A Measure of Welfare Tradeoff Ratio for Fine-grained Investigation of Reciprocity

Original title: Studying the Long-term Dynamics of Reciprocity Based on Welfare Tradeoff Ratios

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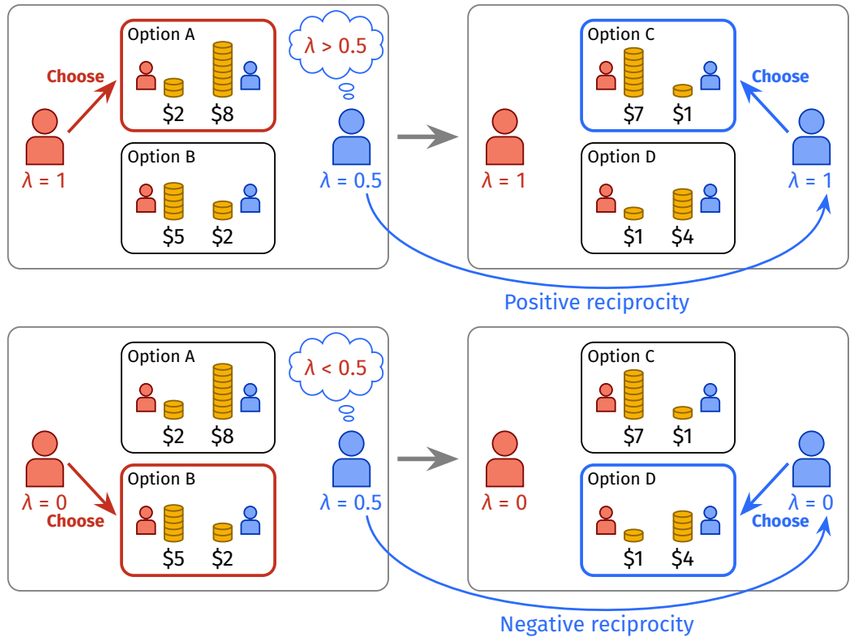
Background

- $\text{utility}_{\text{self}} = \text{payoff}_{\text{self}} + \lambda \cdot \text{payoff}_{\text{other}}$ — welfare tradeoff ratio (WTR)
- $\lambda \uparrow \Rightarrow$ niceness/friendliness/altruism ↑, selfishness/spite ↓
- People reciprocate by adjusting WTR in response to perceived other's WTR



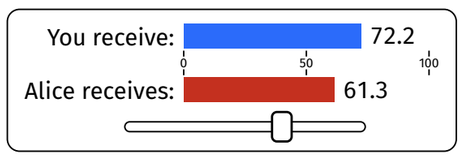
- How **exactly** do people reciprocate in terms of WTR adjustments?
- To answer this, we need to **accurately** and **efficiently**:
  - Measure participant's WTR
  - Convey to the participant the opponent's WTR

} **Our goal here**

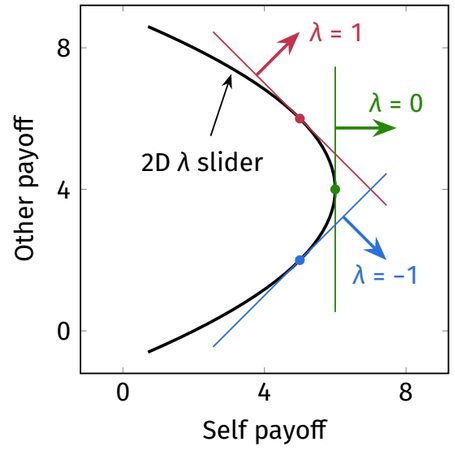
Problems with existing WTR measures

- Binary allocation tasks
  - Each task sets a threshold on λ
  - Multiple tasks narrow down λ
  - **Either inaccurate or inefficient**
- 1D λ slider (we developed elsewhere)
  - One-shot continuous measure
  - Accurate and efficient
  - **Hard to judge opponent's WTR from their decision on the slider**

