

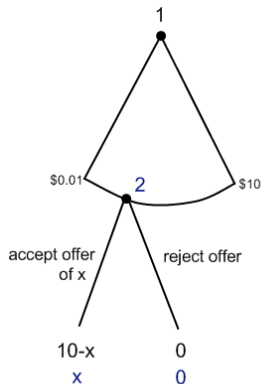
Prosocial Behavior:

What can game theory experiments teach us about altruism, reciprocity, and trust?

February 2, 2022

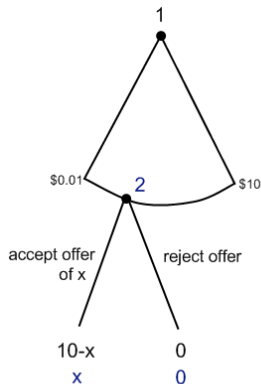
Ultimatum game

- ▶ Game played between a proposer and a responder
- ▶ Proposer endowed with some amount, e.g. \$10
- ▶ Decides amount $x \in \{0.01, 0.02, \dots, 9.98, 9.99, 10\}$ to offer to the responder
- ▶ If responder accepts, proposer gets $10 - x$ and responder gets x
- ▶ If responder rejects, no one gets anything



Ultimatum game

- ▶ SPNE is for the proposer to make smallest possible offer, for the responder to accept everything
- ▶ **But other NE exist!**

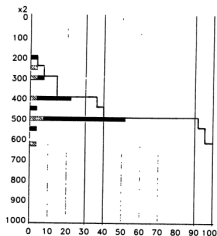


Experimental design in Roth, et al (1991)

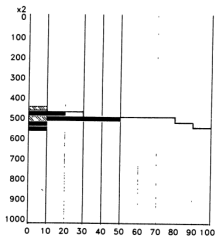
- ▶ Proposers and responders put on opposite sides of the room
- ▶ Instructions read aloud
- ▶ One practice round
- ▶ Ten paid rounds with strangers matching
- ▶ Pen and paper (proposers fill out a form, the form brought to responder, then returned to proposer)
- ▶ One round chosen at random for payment at the end
- ▶ Experiments run in four countries (USA, Israel, Japan, Yugoslavia)
 - ▶ Experimenters trained in the US
 - ▶ Efforts made to control for currency effects

Proposals in US

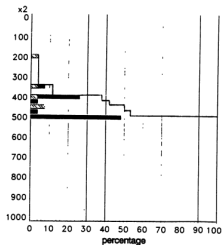
ROUND 1
(\$10, NUMBER OF OBSERVATIONS = 27)



ROUND 1
(\$30, NUMBER OF OBSERVATIONS = 10)

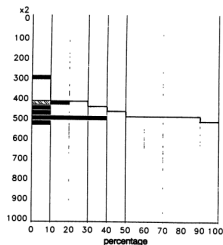


ROUND 10



Zarnikar 6/20/89, Zamir 2/27/90, Okuno 3/13/90

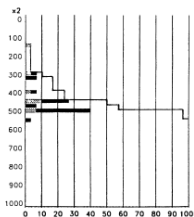
ROUND 10



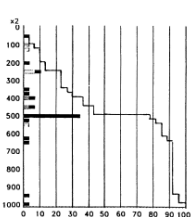
Okuno 3/15/90

Proposals in Japan, Israel, and Yugoslavia

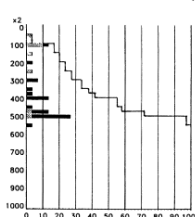
YUGOSLAVIA, ROUND 1
(400,000 DIN, NUMBER OF OBSERVATIONS = 30)



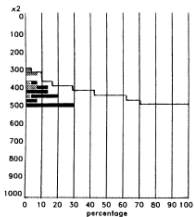
JAPAN, ROUND 1
(2,000 YEN, NUMBER OF OBSERVATIONS = 29)



ISRAEL, ROUND 1
(20 IS, NUMBER OF OBSERVATIONS = 30)

