

Book Reviews

Economics and Language. Five Essays. By ARIEL RUBINSTEIN. Cambridge University Press, Cambridge. 2000. 128 pp. £26.95; paperback £9.95.

Natural language—its structure, its evolution and the way it affects human preferences and human interaction—is the topic of this book, which stems from the Churchill Lectures delivered by the author at Cambridge in 1996. The first five chapters elaborate on the topics covered by the lectures, while the remaining three chapters includes comments on the material presented by a logician, Johan van Benthem, and two economists, Tilman Borgers and Barton Lipman.

The lack of economic analysis of the natural language that characterizes human economic behaviour is certainly a large and visible hole. The most primary of economic activities, trade, cannot be carried out without language. This observation goes back to Adam Smith, as Rubinstein mentions. It is also implicit in the photograph of the author's father buying bread in a Jerusalem street that appears on the volume's cover. The book is an important first step in remedying this omission. As with every first step, it is the author's privilege not to provide a comprehensive analysis of the economic role of language but rather to analyse a number of questions that are of interest to the author and, of course, the reader.

The first three chapters bring economic criteria and game-theoretic tools to the analysis of the structure and evolution of natural language. The fourth chapter analyses the constraints on preferences imposed by the structure of the language used by an individual to verbalize his own decisions. The fifth and final chapter discusses the author's critical view of the language of game theory and the misperceptions that such language may have generated.

The linguistics literature that analyses the structure and origins of natural language is vast. The author's contribution in the first three chapters of the book—grouped under the rubric 'economics of language'—consists in weaving efficiency criteria and game-theoretic tools that economists are well accustomed to into the general endeavour to understand more and more aspects of the structure and origins of natural language.

The first chapter asks why linear orderings are so common in natural language. The answer suggested is that linear orderings perform best according to three inherently economic criteria. Linear orderings are the most efficient tool to indicate unambiguously every element of a general set. This criterion is labelled by the author *indication friendliness*. Linear orderings are also the tools that allow a speaker to describe a (binary) relation among the elements of a general set in the most accurate way. This second criterion is labelled *informativeness*. Finally, linear orderings are the binary relations that can be described by means of the least number of examples. This third and final criterion is labelled *describability*. In other words, taking these criteria as the benchmark for efficiency, if an imaginary planner were asked to design the most efficient natural language, she would choose linear orderings as its key ingredients.

The second chapter asks how a statement in the natural language comes to have a given meaning. The explanation put forth is evolutionary. However, the mere pressure of evolution to select a language that is stable, in the sense that it cannot be altered by a possibly small mutation in the interpretation of a given word, is not enough to render a given statement meaningful. For this to be the case, the standard forces of evolution need to be paired with an additional evolutionary force—one that favours simplicity. In particular, it is key that evolution has a, possibly lexicographic, tendency to select strategies for the sender and the receiver of a given message that do not specify complex reactions to signals that are never sent in equilibrium. The chapter concludes by arguing that, while the evolutionary approach provides an answer to the original question, it fails to explain why evolutionary forces operate on human language but not on the communication that takes place among animals.

This question was first raised, not in terms of the evolution of language, but in terms of the very existence of a language, by Adam Smith. The answer that he proposed is that language is hardwired in humans but not in animals. Rubinstein concludes by asking whether considering the evolution of language rather than its existence simply begs the most important question: the difference between humans and animals. The idea that language is hardwired in humans is, of course, pervasive in linguistics.¹ Of course, the hardwired hypothesis could present some challenges for arguments that explain certain features of natural language in evolutionary terms. The point is that the evidence points to the fact that the key rules governing the syntax of natural language are hardwired in humans. They tend to be strikingly similar in situations where learning from other humans can be excluded as the means by which the common structure has evolved. So, the efficient language structure would have to be selected by evolutionary forces at the hardwiring stage, not while the language is used to, say, facilitate trade among humans.

