

Derivation of potential for group interactions in evolutionary games

György Szabó and Balázs Király

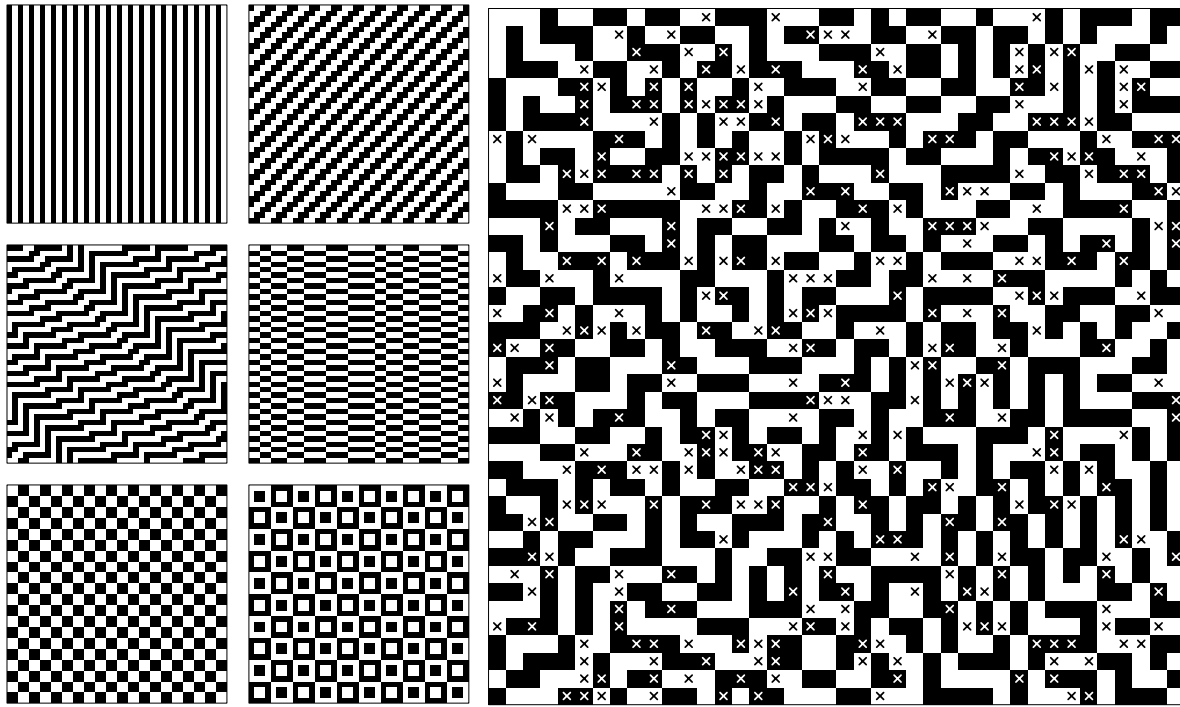
Phys. Rev. E 112 (2025) 064317

Article summary:

The article demonstrates existence of potential for two-strategy group interactions for which the players with identical strategies receive equal payoffs. This type of group interactions include some extended versions of public goods game. Some consequences of group interactions are illustrated by a simple model where the players are located at site of square lattice. This five-player group interaction supports curious formation of strategy arrangements. In addition to the theoretical predictions the Monte Carlo simulations indicate the existence of additional ground states.

References:

<https://journals.aps.org/pre/abstract/10.1103/nhxn-6zqf>



The spatial patterns show the optimal strategies (black or white) for five-player group interactions, if the players are located on the sites of a square lattice. The groups are formed by the players and their four nearest neighbors. The payoffs are optimal if two players choose the first (e.g., white) and three players the second strategy. The left patterns illustrate ordered or partially ordered strategy arrangements. Numerical simulations have indicated the existence of further disordered labyrinth-like patterns, where the small x-s denote players who can reverse their strategies without decreasing the optimal payoffs.