Thinking ahead

Martin Shubik

Game Theory and Strategy. By Philip D. Straffin Jr. *Mathematical Association of America:* 1994. Pp. 244. $27.50 (pbk).

Theory of Moves. By Steven J. Brams. *Cambridge University Press:* 1994. Pp. 248. £36, $54.95 (hbk); £13.95, $17.95 (pbk).

GAME *Theory and Strategy* is an elegant, crystal-clear expository work. Philip Straffin presents the key ideas behind finite games in strategic and coalitional form, and provides many simple and intuitively appealing examples of applications to business, politics, economics, social psychology, philosophy and evolutionary biology. Key concepts are emphasized and clearly explained. Here is a book for interested lay people, undergraduates or graduates with little knowledge of mathematics; even high-school seniors might appreciate it.

Virtually all the basic ideas discussed were published between 1944 and 1974. The curious general reader may wish to learn what has happened more recently. There have been several important new developments that are, for the most part, elaborations of the noncooperative equilibrium concept. They include the concept of perfect equilibrium, the development of game theory with incomplete knowledge of the rules of the game and the treatment of lack of common knowledge. But these topics require a depth of mathematical explanation inappropriate for Straffin's purposes.

Game theory has matured since its creation by John von Neumann and Oskar Morgenstern in 1944 and is now a respected field of study. The latest challenge is the development of new basic ideas. This is especially true for dynamics. Except for two-person zero-sum games there is no generally satisfactory dynamic game theory. Most games and actual strategic problems are neither purely cooperative nor noncooperative and we still lack a clearly correct way to handle them. This is not to criticize Straffin's fine book, but merely to point out that game theory has some way to go and that future directions and problems cannot be inferred from his otherwise thorough account.

Such issues are, however, the concern of Steven Brams, an imaginative and innovative scholar who has done much to promote the use of game-theoretic thought in political science. In *Theory of Moves* he presents an ambitious new approach to some central problems in modelling games for the study of the dynamics of conflict and cooperation. Unfortunately his attempt, like those of T. C. Schelling and N. Howard before him, identifies many of the problems but fails to offer any satisfactory solutions.

He begins by claiming that there are several features of his 'theory of moves' that make it superior to the classical theory of games. Game theory, he says, has neglected the conditions under which players move in a specified order; players, he reminds us, think ahead not just to the immediate consequences of making moves, but also to the consequences of countermoves to these moves, counter-countermoves and so on. To illustrate some of the problems, he spends several pages discussing the 'truel', the name for a three-person version of a duel that I coined in 1954 when asking: "Does the fittest necessarily survive?".

After corresponding with the ethologist Konrad Lorenz, investigating with graduate students games involving more than three players, and contemplating the truel of the Russian and British empires with Afghanistan, I concluded that just about anything goes: that is, the order of moves and likely outcomes are highly dependent on players and context. The standard formal methods of extensive form game theory are adequate for describing many games where the order of moves is part of the strategy, but rather poor for describing 'free-form war gaming' in which conversation and discussion are involved. This point was already implicit in Schelling's work.

Brams's second example is a three-by-three bi-matrix game originally used by L. S. Shapley in 1964 to reveal a basic weakness in blindly accepting as a solution the Nash noncooperative mixed-strategy equilibrium. Shapley noted that the alternating best-response six-cycle does better than the mixed strategy. Brams's conclusion confirms Shapley's view; but at the level of formal theory it does not, to my mind, go beyond Shapley's work.

Brams's central point is that threats, inferences about threats and the plausibility of threats are important. But to a great extent this is what Schelling said in 1960 in *The Strategy of Conflict* (Harvard University Press). At the time, I wrote a fairly unfavourable review of this book. In retrospect, I should have been more complimentary. I failed to appreciate Schelling's skill and perception in pointing out a host of problems in modelling international gamesmanship and brinkmanship, problems not easily solved by conventional game-theoretic methods. All I saw was his lack of clear understanding of many of the features of formal game theory. Although Brams clearly demonstrates that he knows far more formal game theory than Schelling, I fail to find where his work represents either a significant extension of Schelling's analysis or a solid contribution to formal game theory.

Brams's book may be of use to readers who are ignorant of formal game theory but familiar with conversational game theory using two-by-two matrices, usually based on the Prisoner's Dilemma. But it will be of little benefit to people who know some elementary formal game theory and have studied Schelling's work.

It is likely that the development of dynamic game theory will call for greater attention to both context and social psychology. In chess, the sequencing of moves is clear; in international bargaining over hostages or borders, moves are difficult to define and their sequence may be highly dependent on the course of play. Brams gives many interesting examples, including Samson and Delilah, Moses and Pharaoh, and Holmes and Moriarty, to bolster his account of the treatment of anticipation.

His concluding summary contains a nice synopsis of the new insights he claims to have provided in the treatment of stability, power and information. A better title for the book would have been *Modelling Moves and Anticipations in Some Dynamic Games*. □

Martin Shubik is in the Department of Economics, Yale University, PO Box 208281, New Haven, Connecticut 06520-8281, USA.