

## Abstract:

We study environments in which agents are randomly matched to play a game, and before the interaction begins each player observes what happened in a few of the partner's past interactions with other opponents. We develop a novel modeling approach for such environments and apply it to study the Prisoner's Dilemma. We characterize the conditions (on the parameters of the game and on the informativeness of the feedback about past interactions) under which cooperation is a stable state. We first show that in order to support stable cooperation, players need to observe two of the partner's interactions with other agents. Next, we show that an optimal feedback mechanism for supporting stable cooperation is the one in which each agent observes binary signals that only describe whether or not the partner was the sole defector in each interaction. Providing players with more informative feedback in which each agent observes the entire action profile played in each interaction, is detrimental to the stability of cooperation. Finally, we show that when each agent observes only the partner's actions against other opponents, but not the actions played by these opponents, then cooperation is stable if and only if the additional payoff obtained by defecting is larger if the partner defects than if the partner cooperates.