The last aspect of natural language that is discussed in the book is the structure of debates. In particular, the author starts from the observation that in a debate the interpretation of a statement used as an argument differs considerably from the interpretation of the same statement used as a counter-argument. Once again, the explanation can be found in the attempt to elicit efficiently the information communicated to outsiders by the debate. A planner that is constrained by the number of arguments that can be made will, first of all, impose a sequential structure on the game form representing the optimal debate. The planner will also select a 'persuasion rule' of outside observers that treats asymmetrically an argument and a counter-argument. In other words, once again, efficiency considerations provide a rationale for why the strength of the same statement differs when this statement is used as an argument as opposed to a counter-argument in a debate.

The last two chapters of the book are grouped under the rubric 'the language of economics'. The first of these, Chapter four, raises an interesting puzzle. When modelling the preferences of individual agents, economists tend to favour certain utility functions. Rubinstein's working hypothesis is that the constraint on preferences might arise from the language that the decision-maker uses to verbalize the decision taken. The author goes on to formalize this working hypothesis and derive a set of preferences that are 'definable' by means of binary relations. The surprising feature of Rubinstein's analysis is that the most natural (definable) preferences that can be derived using this construct are lexicographic preferences. These are also the least popular among the preferences that economists use in describing the behaviour of individuals.

The fifth and final chapter has a rather different tone and emphasis from the preceding ones. The author presents his critical view of the language of game theory. In particular, he argues that the popular success of game theory and its ability to permeate the jargon of businessmen and politicians can be explained, at least in part, by the language used. He argues that, however, this language is misleading: it tends to depict game theory as an applied topic that provides users with ready-to-use predictions, quantitative answers and uncontroversial solutions, whereas nothing could be farther from the truth. As with 'classical' economic theory, game theory is a 'search for *connections* between concepts, assumptions and assertions which we use in understanding human interaction'. The applicability of the subject is not its strength, and according to the author it is not a virtue either. Game theory, and more generally economics, is a *language* that helps us understand better certain spheres of human interaction.

We find it extremely hard to disagree with Ariel Rubinstein on this view. It is impossible not to admire his intellectual honesty. By now, the term 'methodology of economics' suggests to most a rather outdated debate, one that has not received new blood for a very long time. Perhaps a fresh look would suggest the study of economics as a *language*, one that goes beyond the mere observation that it is in fact a language concerning human interactions. Ariel Rubinstein does not tell readers explicitly what his views are on this point. If one had to level a criticism of the volume, it is probably the lack of a sixth chapter, discussing the structure of modern economics as a language of the social sciences.

NOTE

1. An accessible and extensive text that portrays the status of the hardwired language hypothesis, including the accumulated evidence that supports it, is Steven Pinker's *The Language Instinct* (New York: Harper Collins, 1994).

Economics and Language. Five Essays. By ARIEL RUBINSTEIN. Cambridge University Press, Cambridge. 2000. viii + 128 pp. £26.95. Paperback £9.95.

One picks up this book with a modicum of trepidation, rather as if one had stumbled across a pamphlet by Eminem on *How Opera Works*. While the experience of reading it does not altogether dispel those initial fears, nevertheless it does prompt one to reflect upon the fact that seems to have eluded the author: that there exists a long string of attempts by analysts inspired by neoclassical economics to try to say something cogent about the mysteries of language, ranging from Saussure's appropriation of Walras and Fraser's gloss on Marshall to McCloskey's late forays. While some of these essays appear to take for granted that the reader will cheerfully acquiesce in starting from scratch (or, worse, game theory) in searching for that elusive Economic Theory of Everything, it is perhaps more troubling to observe just how impertinent his ambitions would appear to someone situated outside the charmed circle of economic theorists. Indeed, the history of analytic philosophy in the last century, from Schlick to Brandom, has constituted little more than the protracted vain search for an ideal language, expressed as an austere formalism which would optimize meaning or facilitate communication. The dream of an optimal language that conveys only what has been consciously put into it has enjoyed a revival lately, thanks to the computer and the hype of artificial intelligence, but that does not belie the rational expectation that no small set of formal conditions will ever encompass the gnarly ambiguities of language.

