

3 Game situations

Since its foundation, “classical game theory” studies the strategic relations established between several actors of a social system and holds privileged links with “standard economic theory”. Like economic theory, game theory is grounded on two main assumptions asserting respectively that each actor follows a strongly rational behavior and that all actors are coordinated through some equilibrium notion. But contrary to economic theory, game theory considers direct relations between actors (such as bargaining relations) rather than relations mediatized by prior institutions (such as market transactions). Moreover, game theory is defined at a higher level of generality than economic theory as concerns the actor’s relations (any type of multilateral actions instead of exchanges of goods), hence the actor’s characteristics (any type of preferences instead material interests).

In a first step, game theory appeared as a convenient tool able to treat the empirical discrepancies observed with the Walrasian general equilibrium model, when some strategic relations between actors, not previously considered, are introduced. Some situations of imperfect competition were formalized in which a reduced number of producers are mutually confronted in relation with passive consumers and fix simultaneously the quantities and prices of exchanged goods. In a second step, game theory allowed to interpret the Walrasian general equilibrium as a limit case of a game equilibrium when the strategic dimension of agents’ interactions disappears. The economic system is seen as a big game between many producers and consumers, endowed with specific characteristics and interconnected by a price system, their number being progressively and proportionally increased.

More recently, “evolutionnist game theory” points to the dynamic interactions between actors inserted in a social network, and becomes very close to a parallelly developing “evolutionnist economic theory”. More precisely, both theories are grounded on bounded rationality of the actors and study interaction processes repeated over time, an equilibrium state being only eventually obtained as an asymptotic emergent pattern. Both theories consider that each actor has mainly direct relations with other ones in some neighborhood, with some institutions which appear themselves as emergent structures facilitating those relations. By such, evolutionary game theory abandons its strategic dimension, by neglecting the

crossed expectations of actors about their respective actions in favor of purely reactive actions of the actors in response to the observation of their environment.

The only remaining difference of evolutionist game theory with regard to evolutionist economic theory lies, as for the classical versions of both theories, in its higher level of generality. It proposes a general language for representing the adaptive behavior of individual actors and the collective consequences deriving from their interactions, with some economic applications to auction mechanisms or contractual agreements. It proves theoretical results concerning the transitory behavior and essentially the asymptotic behavior of the interaction processes, with some economic applications to emergence of institutions or diffusion of technologies. More globally, it suggests a conceptual frame which is not restricted to economic phenomena, but extends to political and social ones, even if the results obtained are drastically limited by the complexity of the phenomena at hand.

The first part of the chapter examines the methodological foundations of evolutionist game theory with reference to classical game theory. The second part makes explicit the canonical principles already worked out or potentially existing for elaborating some specific model. The third part introduces prototypical classes of models, based on learning or evolution processes, and summarizes the result they provide. The fourth part examines the achievements of evolutionist game theory and its position with regard to the social sciences.

3.1 Background and problems

3.1.1 Principles of classical game theory

Initiated by the founder book of von Neumann and Morgenstern (1944) and pursued by the pioneering work of Nash (1951), classical game theory is grounded on some simple interaction principles between players. The players match in either sequential or simultaneous meetings, define and implement some corresponding actions and get payoffs from the consequences of the combination of all actions. The players choose their actions in a strongly rational way, hence optimize their expected utility under various constraints, with regard to their beliefs about their material environment and their opponents. The players are coordinated in some equilibrium state, i. e. a stationary state (in absence of perturbations from outside