SEARCH ARTICLE | SOCIAL SCIENCES |

Punishment diminishes the benefits of network reciprocity in social dilemma experiments

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Significance

The evolution of cooperation has a formative role in human societies—civilized life on Earth would be impossible without cooperation. However, it is unclear why cooperation would evolve in the first place because Darwinian selection favors selfish individuals. After struggling with this problem for >150 y, recent scientific breakthroughs have uncovered multiple cooperation-promoting mechanisms. We build on these breakthroughs by examining whether two widely known cooperation-promoting mechanisms—network reciprocity and costly punishment—create synergies in a social dilemma experiment. While network reciprocity fulfilled its expected role, costly punishment proved to be surprisingly ineffective in promoting cooperation. This ineffectiveness suggests that the rational response to punishment assumed in theoretical studies is overly stylized and needs reexamining.

Abstract

Network reciprocity has been widely advertised in theoretical studies as one of the basic cooperation-promoting mechanisms, but experimental evidence favoring this type of reciprocity was published only recently. When organized in an unchanging network of social contacts, human subjects cooperate provided the following strict condition is satisfied: The benefit of cooperation must outweigh the total cost of cooperating with all neighbors. In an attempt to relax this condition, we perform social dilemma experiments wherein network reciprocity is aided with another theoretically hypothesized cooperation-promoting mechanism—costly punishment. The results reveal how networks promote and stabilize cooperation. This stabilizing effect is stronger in a smaller-size neighborhood, as expected from theory and experiments. Contrary to expectations, punishment diminishes the benefits of network reciprocity by lowering assortment, payoff per round, and award for cooperative behavior. This diminishing effect is stronger in a larger-size neighborhood. An immediate implication is that the psychological effects of enduring punishment override the rational response anticipated in quantitative models of cooperation in networks.

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Supporting Information

Appendix (PDF)

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