This volume consists of a disjointed set of five essays delivered as the Churchill Lectures in 1996. The first proposes that constrained optimization can 'explain' a putative prevalence for linear orderings in (essentially written) languages; the second imagines that meanings are assigned to words as the outcome of evolutionary stable strategies in repeated games. The third lecture purports to deal with pragmatics, but awkwardly shifts gears in the middle to model something perhaps misleadingly called a 'debate' in order to suggest that arguments need not conform to strict transitive orderings in 'beating out' rival arguments. The fourth lecture seeks to assert that the manner in which an agent represents his preferences to himself (and here one can not shrug off Wittgenstein's derision about 'private languages') serves to restrict the shape of those preferences. The fifth essay is a series of complaints about the ways in which game theory is justified in the economics literature, especially with regard to the concepts of strategy, equilibrium and solution concept. The final essay closes with the opinion that has been gaining ground of late that, 'I have no expectations of Game Theory becoming "practical" as the term is understood by most people' (p. 88).

As might be suspected in confronting the proposals of an autodidact, a number of infelicities are committed in the name of economic imperialism. In the first two essays, for instance, 'language' is treated as if it consisted solely of nouns and verbs of a single tense. In the second, organic evolution is baldly conflated with maximization. The third confidently posits that the overriding purpose of human debate is to 'extract information'. The fourth imagines a property of preferences called 'definability', which is presumed to hold even when the preferences can be formally demonstrated to be non-computable. The fifth, however, attains new vistas in paradoxes of self-reference, with repeated assertions that game theory is not empirically verifiable or conceptually useful in structuring problems encountered in real life—all contained within a volume by all accounts devoted to the application of game theory to do just that. But then, the author blithely admits in passing that most game theorists do not have a firm grasp on what they are doing when they impose a particular solution concept upon a given game (p. 86). Language has the unnerving capacity to contain a universe never dreamt of in your philosophy, or in that of your interlocutor: a fact unpropitious for the widespread

deployment of the Nash equilibrium. Before the reader becomes snagged on the horns of a vicious dilemma, it may be necessary at this juncture to ask what it is that Rubinstein thinks game theory is good for? I personally find it difficult to extract any clear answer from this book other than that game theory is being done for its own sake—the last refuge of the autodidact.

It would be imprudent for me to recommend this book as anything other than a tonic for those still infected with the belief that a reputation for mathematical facility is *prima facie* evidence of rigour and consistency in thought and expression. Rather, the relevant question in this instance should be why it is that some people are encouraged to engage in public exhibitions of free semiotic play resembling the present set of lectures, whereas others are kept safely confined to the audience. An hour spent with Ludwig Wittgenstein's *Philosophical Investigations* and its meditations on language games will go much further to provide some insights into the vagaries of human discourse than months spent with the Nash bargaining solution.

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Economics and Language: Five Essays. By ARIEL RUBINSTEIN. Cambridge University Press, Cambridge. 2000. viii + 128 pp. £26.95. Paperback £9.95.

The five essays in this book cover a wide range of topics about the factors that mould the general shape of language, the structure of arguments and the interpretation of game theory. In the introduction Rubinstein gives a very bland description of what holds the book together, and at the end he says that the three other scholars who have added comments have convinced him that there is no deep unity to the ideas he is presenting. But there are threads, interesting threads, passing through all the essays.

The first essay asks why we are so comfortable with binary relations, particularly total orderings. Rubinstein presents a number of little theorems stating that, if you have a finite set and you want a small vocabulary to describe it, then you are best off with two-place total orderings. These are neat satisfying results. They can easily be interpreted, as Rubinstein does, as suggesting that in the evolution of language there will be a pressure to have words for binary relations. For example (he does not point this out), it is a universal of human languages that their syntax takes a subject/object/verb form, with languages varying in the standard order of these elements. But a verb taking a subject and an object is a two-place relation. The evidence that these relations are total orderings is much weaker. Many of our relations are comparatives ('bigger', 'better') and these usually admit of many incomparabilities (Mozart and Bach). And even the example of 'to the left of' that Rubinstein cites does not really work. Leftness is only an ordering locally, since the earth is round. This should not really matter: what Rubinstein's considerations suggest is that languages will have the syntactic resources for naming strict orderings when they need them, and this they certainly do.

