

# Solving the puzzle of cooperation in group environments

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Research has shown that when two individuals meet repeatedly they are more likely to cooperate with one another. Flávio Pinheiro and colleagues from the Universities of Minho and Lisbon show that the most successful strategy for cooperation occurs only after an experience of group unanimous behaviour.

In this week's *PLOS Computational Biology*, the authors explore the core principles of the 'prisoner's dilemma' as applied to decision-making within a group environment. The prisoner's dilemma of cooperation is a useful metaphor employed in situations where [personal interests](#) impel individuals to make decisions that oppose the interests of the group.

Using an Evolutionary Game Theory model, the authors investigate whether cooperation might emerge in individuals who assemble into groups that interact through repeated 'Public Goods Games', where individuals may contribute to a common pool, subsequently sharing the resources.

The authors explore a large set of possible responses that depend on previous levels of group cooperation. The most successful strategy for cooperation, which they call 'All-or-None', only occurs following a round of unanimous group behaviour and is both cooperative and punitive.

The results of the study may find applications to biological, technological, social and economic studies that incorporate some form

of [cooperation](#) or coordination within groups, from group hunting and social welfare to [climate change negotiations](#).

**More information:** Pinheiro FL, Vasconcelos VV, Santos FC, Pacheco JM (2014) Evolution of All-or-None Strategies in Repeated Public Goods Dilemmas. *PLoS Comput Biol* 10(11): e1003945. [DOI: 10.1371/journal.pcbi.1003945](#)

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