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Costly hide and seek pays: unexpected consequences of deceit in a social dilemma

By: Szolnoki, A (Szolnoki, Attila)^[1]; Perc, M (Perc, Matjaz)^[2,3]

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Abstract

Deliberate deceptiveness intended to gain an advantage is commonplace in human and animal societies. In a social dilemma, an individual may only pretend to be a cooperator to elicit cooperation from others, while in reality he is a defector. With this as motivation, we study a simple variant of the evolutionary prisoner's dilemma game entailing deceitful defectors and conditional cooperators that lifts the veil on the impact of such two-faced behavior. Defectors are able to hide their true intentions at a personal cost, while conditional cooperators are probabilistically successful at identifying defectors and act accordingly. By focusing on the evolutionary outcomes in structured populations, we observe a number of unexpected and counterintuitive phenomena. We show that deceitful behavior may fare better if it is costly, and that a higher success rate of identifying defectors does not necessarily favor cooperative behavior. These results are rooted in the spontaneous emergence of cycling dominance and spatial patterns that give rise to fascinating phase transitions, which in turn reveal the hidden complexity behind the evolution of deception.

Keywords

Author Keywords: cooperation; prisoner's dilemma; phase transition

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Author Information

Reprint Address: Szolnoki, A (reprint author)

+ Hungarian Acad Sci, Res Ctr Nat Sci, Inst Tech Phys & Mat Sci, POB 49, H-1525 Budapest, Hungary.

Addresses:

+ [1] Hungarian Acad Sci, Res Ctr Nat Sci, Inst Tech Phys & Mat Sci, H-1525 Budapest, Hungary

+ [2] Univ Maribor, Fac Nat Sci & Math, Dept Phys, SI-2000 Maribor, Slovenia

+ [3] King Abdulaziz Univ, Fac Sci, Dept Phys, Jeddah, Saudi Arabia

E-mail Addresses: szolnoki.attila@ttk.mta.hu; matjaz.perc@uni-mb.si

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