The History and Present State of Game Theory : Toward a Better Understanding of Human Behavior

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This paper considers the history of game theory since von Neumann and Morgenstern published their monumental work *The Theory of Games and Economic Behavior* in 1944. It points out changes in research themes and discusses what game theory has achieved up to the present. The aim of von Neumann and Morgenstern was "to find the mathematically complete principles which define rational behavior for the participants in a social economy, and to derive from them the general characteristics of that behavior." Extending the theory of von Neumann and Morgenstern, Nash classified all games as either non-cooperative games or cooperative games and defined the notion of an equilibrium point for a non-cooperative game. Nash also suggested a research program, now called the Nash program, to analyze a cooperative game by constructing a non-cooperative game model for negotiations. The main field of game theory was cooperative games in the 1950s and the 1960s. Thereafter, research trends in game theory in the 1970s and the 1980s shifted from cooperative games to non-cooperative games, led by the seminal works of Harsanyi on incomplete information games and Selten on perfect equilibrium in extensive games. This so-called non-cooperative revolution greatly promoted applications of non-cooperative game theory to economics. At the same time, researchers became increasingly dissatisfied with the strong assumption of rationality in traditional game theory, and consequently research interest turned toward two new fields in the 1990s. One is evolutionary game theory, developing out of evolutionary biology, and the other is behavioral game theory, which collaborates with psychology. Evolutionary game theory investigates dynamic processes of evolution and learning in economic behavior, and it reformulates game equilibrium as a stable stationary state of those dynamic processes. Behavioral game theory studies the structures of motivation, cognition, and reasoning in human decision-making using the methodology of experiments. This paper shows how present-day research in game theory is developing in divergent fields that consider both traditional theory based on unbounded rationality and behavioral theory exploring human bounded rationality. Game theory continues to be one of the most active research fields in economics.

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