Bridging self-games and cooperation in evolutionary games on networks

Chiara Mocenni[1]

[1] Università di Siena

Classical evolutionary game theory focuses on infinite well-mixed populations, where the dynamics is ruled by averaging the payoffs of all possible interactions between couples of players. Classical theory has been recently extended to account for the presence of networks of connections among a finite number of agents. Anyway, in both the above theories, agents are only allowed to interact with others players. In this paper, we introduce the concept of internal mechanisms, represented by games that agents play against themselves (self games), and we study their impact on the dynamics at the level of single agents and of the whole population. The main findings concern with the onset of mixed Nash equilibria, which can be stable and, in some cases, represent consensus solutions. Surprisingly, the internal mechanisms can drive games with only dominant strategies, such as the prisoner's dilemma game, towards globally stable steady states showing emergent cooperative behavior. The results have been obtained on the basis of theoretical reasonings as well as extensive numerical experiments.