

Mechanisms supporting cooperation for the evolutionary Prisoner's Dilemma games

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Abstract

The evolutionary Prisoner's Dilemma (PD) games are used progressively to study the maintenance of cooperative (altruistic) behavior among selfish individuals. In the latest versions of these multi-agent models players are located on the sites of a graph, their income comes from PD games with the neighbors, and the players try to maximize their income by adopting one of the successful neighboring strategies with a probability dependent on the payoff difference. We discuss briefly the mechanisms supporting the maintenance of cooperation if the players are located on a lattice or on the so-called scale-free network. In the knowledge of these mechanisms we can introduce additional personal features yielding relevant improvement in the maintenance of cooperative behavior even for a spatial connectivity structure. Discussing several examples we show that the efficiency of these mechanisms can be improved by considering co-evolutionary games where players are allowed to modify not only their strategy but also the connectivity structure, their capability to transfer their strategy (as a personal feature), and even the evolutionary rules they use.