter's theory of entrepreneurship (Langlois 1998). In a world in which all the rules are changing, following a charismatic figure is a way of solving an otherwise intractable problem of coordination. They are all ways of doing the best we can with what we have – and, indeed, of doing far better than we would if all we did was deliberate consciously.

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## Further reading

(References cited in the text marked \*)

- \* Axelrod, R. (1984) *The Evolution of Cooperation*, New York: Basic Books. (A computer simulation shows how cooperation can emerge spontaneously.)
- \* Berger, P. and T. Luckmann. (1966) *The Social Construction of Reality*, New York: Doubleday. (Extends the sociology of Alfred Schütz; helped inspire the 'social constructivism' movement.)
- \* Burrell, D.B. (1967) 'Obeying Rules and following instructions', in F.J. Crosson and K.M. Sayre (eds) *Philosophy and Cybernetics*, South Bend: University of Notre Dame Press. (Makes the distinction between rules as constraints and rules as causes of action.)
- \* Caldwell, B.J. (1994) 'Situational analysis', manuscript, University of North Carolina-Greensboro. To appear in J. Davis, D. Wade Hands and Uskali Mäki (eds) *Handbook of Economic Methodology*, Aldershot: Edward Elgar, forthcoming. (Excellent survey of situational analysis.)
- \* Choi, Y.B. (1993) *Paradigms and Conventions*, Ann Arbor: University of Michigan Press. (Proposes a novel theory of behaviour.)
- \* Coleman, J.S. (1990) 'Rational organization', *Rationality and Society* 2(1): 94–105. (Argues for the rationality of what Max Weber called 'charismatic' authority.)

- \* Cosmides, L. and J. Tooby (1994) 'Better than rational: evolutionary psychology and the invisible hand', *American Economic Review* 84(2): 327–32. (An exposition of evolutionary psychology aimed at economists.)
- \* Denzau, A.T. and C. Douglass North (1994) 'Shared mental models: ideologies and institutions', *Kyklos* 47(1): 1–13. (An exploration of the role of ideas in institutions.)
- \* Dreyfus, H.L. (1979) *What Computers Can't Do: The Limits of Artificial Intelligence*, rev edn, New York: Harper Colophon. (A phenomenological critique of artificial intelligence scholarship.)
- \* Dreyfus, H.L., and S.L. Dreyfus (1986) *Mind over Machine: the Power of Human Intuition and Expertise in the Era of the Computer*, New York: Free Press. (A phenomenological critique of artificial intelligence scholarship.)
- \* Eggertsson, T. (1990) *Economic Behaviour and Institutions: Principles of Neoinstitutional Economics*, New York: Cambridge University Press. (The theory of institutions from a neo-classical perspective.)
- \* Friedman, M. (1953) 'The methodology of positive economics', in M. Friedman *Essays on Positive Economics*, Chicago: University of Chicago Press. (Friedman's famous methodological broadside: assumptions needn't be realistic.)
- \* Heckathorn, D.D. (1991) 'Extensions of the prisoner's dilemma paradigm: the altruist's dilemma and group solidarity', *Sociological Theory* 9: 34–52. (Shows that norms can generate 'too much' solidarity.)
- \* Heiner, R.A. (1983) 'The origin of predictable behaviour', *American Economic Review* 73(4): 560–95. (Derives rule-following behaviour from the limited reliability of human action.)
- \* Heyne, P. (1999) *The Economic Way of Thinking*, 9th edn, Englewood Cliffs: Prentice-Hall. (Accessible introduction to economic reasoning.)
- \* Holland, J.H., K.J. Holyoak, R.E. Nisbett and P.R. Thagard (1986) *Induction: Processes of Inference, Learning and Discovery*, Cambridge: MIT Press. (Of-cited account of cognition from a computer-science perspective.)
- \* Kirman, A.P. (1992) 'Whom or what does the representative individual represent?' *Journal of Economic Perspectives* 6(2): 117–36. (Survey of the concept of representative agent.)
- \* Koppl, R.G. and R.N. Langlois (1994) 'When do ideas matter? a study in the natural selection of social games', *Advances in Austrian Economics* 1: 81–104. (An expertise model of human action.)
- \* Lane, D., F. Malerba, R. Maxfield and L.i Orsenigo (1996) 'Choice and action', *Journal of Evolutionary Economics* 6: 43–76. (A manifesto for the expertise view of economic behaviour.)
- \* Langlois, R.N. (1984) 'Internal organization in a dynamic context: some theoretical considerations', in M. Jussawalla and H. Ebenfield (eds) *Communication and Information Economics: New Perspectives*, Amsterdam: North-Holland, pp. 23–49. (Proposes the distinction between structural and parametric uncertainty.)
- \* Langlois, R.N. (1986a) 'Coherence and flexibility: social institutions in a world of radical uncertainty', in Israel Kirzner (ed.) *Subjectivism, Intelligibility, and Economic Understanding: Essays in Honor of the Eightieth Birthday of Ludwig Lachmann*, New York: New York University Press, pp. 171–91. (An extension of Heiner's model (q. v.).)
- \* Langlois, R.N. (1986b) 'Rationality, institutions, and explanation', in R.N. Langlois (ed.) *Economics as a Process: Essays in the New Institutional Economics*, New York: Cambridge University Press, pp. 225–55. (Argues for an evolutionary account of institutions.)
- \* Langlois, R.N. (1990) 'Bounded rationality and behaviouralism: a clarification and critique', *Journal of Institutional and Theoretical Economics* 146(4): 691–5. (A perspective on Simon's concept of bounded rationality.)
- \* Langlois, R.N. (1992) 'Orders and organizations: toward an Austrian theory of social institutions', in B. Caldwell and S. Böhm (eds) *Austrian Economics: Tensions and New Directions*, Dordrecht: Kluwer Academic Publishers. (A survey of the economics of institutions.)
- \* Langlois, R.N. (1998) 'Personal capitalism as charismatic authority: the organizational economics of a Weberian concept', *Industrial and Corporate Change* 7: 195–214. (Uses Max Weber to understand Schumpeter.)
- \* Langlois, R.N. and M.M. Cosgel. (1993) 'Frank Knight on risk, uncertainty, and the firm: a new interpretation', *Economic Inquiry* 31: 456–65. (An exposition and reinterpretation of Knight's views on uncertainty.)
- \* Langlois, R.N. and L. Csontos (1993) 'Optimization, rule following, and the methodology of situational analysis', in U. Mäki, B. Gustafsson and C. Knudsen (eds) *Rationality, Institutions, and Economic Methodology*, London: Routledge. (Argues for the compatibility of rule-following and situational analysis.)
- \* Latsis, S.J. (1976) 'A research programme in economics', in S.J. Latsis (ed.) *Method and Appraisal in Economics*, Cambridge: Cambridge University Press. (A critique of neo-classical economics from a methodological perspective.)
- Loasby, B.J. (1976) *Choice, Complexity, and Ignorance*, Cambridge: Cambridge University Press. (Insightful and wide-ranging treatise on decision making.)
- \* Nelson, R.R., and S.G. Winter (1982) *An Evolutionary Theory of Economic Change*, Cambridge: The Belknap Press of Harvard University Press. (Classic reformulation of economics in evolutionary terms; introduces the concept of 'routines'.)
- North, C. Douglass (1990) *Institutions, Institutional Change and Economic Performance*, New York: Cambridge University Press. (Major contribution to the economics of institutions by a Nobel Laureate.)
- \* Pelikan, P. (1992) 'The dynamics of economic systems, or how to transform a failed socialist economy', *Journal of Evolutionary Economics* 2(1): 39–63. (Makes the distinction between rules as constraints and rules as causes of action.)
- \* Polanyi, M. (1958) *Personal Knowledge*, Chicago: University of Chicago Press. (Articulates the concept of tacit knowledge.)