Rubinstein assumes throughout that the logical machinery of a language will contain the apparatus of first-order predicate calculus with identity. Thus, we have the quantifier 'all' but not the quantifier 'most'; we have 'is identical to' but not 'is similar to'. Some of his results would fail without these assumptions. In the third essay he makes some preliminary observations towards giving a game-theoretic analysis of argument or debate, taking it to be a process in which two people try to persuade an audience, subject to rules that are designed to give the audience a chance to discover which persuader is right. The results of this analysis are less interesting than the idea behind it, and again there are some very restrictive assumptions—in particular, that when one persuader makes a claim the set of facts assumed by all changes to remove facts inconsistent with it. Conceivably, though, some such model could justify taking some skeleton of logical devices as basic to language, as it could turn out that the most efficient assignment of meanings to logical symbols to make a debate have the intended information-extracting function that would privilege the standard operators.

In discussing the evolutionary pressure on a language to take a certain form, Rubinstein considers variations on the idea of an evolutionarily stable strategy, as part

of an attempt to argue that there are some concepts, such as 'danger', that most languages will have simple means of denoting. Some of the argument here is reminiscent of attempts in epistemology a generation ago to find the best descriptive basis from which to make inductive generalizations. The consensus now is that this was a mistake, and that instead we should assume that agents come equipped with general beliefs and observational capacities, and should try to articulate the ways in which they will form new beliefs. So too here, one suspects, form may be more tractable than content.

In the remaining essays Rubinstein discusses how the terms we use to describe game theory, in particular the loaded word 'solution', warp our understanding of the theory. These essays are full of material that will be useful for resisting facile game-theoretical explanations of real-life situations. At first sight these seem quite disjoint from the earlier parts of the book. But there is one fascinating link. We are biased in choice situations to considering options we can easily describe; so too when considering what options other people may be considering, or may be expecting that we are considering. In fitting an abstract game-theoretic analysis to a situation involving real human beings, therefore, we ought to factor in the linguistic resources available. This ought to constrain the range of solutions that are serious candidates: they must figure in the subgames all of whose moves are describable by the people in question. So the application of game theory is constrained to respecting limits on articulateness which, if Rubinstein is right, are themselves products of a larger evolutionary process in which restricted agents pressure one another into possession of efficient expressive devices. Seen this way, the book is more of a unity after all.

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ADAM MORTON

Markets, Games, and Organizations: Essays in Honor of Roy Radner. Edited by TATSURO ICHIISHI and THOMAS MARSCHAK. Springer, Heidelberg. 2003. vi + 314 pp. £56.

This book is a collection of 17 essays written in honour of Professor Roy Radner's 75th birthday, first published in two special issues of the *Review of Economic Design* in 2001. Radner's impact on economics has been phenomenal, both through his own work and through the influence on his students, colleagues and co-authors. The essays are by his former students at Berkeley, his former post-doctoral fellows at Bell Labs and his published co-authors. The list of contributors is very impressive. The papers are of high standard, as would be expected from the contributors writing in honour of one of the leading economists of the last fifty years. They cover a wide area of economic theory, many in which Radner himself has been a seminal influence. In my review I will concentrate on a few papers.

The first paper is by Rabi Bhattacharya and Mukul Majumdar who examine the problem of survival in a competitive economy. The issue is to study the likelihood that the value of endowments is greater than some threshold level of income (which depends on the current prices) necessary for survival. After a simple example, which would be excellent for classroom exposition, the authors obtain general characterizations. The asymptotic probability of survival can be calculated, and one of the key insights is that indirect term-of-trade effects can lead to ruin. This problem echoes Amartya Sen's concept of entitlement failure. In small economies one can use these ideas to look at problems of terms-of-trade and current account sustainability in an international trade context. Rose-Anne Dana examines the uniqueness of competitive equilibria in finite and infinite dimensional economies (with and without complete markets) when consumers have an additively separable preference. The paper derives an important set of results, as this class of preferences is typically used in finance where uniqueness of equilibria is often implicitly assumed.

The paper by Kenneth Arrow looks at the question of entry of new firms in a situation where there is limited knowledge of productive opportunities. The key question is how the entry of new firms should be financed. He stresses that an optimal