

# Evolution of Cooperation and the Complexity of Human Moral Codes

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## Abstract

Explaining the emergence of cooperation is one of the biggest challenges science faces today. Indeed, cooperation dilemmas occur at all scales and levels of complexity, from cells to global governance. Theoretical and experimental works have shown that status and reputations can provide solutions to the cooperation conundrum. These features are often framed in the context of indirect reciprocity, which constitutes one of the most elaborate mechanisms of cooperation discovered so far. By helping someone, individuals may increase their reputation, which can change the predisposition of others to help them in the future. The reputation of an individual depends, in turn, on the social norms that establish what characterises a good or bad action. Such norms are often so complex that an individual's ability to follow subjective rules becomes important. In this seminar, I will discuss a simple evolutionary game capable of identifying the key pattern of the norms that promote cooperation, and those that do so at a minimum complexity. This combination of high cooperation and low complexity suggests that simple moral principles, and informal institutions based on reputations, can elicit cooperation even in complex environments.

This is a joint work with Fernando P. Santos (Princeton University) and Jorge M. Pacheco (University of Minho).

## References:

- Santos, F. P., Pacheco, J. M., & Santos, F. C. (2018). Indirect Reciprocity and Costly Assessment in Multiagent Systems. In *Thirty-Second AAAI Conference on Artificial Intelligence*.
- Santos, F. P., Santos, F. C., & Pacheco, J. M. (2018). Social norm complexity and past reputations in the evolution of cooperation. *Nature*, 555(7695), 242.