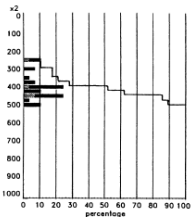


YUGOSLAVIA, ROUND 10



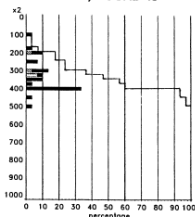
Prasinikar 12/14/89, 12/22/89, 12/27/89

JAPAN, ROUND 10



Okuno 4/20/90, 5/10/90, 5/11/90

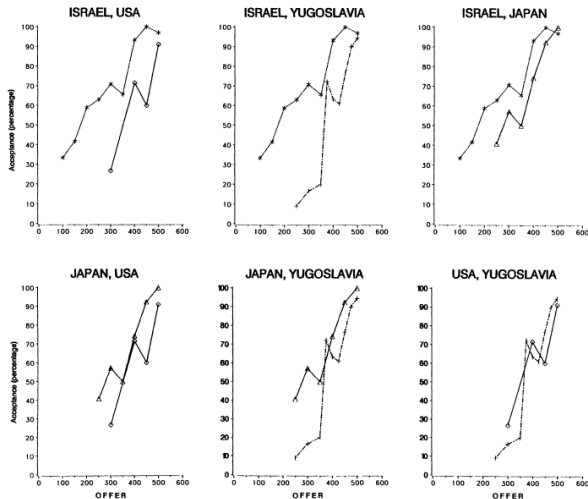
ISRAEL, ROUND 10



Zamir 4/25/90, 5/7/90, 5/16/90

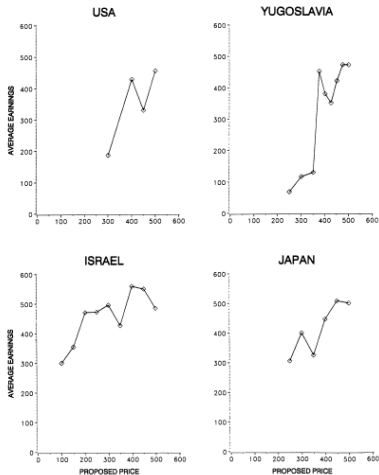
Modal offer 500 in US and Yugoslavia, 400 in Japan and Israel

Responder behavior



Remembers offers were smaller in Israel and Japan
But responders are more accepting in Israel and Japan

Proposer earnings



Proposers who offer more earn more: altruism?

Summary

- ▶ Contrary to subgame perfect NE prediction, lots of large offers (approx. 50% of the pie)
- ▶ Proposer behavior seems to adjust to responder behavior \Rightarrow Not driven by altruism only
- ▶ We cannot reject the hypothesis that some altruism is present

Why do responders punish?

- ▶ One common model is inequity aversion
- ▶ $U^i(m^i, m^{-i}) = m^i - \alpha \max\{m^i - m^{-i}, 0\} - \beta \max\{m^{-i} - m^i, 0\}$
- ▶ Proposed in Fehr and Schmidt (1999):

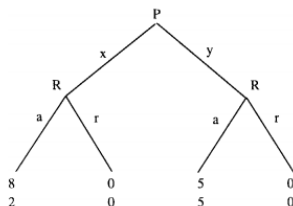
A theory of fairness, competition, and cooperation

[E Fehr, KM Schmidt](#) - The quarterly journal of economics, 1999 - academic.oup.com

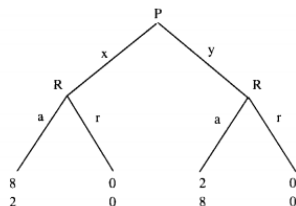
There is strong evidence that people exploit their bargaining power in competitive markets but not in bilateral bargaining situations. There is also strong evidence that people exploit free-riding opportunities in voluntary cooperation games. Yet, when they are given the ...

☆  Cited by 11278 Related articles

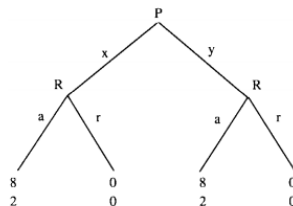
Falk, et al (2003)



