How Localized Information Affects the Evolution of Indirect Reciprocity

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1 Background

Indirect reciprocity is a basic mechanism to sustain cooperation based on reputations in triangular relationships

Observer strategy: Sugden
Cooperation with a badly reputed person gives donor a bad reputation

Observer strategy: Kandori
Cooperation with a badly reputed person gives donor a good reputation

Which observer strategy best promotes the evolution of cooperation?

2 Method

Step ❶: Randomly choose a donor, a recipient, and observers within range.
Step ❷: Play the game: If the recipient’s reputation in the eyes of the donor exceeds the donor’s donation threshold, the donor regards the recipient as being good and cooperates.
Step ❸: Each observer evaluates the donor’s action and updates his/her reputation record accordingly.

Donation thresholds are either fixed at 0 or are allowed to evolve through mutation and selection.

3 Results

Donation thresholds fixed at 0
Reputations of 100 persons
A point represents a person

Donation thresholds evolving

4 Summary & Future Work

- The Kandori strategy imposes stricter judgment on the donor and, consequently, gradually increases the donation threshold of individuals, diminishes cooperation, and decreases payoffs.
- The Sugden strategy, by contrast, avoids this problem and promotes the evolution of cooperation.
- We plan to study three extensions: to well-mixed populations, to participants that can make mistakes, and to different rates of memory loss in reputation records.