- \* Popper, K.R. (1966) *The Open Society and Its Enemies*, vol. II, 2nd edn, Princeton: Princeton University Press. (Popper's critique of Hegel and Marx.)
- \* Popper, K.R. (1967) 'La Rationalité et le Statut du Principe de Rationalité', in E.M. Claassen (ed.) *Les Fondements Philosophiques des Systèmes Economiques*, Paris: Payot. (Exposition of the rationality principle.)
- \* Robbins, L. (1932) *An Essay on the Nature and Significance of Economic Science*, London: Macmillan. (Classic reformulation of economics as a logical problem of allocation.)
- \* Rowe, N. (1989) *Rules and Institutions*, Ann Arbor: University of Michigan Press. (A game theory-based account of institutions.)
- \* Schotter, A. (1981) *The Economic Theory of Social Institutions*, New York: Cambridge University Press. (A game theory-based account of institutions.)
- \* Schumpeter, J.A. (1934) *The Theory of Economic Development*, Cambridge: Harvard University Press. (Schumpeter's classic account of the role of the entrepreneur in economic growth.)
- \* Schütz, A. (1943) 'The problem of rationality in the social world', *Economica* N.S. 10: 130–49. (An argument for means–ends rationality in 'pure' economic theory.)
- \* Schütz, A. and T. Luckmann (1973) *The Structures of the Life-World*, trans. R.M. Zaner and H.T. Engelhardt, Jr. Evanston, Ill.: Northwestern University Press. (An exposition of the Schützian sociology of institutions.)
- \* Sen, A.K. (1976) 'Rational fools: a critique of the behavioural foundations of economic theory', *Philosophy and Public Affairs* 6: 317–44. (Classic critique of neo-classical rationality from a Nobel Laureate.)
- \* Simon, H.A. (1955) 'A behavioural model of rational choice', *Quarterly Journal of Economics* 69: 99–118. (The 'satisficing' model of behaviour.)
- \* Simon, H.A. (1959) 'Theories of decision-making in economics and behavioural science', *American Economic Review* 49: 253–83. (Bounded rationality and its alternatives.)
- \* Smith, A. (1976a) *An Enquiry into the Nature and Causes of the Wealth of Nations*, Glasgow edn, Oxford: Clarendon Press. (A founding document of economics, it has lost no relevance over the years.)
- Smith, A. (1976b) *The Theory of Moral Sentiments*, Indianapolis: Liberty Classics. (Smith's treatise on moral philosophy.)
- \* Sugden, R. (1986) *The Economics of Rights, Cooperation, and Welfare*, Oxford, Basil Blackwell. (A game theory-based account of institutions.)
- \* Vanberg, V. (1993) 'Rational choice, rule-following, and institutions – an evolutionary perspective', in U.Mäki, B. Gustafsson and C. Knudsen (eds) *Rationality, Institutions, and Economic Methodology*, London: Routledge. (An argument in favour of the rule-following model.)
- \* Vanberg, V. (1994) *Rules and Choice in Economics*, London: Routledge. (An argument in favour of the rule-following model.)
- \* Whitehead, A.N. (1911) *An Introduction to Mathematics*, New York: Henry Holt and Company. (Insights on the human mind as well as on mathematics.)

**See also:** DECISION MAKING; FRIEDMAN, M.; GROWTH OF THE FIRM AND NETWORKING; INSTITUTIONAL ECONOMICS; MARSHALL, A.; SIMON, H.A.; SMITH, A.