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Coevolutionary success-driven multigames

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Abstract

Wealthy individuals may be less tempted to defect than those with comparatively low payoffs. To take this into consideration, we introduce coevolutionary success-driven multigames in structured populations. While the core game is always the weak prisoner's dilemma, players whose payoffs from the previous round exceed a threshold adopt only a minimally low temptation to defect in the next round. Along with the strategies, the perceived strength of the social dilemma thus coevolves with the success of each individual player. We show that the lower the threshold for using the small temptation to defect, the more the evolution of cooperation is promoted. Importantly, the promotion of cooperation is not simply due to a lower average temptation to defect, but rather due to a dynamically reversed direction of invasion along the interfaces that separate cooperators and defectors on regular networks. Conversely, on irregular networks, in the absence of clear invasion fronts, the promotion of cooperation is due to intermediate-degree players. At sufficiently low threshold values, these players accelerate the erosion of defectors and significantly shorten the fixation time towards more cooperative stationary states. Coevolutionary multigames could thus be the new frontier for the swift resolution of social dilemmas. Copyright (C) EPLA, 2014

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