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Evolution of Super-Reciprocity in Noisy Iterated Games MASOUD MIRMOMENI, AREND HINTZE, CHRISTOPH ADAMI, Michigan State Univ — In the classical Iterated Prisoners Dilemma (IPD), direct reciprocity is a form of communication leading to altruistic behavior. However, if players use stochastic strategies, a secondary form of cooperation in which players alternate in receiving the Temptation (T) and Sucker (S) rewards can emerge (super-reciprocity). This reciprocal behavior will become evolutionary dominant if the reward (T) is increased above a certain threshold, but is inherently more risky than primary cooperation since it relies on trust between players in two consecutive iterations of the game. Here, we investigate how different environmental conditions such as mutation rate, environmental noise, and reward T affect the evolution of reciprocity. Super-reciprocal strategies rely on the synchronization of two genes and are thus much more sensitive to environmental changes that affect the accuracy of players prediction of opponents' future moves. We find that increasing the environmental noise or mutation rate is deleterious to super-reciprocity, while increasing T stabilizes its evolution. Conversely, in environments that are highly predictable and where there is no payoff advantage to engage in reciprocal cooperation, basic cooperation via reciprocal communication remains the strategy of choice.

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