



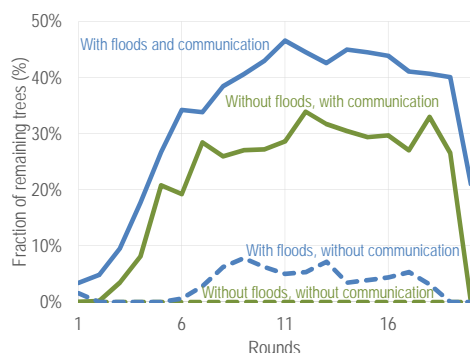
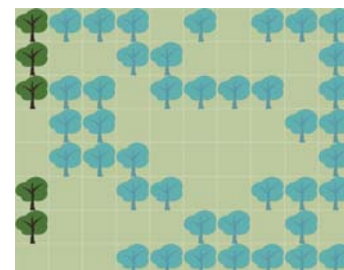
Behavioral Experiments Reveal How Risk Perception and Worldviews Impact Common-Good Governance

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Forest Game

Common resources are often threatened by over-exploitation. Such situations (tragedy of the commons) have been in the focus of researchers for several decades. We extend on existing research by investigating how (i) risk perception of external hazards and (ii) worldviews affect cooperative behavior. To this end we designed a stylized computer game:

Participants in groups of five recurrently decide, in each of altogether 20 rounds, how many trees to harvest from a forest of 80 trees that provides two or three ecosystem services: (i) a provisioning service (harvested trees increases a participant's profit), (ii) a supporting service (the forest's regeneration rate linearly increases with the number of remaining trees), and optionally, (iii) a regulating service (the risk of losing trees to randomly occurring rainfall-induced floods decreases with the number of remaining trees).



Flood risk reduces over-harvesting

Groups are better at preserving the forest when it provides flood protection as an additional ecosystem service, as shown in the figure on the left. From the viewpoint of game theory, this finding is surprising, as the profit losses from floods do not outweigh those from foregone harvesting. Yet, the result matches expectations from bounded rationality, as loss aversion stimulated by the stochastically occurring floods promotes cautious harvesting.

No cooperation without communication

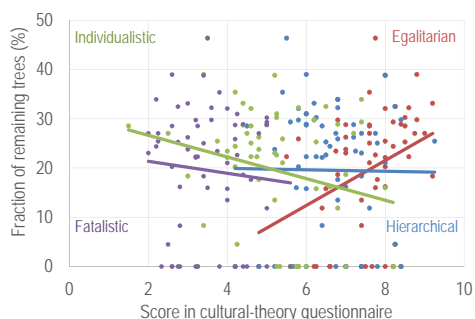
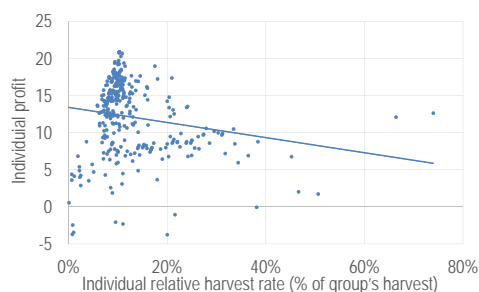
Communication plays a vital role in managing common goods. We implemented versions of the game in which players could either freely communicate via a chat box or were precluded from communicating. Groups that could communicate on average managed to maintain the forest in much better condition.

Fairness pays

We tested how individual harvest rates relate to payoffs. Interestingly, individuals who harvest more than their fair share are likely to be the ones earning less. We conclude that selfish individuals are likely to cause the breakdown of the common resource, causing all participants to earn less.

Worldviews matter

We find differential correlations between the average forest condition resulting from a group's harvesting and the group's average cultural-theory scores, as shown in the figure on the left. This is in line with expectations from cultural theory: in the absence of harvest limits and private property, egalitarian affinities improve a group's ability to preserve the forest (positive correlation), whereas individualistic affinities have the opposite effect (negative correlations).



Outlook

A second forest game will focus on probing and quantifying the expectation, central to cultural theory, that the satisfaction of participants increases when governance policies accord with their worldviews. For this, we will consider policies that are narrowly focused on only one of the worldviews recognized by cultural theory, such as harvest limits (hierarchical), private property (individualistic), or income redistribution (egalitarian). Policies of this kind, called 'corner solutions' in cultural theory, have already been trialed with YSSP 2016 participants.

A third forest game will examine dynamic patterns of policy change collectively enacted by participants and how these are associated with a group's composition in terms of cultural-theory scores. In particular, we will explore whether the aforementioned satisfaction effects can lead to the successive establishment and destabilization of corner solutions.