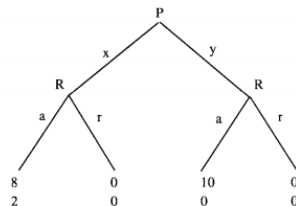
(a) (5/5)-game



(b) (2/8)-game

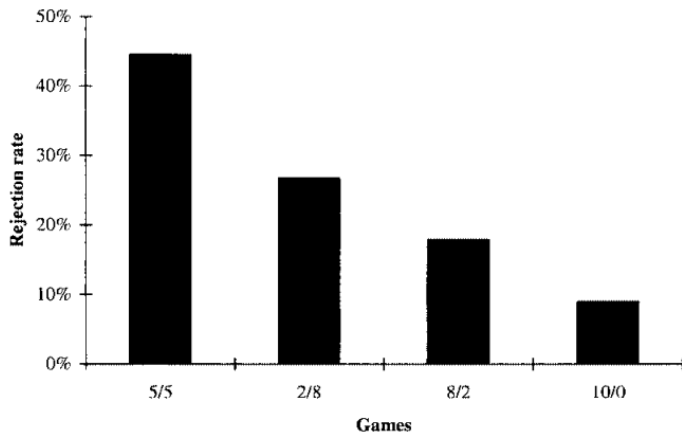


(c) (8/2)-game



(d) (10/0)-game

Results



Outcome-based models not satisfactory

Ultimatum results: summary

- ▶ Subgame-perfect NE does not explain behavior
- ▶ Behavior could be in part driven by altruism
- ▶ In part a rational response to social norms
- ▶ Intentions matter!

Dictator game

- ▶ Introduced by Forsythe, et al (1994) as a more pure measure of altruism than ultimatum game

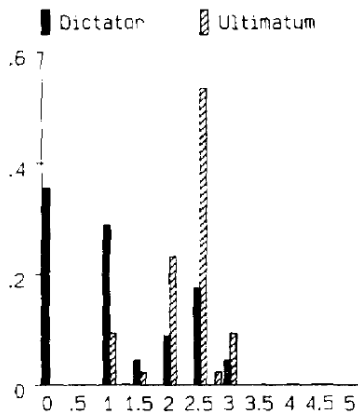
The game:

1. Proposer endowed with some amount, e.g. \$10
2. Decides amount $x \in \{0.01, 0.02, \dots, 9.98, 9.99, 10\}$ to offer to other player
3. Split implemented

Experimental Design in Forsythe, et al (1994)

- ▶ All subjects given a flat show-up fee of \$3 for participating
- ▶ Before the experiment, subjects allocated into two rooms (A and B)
- ▶ Subjects in Room A paired with subjects in Room B
- ▶ Subjects in Room A given an additional \$5 and can allocate some amount to partner in 50 cent increments

Results in Forsythe, et al (1994)



Cherry, et al (2002)

- ▶ **Baseline:** Classic dictator design with \$10 or \$40 to allocate (chosen at random)
- ▶ **Earnings:** Prior to playing the dictator game, subjects in Room A earned money by answering questions on GMAT
 - ▶ Room A1: Earned \$40
 - ▶ Room A2: Earned \$10
- ▶ **Earnings with double blind:** Same as earnings, but can't connect decisions to subjects

Results in Cherry, et al (2002)

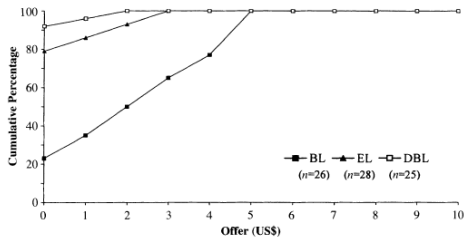


FIGURE 1. CUMULATIVE DISTRIBUTIONS OF OFFERS IN THE \$10 DICTATOR GAMES

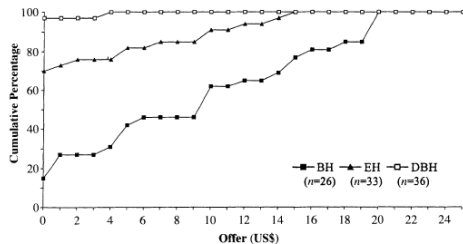


FIGURE 2. CUMULATIVE DISTRIBUTIONS OF OFFERS IN THE \$40 DICTATOR GAMES

Interpretation

- ▶ **Earnings:** When money is earned, people feel justified in claiming more
- ▶ **Earnings with double blind:** Experimenter opinion matters!

