

## Reward is important.

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- Avoid punishment's serious shortcomings. Such as the waste of resources.
- Budget-balanced can reverse the downward trend and promote cooperation.

## Methods

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64 Students 20 Rounds of the repeated game among the same four players.

CR1: Standard PGG --10 Rounds

CR2: PGG with endogenous reward --10 Rounds

RC1: PGG with endogenous reward --10 Rounds

RC2: Standard PGG --10 Rounds

- Total tax  $R = 4\alpha(20 - \bar{x})$  to be redistributed in the second stage of endogenous reward. Set  $\alpha = 20\%$
- In the reward stage, each player has 30 points. So player  $i$ 's expected payoff is  $\pi_i(x, g) = 0.8 \times (20 - x_i + 1.6\bar{x}) + g_i \cdot R/120$  in CR2 and RC1.

## Model of conditional cooperation

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- Three categories: Conformist Cooperator Defector
- Conformist: a conditional cooperator who cooperates primarily depending on whether others are cooperating.

$x(t+1) = ax(t) + b(x'(t) - x(t))$   $x(t)$  represent contribution  $\pi(t)$  represent payoff Use  $(x_0, a, b)$  to show the action characterizations of three categories. Estimate  $(x_0, a, b)$  for each type of individual by linear regression.

## Simulations

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start with a set of stylized parameter specifications  $(x_0, a, b)$  for cooperators, conformists and defectors close to the estimations in Table 2. For a variety of group compositions and parameters  $a$  and  $b$ , the group average contribution increases over rounds in the reward PGG. (Fig-A,B,C)

## Discussion

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- The conditional cooperation model is relatively simple.
- Consider the two-lag extension to the standard conditional cooperation model.

- Future research: what happens if both reward and punishment options are simultaneously available each time after a round of the PGG?