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Behavioral decision making, forecasting, game theory, and role-play

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Abstract

Green's finding that the outcome of role-play provides forecasts that are superior to those of game theorists highlights some of the unrealistic assumptions used in traditional game theory. In this commentary I discuss how elements studied in the behavioral decision literature impact the manner in which people behave in conflict situations studied by Green, and in the spectrum auction conducted in the United States. The main behavioral elements discussed are loss aversion, myopia, and the winner's curse.

Green (2002) presents compelling evidence that when it comes to forecasting the outcomes of real world conflicts, role-play can be more effective than the forecasts made by game theorists. Yet most of the commentaries on Green's paper urge caution when interpreting his findings to imply that game theory should be abandoned as a forecasting tool. For example, Bolton (2002) points out that it is now common practice in business school negotiation classes to use role-play and game theory together. He suggests that in the future the most useful lessons will come from work that combines game theory with experimental economics, along the lines described in Erev, Roth, Slonim, and Barron (2002).

Although I concur with Bolton's general conclusion, I would argue that game theory's value as a forecasting tool will continue to be limited until game theorists revamp its structure along behavioral lines. Traditional game theory assumes that players are fully rational in respect to preferences (expected utility), judgments, and strategic choices. Yet the behavioral decision literature documents that preferences routinely violate the axioms of expected utility, and that judgments exhibit systematic biases and errors.

In making the case for the explicit incorporation of behavioral concepts into game theory, I draw on two sets of experiences. The first is my own experience from a setting described by Bolton, teaching a graduate business school course that makes dual use of game theory and role-play. The second is the experience of the spectrum auction being conducted by the US government.

1. Lessons from the classroom

One of Green's conflict situations is the '55% Pay Plan', a revenue sharing dispute between

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US football players and team owners in the National Football League. Game theorists were asked to forecast if there would be a strike, and if so whether its duration would be short, medium, or long. The actual outcome of the dispute was a long strike. Among the game theorists' predictions of the actual outcome, 29% were accurate, a little better than the 25% associated with chance. In contrast, the corresponding accuracy rate from role-play was 60%.

What accounts for the apparent forecasting superiority of role-play in the '55% Pay Plan'? Is there anything missing in traditional game theory that would have led game theorists to underpredict the likelihood of a long strike? I suggest that several behavioral elements are missing from the game theoretic framework, elements that can be understood through the well-known game 'Dollar Auction'. In Dollar Auction, players bid for a $1 bill in an open cry ascending (English auction), and the winner receives the $1 and pays his or her last bid. However, the game has a twist. The second highest bidder also pays his or her last bid, but receives nothing.

Raiffa (1982) describes having induced two of his colleagues at Harvard Business School to play the game. Notably, the bidding began below $1. When it reached $1, the second highest bidder at the time realized that he could enter a bid for $1.01; paying $1.01 for $1 is better than losing the auction and paying 99 cents. However, the bidding did not stop at $1.01, and both players continued to bid. Indeed, by the time the bidding reached $3.10, emotional temperatures had risen, and the game showed no sign of concluding. Raiffa then intervened and terminated play.

Raiffa (1982) emphasizes that Dollar Auction is highly relevant to labor disputes such as the '55% Pay Plan'. A key lesson from Dollar Auction is that once both parties have incurred costs, there are psychological forces at work that tend to induce escalation in disputes such as the '55% Pay Plan'. In my own class, students play Dollar Auction for a $20 bill. In 7 years of play, the bidding has never stopped below $20, and only once did it stop at $20. Final bids ranged from $20 to $66, with the most frequent final bid around $30.

In his commentary, Goodwin (2001) points out that Green did not test role-play against game theory, per se, but against the forecasts of game theorists. However, with games such as Dollar Auction, it is possible to test predictions stemming from game theory. In the traditional game theoretic approach, players are assumed to prefer more money to less, and to exhibit Nash equilibrium behavior.

When players bid more than $1 to receive $1 in Dollar Auction, the outcome of the game is not a Nash equilibrium. Because people routinely bid more than $1 in Dollar Auction, it is natural to ask what factors drive their behavior? I suggest that the answer involves a mixture of behavioral phenomena that are familiar to readers of this journal:

- bounded rationality
- loss aversion leading to the escalation of commitment, and
- players' overvaluation of their own positions.

Bounded rationality leads most players to be myopic, and prevents them from thinking far enough out along the game tree to determine the Nash equilibria of the game. Loss aversion leads players to be willing to accept actuarially unfair bets in an effort to avoid loss. Kahneman and Tversky (1979) document that people tend to exhibit risk-seeking behavior in the domain of losses. This includes the loss of ego or pride as well as financial loss. In Dollar Auction, ego enters as an issue once the bidding exceeds the $1 being auctioned, and players attach increasing importance to 'winning' the $1 bill. The ego effect can be compounded by overvaluation, when a player misestimates the costs he or she