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## Bounded Rationality

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The term 'bounded rationality' is used to designate rational choice that takes into account the cognitive limitations of the decision-maker – limitations of both knowledge and computational capacity. Bounded rationality is a central theme in the behavioural approach to economics, which is deeply concerned with the ways in which the actual decision-making process influences the decisions that are reached.

The theory of subjective utility (SEU theory) underlying neo-classical economics postulates that choices are made: (1) among a given, fixed set of alternatives; (2) with (subjectively) known probability distributions of outcomes for each; and (3) in such a way as to maximize the expected value of a given utility function (Savage 1954). These are convenient assumptions, providing the basis for a very rich and elegant body of theory, but they are assumptions that may not fit empirically the situations of economic choice in which we are interested.

Theories of bounded rationality can be generated by relaxing one or more of the assumptions of SEU theory. Instead of assuming a fixed set of alternatives among which the decision-maker chooses, we may postulate a process for generating alternatives. Instead of assuming known probability distributions of outcomes, we may introduce estimating procedures for them, or we may look for strategies for dealing with uncertainty that do not assume knowledge of probabilities. Instead of assuming the maximization of a utility function, we may postulate a satisficing strategy. The particular deviations from the SEU assumptions of global maximization introduced by behaviourally oriented economists are derived from what is known, empirically, about human thought and choice processes, and especially what is known about the limits of human cognitive capacity for discovering alternatives, computing their consequences under certainty or uncertainty, and making comparisons among them.

### Generation of Alternatives

Modern cognitive psychology has studied in considerable depth not only the processes that human subjects use to choose among given alternatives, but also the processes (problem-solving processes) they use to find possible course of action (i.e., actions that will solve a problem) (Newell and Simon 1972). If we look at the time allocations of economic actors, say business executives, we find that perhaps the largest fraction of

This chapter was originally published in *The New Palgrave: A Dictionary of Economics*, 1st edition, 1987. Edited by John Eatwell, Murray Milgate and Peter Newman


Palgrave Macmillan (ed.), *The New Palgrave Dictionary of Economics*,
DOI 10.1057/978-1-349-95121-5_472-1

decision-making time is spent in searching for possible courses of action and evaluating them (i.e., estimating their consequences). Much less time and effort is spent in making final choices, once the alternatives have been generated and their consequences examined. The lengthy and crucial processes of generating alternatives, which include all the processes that we ordinarily designate by the word 'design', are left out of the SEU account of economic choice.

Study of the processes for generating alternatives quickly reveals that under most circumstances it is not reasonable to talk about finding 'all the alternatives'. The generation of alternatives is a lengthy and costly process, and one where, in real-world situations, even minimal completeness can seldom be guaranteed. Theories of optimal search can cast some light on such processes, but, because of limits on complexity, human alternative-generating behaviour observed in the laboratory is usually best described as heuristic search aimed at finding satisfactory alternatives, or alternatives that represent an improvement over those previously available (Hogarth 1980).

## Evaluation of Consequences

Cognitive limits, in this case lack of knowledge and limits of ability to forecast the future, also play a central role in the evaluation of alternatives. These cognitive difficulties are seen clearly in decisions that are taken on a national scale: whether to go ahead with the construction of a supersonic transport; the measures to be taken to deal with acid rain; Federal Reserve policies on interest rates; and, of course, the supremely fateful decisions of war and peace.

The cognitive limits are not simply limits on specific information. They are almost always also limits on the adequacy of the scientific theories that can be used to predict the relevant phenomena. For example, available theories of atmospheric chemistry and meteorology leave very wide bands of uncertainty in estimating the environmental or health consequences of given quantities and distributions of air pollutants. Similarly, the accuracy of predictions of the economy by computer models is severely limited by lack of knowledge about fundamental economic mechanisms represented in the models' equations.

## Criteria of Choice

The assumption of a utility function postulates a consistency of human choice that is not always evidenced in reality. The assumption of maximization may also place a heavy (often unbearable) computational burden on the decision maker. A theory of bounded rationality seeks to identify, in theory and in actual behaviour, procedures for choosing that are computationally simpler, and that can account for observed inconsistencies in human choice patterns.

## Substantive and Procedural Rationality

Theories of bounded rationality, then, are theories of decision making and choice that assume that the decision maker wishes to attain goals, and uses his or her mind as well as possible to that end; but theories that take into account in describing the decision process the actual capacities of the human mind.

The standard SEU theory is presumably not intended as an account of the process that human beings use to make a decision. Rather, it is an apparatus for predicting choice, assuming it to be an objectively optimal response to the situation presented. Its claim is that people choose as if they were maximizing subjective expected utility. And a strong a priori case can be made for the SEU theory when the decision making takes place in situations so transparent that the optimum can be reasonably approximated by an ordinary human mind.

Theories of bounded rationality are more ambitious, in trying to capture the actual process of decision as well as the substance of the final decision itself. A veridical theory of this kind can only be erected on the basis of empirical knowledge of the capabilities and limitations of

the human mind; that is to say, on the basis of psychological research.

The distinction between substantive theories of rationality (like the SEU theory) and behavioural theories is closely analogous to a distinction that has been made in linguistics between theories of linguistic competence and theories of linguistic performance. A theory of competence would characterize the grammar of a language in terms of a system of rules without claiming that persons who speak the language grammatically do so by applying these rules. Performance theories seek to capture the actual processes of speech production and understanding.

The question of the desirability and usefulness of a procedural theory of decision involves at least two separate issues. First, which kind of theory, substantive or procedural, can better predict and explain what decisions are actually reached. Does SEU theory predict, to the desired degree of accuracy, the market decisions of consumers and businessmen, or does such prediction require us to take into account the cognitive limits of the economic actors?

Second, are we interested only in the decisions that are reached, or is the human decision making process itself one of the objects of our scientific curiosity? In the latter case, a substantive theory of decision cannot meet our needs; only a veridical theory of a procedural kind can satisfy our curiosity.

## Bounded Rationality in Neoclassical Economics

It should not be supposed that mainstream economic theory has been completely oblivious to human cognitive limits. In fact, some of the most important disputes in macroeconomic theory can be traced to disagreements as to just where the bounds of human rationality are located. For example, one of the two basic mechanisms that accounts for underemployment and business cycles in Keynesian theory is the money illusion suffered by the labour force – a clear case of bounded rationality. In Lucas's rational expectationist theory of the cycle, the corresponding cognitive limitation is the inability of businessmen to discriminate between movements of industry prices and movements of the general price level – another variant of the money illusion. Thus the fundamental differences between these theories do not derive from different inferences drawn from the assumptions of rationality, but from different views as to where and when these assumptions cease to hold – that is, upon differences in their theories of bounded rationality.

What distinguishes contemporary theories of bounded rationality from these ad hoc and casual departures from the SEU model is that the former insist that the model of human rationality must be derived from detailed and systematic empirical study of human decision making behaviour in laboratory and real-world situations.

## See Also

- ▶ Behavioural Economics
- ▶ Rational Behaviour
- ▶ Satisficing

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