List (2007)

- ▶ **Baseline:** Standard dictator game
- ▶ **Take 1:** Standard dictator game with an option to take \$1 from the other player
- ▶ **Take 5:** Standard dictator game with options to take \$1-\$5 from the other player
- ▶ **Earnings:** Same as Take 5, instead proposers earned \$10 and receivers earned \$5 from some task

List results

Baseline:

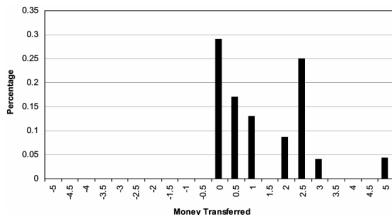


FIG. 1.—Baseline treatment (data online table B1)

Take 1:

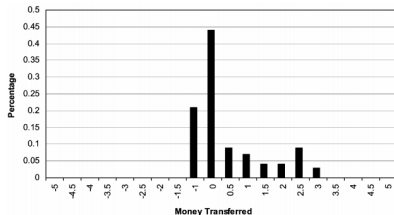


FIG. 2.—Treatment Take (\$1) (data online table B2)

Take 5:

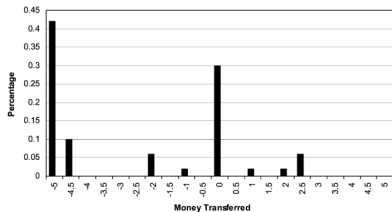


FIG. 3.—Treatment Take (\$5) (data online table B3)

Earnings:

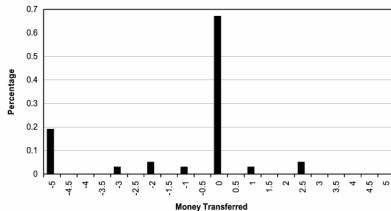


FIG. 4.—Treatment earnings (data online table B4)

Interpretation

- ▶ Subject give because they don't want to look like jerks
- ▶ Including the “take” options makes selfish behavior appear more acceptable
- ▶ Evidence against models of social preferences, like Fehr and Schmidt

Trust game

- ▶ Proposer and responder each given \$10
- ▶ Proposer decides how much of \$10 to pass to the responder
- ▶ The amount passed gets tripled and added to the responder's account
- ▶ The responder decides how much to pass back to the proposer
- ▶ **What is the subgame-perfect Nash equilibrium?**

Berg, et al (1995)

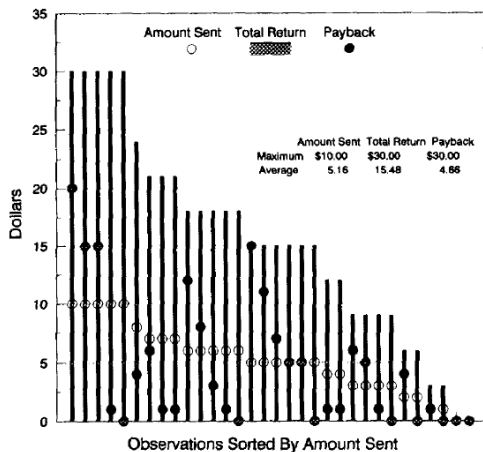


FIG. 2. Trust experiment results showing amount sent (○), total return (▨), and payback (●). No history was provided to the subjects.

On average, \$5.16 is sent by proposers and \$4.66 is returned by responders

McCabe, et al (2003)

McCabe, et al (2003) use two treatments to understand behavior in the trust game:

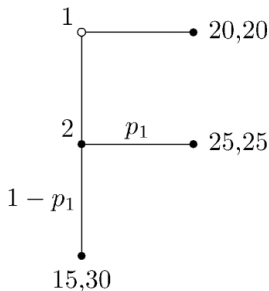


Fig. 1. Voluntary trust game (VTG).

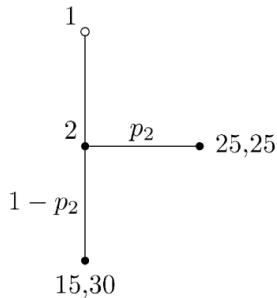


Fig. 2. Involuntary trust game (ITG).

Outcome-based models (i.e., inequity aversion) predict the same behavior for Player 2. **What do you think happens?**

McCabe, et al (2003)

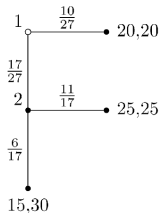


Fig. 3. Frequency of moves in the voluntary trust game.

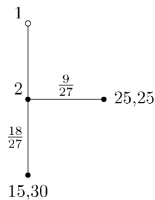


Fig. 4. Frequency of moves in the involuntary trust game.

These results also show that intentions matter!