Modeling Rational Agents. From Interwar Economics to Early Modern Game Theory. By Nicola Giocoli. Cheltenham, UK, and Northampton, MA, USA: Edward Elgar, 2003. 464 pp. $125.00.

This book is an extended and revised version of the author's Ph.D. dissertation at the University of Florence; the History of Economics Society authenticated it with its Joseph Dorfman Best Dissertation Award in 2001. Indeed, this unusually ambitious project is a remarkable tour de force that required a deep knowledge of game theory, and related domains of inquiry, as well as a good sense of who the major players were in 20th century economics, and how they influenced each other.

Now assistant professor of economics at the University of Pisa, Giocoli tries to rationalize the curious "fall and rise of modern game theory" (the title of the concluding chapter 6 of his book): game theory after a tremendous initial reception – extensive review essays of Von Neumann & Morgenstern's Theory of Games and Economic Behavior in about every leading economics journal --, did not, on the surface at least, take off until about 3 decades later. What happened?

Giocoli's reconstruction of that seemingly strange tale harks

back to interwar economics and the successful attempts of some economists to mathematize, and de-psychologize, their discipline. With the process of formalization, so Giocoli argues, began the progressive replacement of the rationality concept from one linked to the idea of maximization to one linked to the notion of consistency. Giocoli identifies Samuelson's weak axiom of revealed preference in the late 1930s as the key trigger of a transformation that today finds it expression in intriguing articles such as Andreoni & Miller (2002). The author furthermore argues that this replacement of one notion through another went hand-in-hand with a parallel evolutionary process of sorts: the replacement of a system-of-forces (SOF) conceptualization of economics through a system-of-relations (SOR) perspective.[1]

While proponents of the SOR perspective such as Samuelson, Hicks, Allen, Frisch, Wold, and Debreu engineered – through mathematization, axiomatization, a focus on equilibrium conditions, and a reliance on unlimited foresight – the "escape from psychology" (the title of chapter 2), proponents of the SOF perspective such as Hayek and Morgenstern attempted

[1] These perspectives can be thought of as meta-views, or conceptual lenses, of the theories, facts, methods, and open questions that constitute the body of knowledge of a discipline. Roughly, the SOF view is linked to the rationality-as-maximization conceptualization while the SOR view is linked to the rationality-as-consistency conceptualization.

an “escape from perfect foresight” (the title of chapter 3) by pointing out the logical problems of unlimited foresight, by pondering what proper assumptions about agents’ foresight were, and by being concerned about the modeling of the (convergence of) disequilibrium processes, i.e., the question of learning. Giocoli argues that this battle between the proponents of the SOR perspective and those of the SOF perspective ended in a theoretical stalemate, mainly because the proponents of the SOR approach did not have the mathematical machinery at their disposal that would have allowed them to present a creditable alternative.

So, why then did the joint effort of von Neumann and Morgenstern fail? And why did Nash’s effort fail? After all, these giants undisputedly added some important formal machinery to economists’ tool-box. Giocoli addresses these questions in chapters 4 (entitled “Von Neumann and Morgenstern’s Game Theory”) and chapters 5 (entitled “Nash’s Game Theory”).

Giocoli’s story line, stripped to its bare bones, is this: The game theory that von Neumann and Morgenstern presented to the world was normative in that it endorsed the various solution concepts as different chapters in the “handbook for good

play”. In that they tried to model agents’ mental processes, and in that they didn’t provide a dynamic set-up, they were at odds with both the SOR and SOF images, and also at odds with the attempts to escape from psychology and the escape from perfect foresight. Hence they were looked at suspiciously by both camps It didn’t help matters that much of Theory of Games and Economic Behavior was focused on two-player zero-sum games that had little relevance for economists and that the key solution concept that they employed – the minimax solution – transformed the alleged game-theoretic problem into a simple decision problem devoid of strategic uncertainty, thus undermining the very starting point of their endeavor. It also didn’t help matters that von Neumann and Morgensten abandoned the classical tools of mathematics – calculus and statistical mechanics – and instead relied on nonstandard tools of mathematics derived from quantum mechanics.

As to Nash, he found a way – the Nash equilibrium (NE) – to extend the scope of strategic analysis to nonzero-sum games, making it applicable to strategic situations of interest to economists. Yet, the NE did not take off like a rocket. Why? According to Giocoli, “the main reason is that the concept did not provide any acceptable way out from the theoretical stalemate that early 1950s economists had inherited from their

interwar predecessors." (p. 297) It didn't do so, in Giocoli's reading, because it offered yet another equilibrium concept - one, to make things worse, that didn't address the issue of how players could coordinate on it, especially when mixed strategies and/or multiple equilibria were involved (an issue finally addressed comprehensively, but inevitably incompletely[2], by Harsanyi and Selten, 1988).

Is this the story? I believe there to be an important blind-spot in Giocoli's narrative. It concerns his claim (e.g., p. 297) that game theory disappeared from the journals and throughout the 1950s and 1960s was ignored by most neoclassical economists: "Even in the 1970s, game theory remained the realm of a few specialists and it was at least a decade away from making its official entry into the table of contents of standard economics textbooks." (p. 297) There is no disputing that this statement captures correctly the fact that the accomplishments of Von Neumann and Morgenstern and Nash for a while did not make the big splash that many expected after the initial reception in the mid-1940s to mid-1950s. However, I would argue, that the table of contents of

[2] "One cannot, without empirical evidence, deduce what understandings can be perceived in a non-zero sum game of manoeuver any more than one can prove, by purely formal deduction, that a particular joke is bound to be funny." (Schelling 1960, p. 1964, in his chapter on "Game Theory and Experimental Research.")

standard economic textbooks, or the ignorance of most neoclassical economists, are a poor gauge for the advances of game theory in the 1950s and 1960s.

The fact is that during those years a significant number of researchers built on, and advanced, the accomplishments of Von Neumann and Morgenstern (e.g., expected utility theory, NE). Kreps and Rubinstein (1997), in their “appreciation” of 18 classics in game theory argue that “the subject underwent explosive development in the 1950s and 1960s.” (p. xii) Repeatedly, they even talk of the “heroic period” (p. xii) of game theory. Importantly, a small but steadily growing group of researchers – some of them prominent game theorists -- started testing the new theories experimentally. Game theorist and experimentalist extraordinaire Al Roth (1995, especially pp. 4 - 22) has provided us with an excellent, albeit somewhat US-centric, sketch of the fledgling discipline of experimental economics and its testing of theories of individual choice as well as game-theoretic predications for various 2- and n-person games during the 1950s and 1960s. Selten (1993), too, sketches these developments and explicitly mentions the pioneering n-person game experiments by Kalisch, Milnor, Nash (!), and Nering (1954) as a major motivation for his and the Frankfurt group of experimentalists’ work, both in form of

experiments and theory development.

The gist of the contributions of Roth and Selten is that it took time to build an applicable game theory, and an appropriate experimental methodology and technology, and that modern game theory's usefulness was decisively informed and refined by the insights from the experiments that were conducted all the way through the 1950s, 1960s, and 1970s.[3] Maybe, then, the time it took for game theory to reach the masses, is not that strange a tale after all.

Andreas Ortmann,
CERGE-EI,
Charles University and
Academy of Sciences of the Czech Republic

[3] I note in passing that the success of experimental economics has, arguably completely, reversed the process of the progressive replacement of the SOF conceptualization of economics through the SOR perspective.

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