

4. GAMES

The three subparts of this part on games are focused on the accuracy of the Nash equilibrium (twelve entries), alternatives to the Nash theory (five) and the dynamics observed as games take place over time (five). Clearly, the Nash equilibrium concept has proved to be a powerful predictor of conflict situations, especially in non-zero sum environments but it is not perfect as a model. Other-regarding behavior surfaces naturally in conflicts and theoretically can be found in the form of assessments of the rationality of others, altruism, concepts of fairness, spite, etc. The chapters in this part reflect attempts to improve upon it and advance our understanding of why it works. The question becomes whether or not the principles of Nash equilibrium can be viewed in the behavior as modification of the attitudes or whether the attitudes themselves induce fundamentally different principles of behavior that can replace the strategic behavior of game theory. The substance of the papers is that strategic behavior is a deep and reliable property of human behavior in conflict environments.

4.1. Accuracy of the Nash Model

The first chapter, by Rosemarie Nagel, sets a proper stage for the section. The Nash theory ranges over many interpretations including reasoning, reasoning about the reasoning of others and a process of convergence. The “beauty contest” is an ingenious way to study the beliefs that agents have about the rationality of others and how those beliefs change over time, experience and insights about behavior. As an experimental environment it has special advantages because reasoning can be examined directly without intervention of altruism or other forms of unobservable incentives that are addressed in other parts of the section. Variations of the beauty contest game have proliferated as researchers discovered ways to use the game to explore new and increasingly complex phenomena.

Nagel puts it as follows. “In summary, experiments on the beauty-contest are easy to perform and are ideal for studying iterated dominance and numbers of levels of reasoning applied by real subjects. In the beginning, behavior is far away from equilibrium and converges to equilibrium over time. A simple bounded rational reasoning model describes the behavior in a consistent way across several treatments, especially in the first period. Convergence over time can be explained by various adaptive learning models and a continuous low level of rationality.”

In a series of four entries, Hoffman, McCabe, and Smith test the many dimensions of ultimatum and dictator games. The ultimatum game has served as a challenge for at least two decades as game theorists ponder about why a person with the power to make

a take it or leave it offer would not offer the minimum and why a person receiving such an offer might not take it. Concepts of fairness, the choice of language in describing the task, the context of the task (market or bargaining), the magnitude of the incentives and the possibility of reputation formation especially in terms of the presence of the experimenter are all examined. The influences of these variables are explored and the entries weave a theory attempting to explain the influences that are observed.

The general pattern of reports is set by Murnighan who reviews experiments from economics and from psychology that test the idea that people in ultimatum games are motivated by attitudes of fairness. A major tool employed is restricted information about the amount to be divided. In addition they study experiments in which third parties add fairness labels and they study children. The thrust of the findings is that anger, perhaps due to frustrated expectations accounts for rejections and that proposers tend to be aware of that source of motivation and use that awareness in crafting a strategy. Basically, it appears that people use concepts of fairness strategically trying to appear fair while pursuing self interest. The review includes studies of children as young as kindergarten.

Andreoni and Miller continue the analysis of compatibility between other-regardingness and game theory by demonstrating how rational choice, interpreted as classical consistency, can be used to recover preferences for non-observables, such as attitudes of altruism. Similarly, Bolton, Brandts, Katok, Ockenfels, and Zwick demonstrate how the attitudes of other-regardingness can be viewed as influencing the outcomes in a direction suggested by the equilibrium of the conflict once changed to include the preferences. The behaviors of altruism, fairness and reciprocity need not have the structure that the ethical and philosophical roots of these concepts suppose. People differ and therefore, their behavior differs.

Part of the mystery of other-regardingness lie in the dynamics of adjustments and specifically coordination. Van Huyck and Battalio study the development of coordination from two perspectives. One is the existence of a very special equilibrium that guarantees a level of security to be compared with the most efficient Nash. The other is the number of alternatives, where a dramatic increase in the number of alternatives is associated with a “smoothing” of the dynamic path. The thought is that “smoother” paths might facilitate convergence to the efficient outcomes. For Rhodes and Wilson, coordination problems are easily solved in the presence of institutional coordinating devices such as signals. On the other hand, when the institutions are ambiguous, there are obstacles to coordination that can become exacerbated by behaviors that seem to be attempts to compensate for the unpredictability of others and even punishments for unpredictable behavior. Bouchez and Friedman also focus on the convergence process and on theories of convergence processes in matrix games. The treatments include the amount of feedback about decisions and the payoff, whether it is the actual payoff that resulted from a match of the average of payoffs from a number of matches without the payoff from any particular match being known. Convergence, the speed of convergence and the patterns of individual strategies are studied in relation to evolutionary equilibria.

The final entry in this part is that of Binmore and Swierzbinski. Here the Nash bargaining environment is used to characterize outcomes with solution concepts based on

different social or philosophical norms of fairness and placed in competition with the Nash equilibria. Manipulations of information were used to condition subjects to start near the prediction of one of the competing theories as a focal point. In this manner the research is able to identify the stability of the focal points and the extent to which the underlying norm of behavior gradually become transformed toward equilibrium play.

4.2. Learning in Games

Dynamics of adjustment are clearly related to learning. Rapoport and Seale, in a rare study of the effect of differing information about the others payoffs in games, demonstrate that the greater precision in understanding the preferences of the other side of the market results in higher prices. Furthermore, any “advantages” afforded one player or another through the information is exacerbated by repeated play with the same opponent. An adaptive learning model is applied to the dynamics. The theme of uncertainty about the payoff of the other is continued in Kahn and Murnighan who study the repeated prisoner’s dilemma with differing information about the payoffs. The focus is on emerging cooperation and the conditions under which it takes place with an emphasis on the possible role of underlying psychological variables.

The theory becomes complex with the surfacing of different ideas about asymmetric information and different ways in which it might become resolved. Blume, DeJong, and Sprinkle study two person games with “partially conflicting” interests who can communicate. Using “a priori” meaningless messages in such games, they ask how agents attach meaning to the messages and extend the analysis to study outcomes, the learning process and the relationship between learning and the size of the message space.

Classical ideas of refinements are addressed by Cooper. The game studied is an entry game in which the incumbent can be a low cost or a high cost firm, a fact that will become known to an entrant only after a decision to enter. The entrant will profit if the incumbent is high cost but will lose if the incumbent is a low cost. Theoretical equilibrium refinements are studied and are poor models relative to adaptive learning.

Camerer and Ho outline one of the most successful of all learning models. A sophisticated experienced weighted learning model is compared to reinforcement learning and weighted fictitious play across a variety of games. The structure of these models is discussed together with interpretations of the measured parameters and areas of potential improvement.