Adaptive aggregation reduces organisms' death risk in spatial rock-paper-scissors models

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We investigate the impact of intraspecific aggregation behaviour in cyclic systems described by the rock-paper-scissors game rules. We consider that each individual can scan and interpret the environmental cues, thus, moving towards the direction with the highest density of conspecifics. In our simulations, the locally adaptive gregariously depends on the organism's physical and cognitive abilities. Our outcomes show that the formation of groups reduces the individuals' death risk, which decelerates the dynamics of the spatial patterns. Running a massive number of simulations, we compute the changes in population dynamics and organisms' spatial distribution, considering that the adaptive aggregation is triggered for different levels of density of enemies surrounding the organism. Finally, we calculate the coexistence probability and show that adaptive aggregation promotes biodiversity. Our numerical experiments may be helpful to biologists, and data scientists in understanding how local interactions influence ecosystem dynamics.