Option A: $2 for Self, $8 for Other
Option B: $5 for Self, $2 for Other



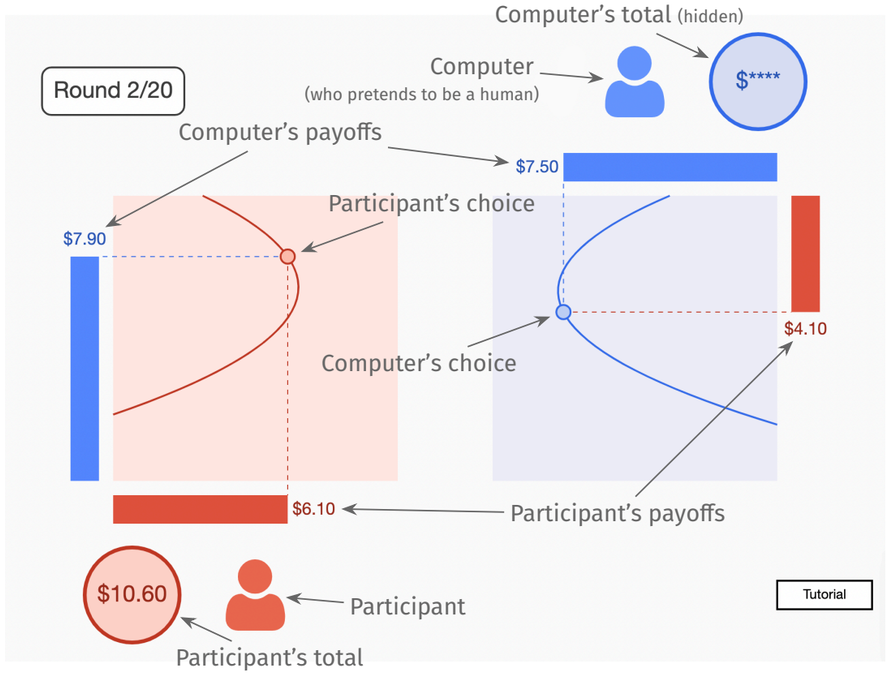
2D λ slider



- Participant chooses a point on the parabolic curve (other shapes are possible) that determines an allocation between Self and Other
- One-to-one correspondence between λ and points on slider
- Measuring λ to an **arbitrary precision** from **one** response
- Opponent's decision on the slider **directly reveals** their λ (via the tangent of the curve at the chosen point)

Experiment design

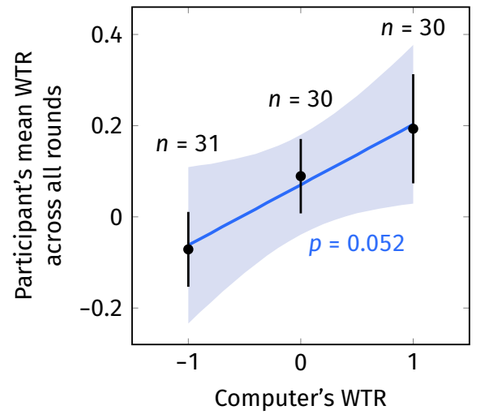
https://experiments.evullab.org/qi-games-1/



In each round:
1. Participant makes choice on her slider
2. Participant observes computer's choice on its slider
3. Payoffs are collected to the totals

Results

- **Question:** Does the 2D λ slider work at all?
- 3 between-subjects conditions: Computer's λ ≈ −1/0/1



- **Preliminary conclusion:** Participants are sensitive to the opponent's WTR revealed by the 2D λ slider and adjust their WTR accordingly

Limitations & future work

(**P**: Problem **S**: Solution)

P Responses are quite noisy

S1 Ask participant to predict computer's decision, to assess whether participant understands the slider

S2 Make the game **sequential** (participant and computer take turns acting), to reduce participant's cognitive load

P About half of participants said they didn't adjust their niceness

S Try using a **reciprocating** opponent

P Participant might respond to **difference** in payoffs of computer's decision, rather than its WTR

S Control for difference in payoffs