



Media release

Zurich, 23. February 2024

Embargoed until: 23. February 2024, 09.30 CET

Combination of Group Competition and Repeated Interactions Promotes Cooperation

How did cooperative behavior prevail in human evolution? Researchers from the Universities of Zurich, Lausanne and Konstanz have challenged two prevailing explanations – repeated interactions on the one hand or group competition on the other. Instead, both mechanisms synergistically contribute to fostering cooperation effectively.

One of the great unresolved mysteries of human evolution is how pro-social, cooperative behavior could have evolved. What led to the establishment of a behavior that prioritizes the benefit of the community over that of the individual in a world where materially successful individuals reproduce, and others slowly perish?

The prevailing theory suggests that this occurred due to repeated interactions. Over generations, humans learned that cooperative behavior pays off in the long run. People collaborate because they anticipate interacting with the same individuals in the future. Therefore, those who behave antisocially suffer reputational damage and are punished by others with uncooperative behavior, manifesting that uncooperative behavior does not pay off in the long run.

Exchange experiment in Papua New Guinea

However, there is strong empirical evidence that people behave cooperatively even in non-recurrent and anonymous interactions where there is no risk of reputational damage. How can this be explained? Behavioral economists from the Universities of Zurich, Lausanne and Konstanz addressed this question by conducting an experiment among indigenous people in Papua New Guinea.

In a setup resembling a trust game, pairs of individuals had to exchange money with each other and to decide whether they wanted to act selfishly and uncooperatively or rather socially and cooperatively (see box). The conclusion: when paired with an anonymous member of their own community, participants exchanged very large amounts. In pairings with members of other communities, however, very little was transferred.

Prevailing paradigm challenged

In a comprehensive theoretical analysis linked with the experiment, the researchers show that the prevailing theory of repeated interactions alone cannot explain the evolution of human cooperation, since repeated interactions only enable the evolution of cooperation if the individual ability to reduce cooperation is arbitrarily restricted. Without such arbitrary restrictions, cooperation collapses.

This is because even in repeated interactions, there is an incentive to gain an advantage by always cooperating a little less than the partner. Over time, this leads to a breakdown in cooperation. "This is



perhaps the most provocative result of our study, as it completely contradicts the mainstream,” says corresponding author Ernst Fehr of the University of Zurich.

Cooperating groups compete with each other

A second common thesis on how cooperation could evolve also falls short: the idea that groups with several team-oriented members fare better in competition – and that general cooperation spreads because less cooperative groups die out. However, the theoretical analysis shows that the migration of cooperative and non-cooperative individuals between groups weakens the cooperative groups. Furthermore, there is also competition between cooperative groups, which weakens overall cooperation in the population.

Combined, “super-additive” approach is key

So how can the obvious fact be explained that people often behave very cooperatively even in one-time interactions? The authors show that this can be explained by the simultaneous interaction of both mechanisms. They found that the two well-known mechanisms, “repeated interactions” and “group competition,” synergistically interact and lead to a form of super-additive cooperation.

First author Charles Efferson of the University of Lausanne summarizes the study’s results as follows: “Repeated interactions create an incentive for cooperation within the group. However, this is a fragile state. Group competition, on the other hand, has a stabilizing effect on this fragile state. This strengthens intra-group cooperation on the one hand and promotes uncooperative behavior with outsiders on the other.” Thus, social motives seem to have developed in human history under the combined influence of both mechanisms.

Literature:

Charles Efferson, Helen Bernhard, Urs Fischbacher, and Ernst Fehr (2024): Super-additive cooperation. Nature. DOI: 10.1038/s41586-024-07077-w

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Experiment in Papua New Guinea

The participants were each given five monetary units in local currency, equivalent to half a day's wages. They were then divided into pairs and a one-time interaction between the people took place, an anonymous sequential exchange. Person 1 was asked to decide how much of the five monetary units they wanted give to person 2, knowing that the amount would be doubled and given to person 2. This decision was announced to person 2. Person 2 could now decide how much of their five monetary units they would like to give to person 1. This amount was also doubled. This lead to a situation in which the reciprocal transfer of monetary units (= co-operation) is advantageous for both parties. However, if person 2 acted selfishly and transferred nothing to person 1, and if person 1 expected this and also acted selfishly, they would also transfer nothing to person 2.

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