Experimental Economics

(and bounded rationality)

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Lecture 3: Social Norms, Cooperation and Public Goods

Public goods

- Reading
  - Holt, “Markets, Games and Strategic Behavior”, ch. 14
  - Ledyard (1995) “Public Goods A Survey of Experimental Research” in Kagel & Roth (Eds.)*Handbook of Exp Econ*
  - Fehr & Gächter (2000) Cooperation and Punishment in Public Goods Experiments *American Economic Review*
  - *Falkinger, Fehr, Gächter and Winter-Ebmer (2000; “A Simple Mechanism for the Efficient Provision of Public Goods - Experimental Evidence”, American Economic Review*
  - *Frank, Gilovich. and Regan (1993); “Does Studying Economics Inhibit Cooperation?”, Journal of Economic Perspectives*

Public Goods

- Definition: Non rivalrous/non excludable (Samuelson 1954)
- Problem: free riding!
- Why?
- A. Smith (1776): Street lamps
    - One person enjoys, does not detract from other person's enjoyment
    - Can't charge every person for amount they use

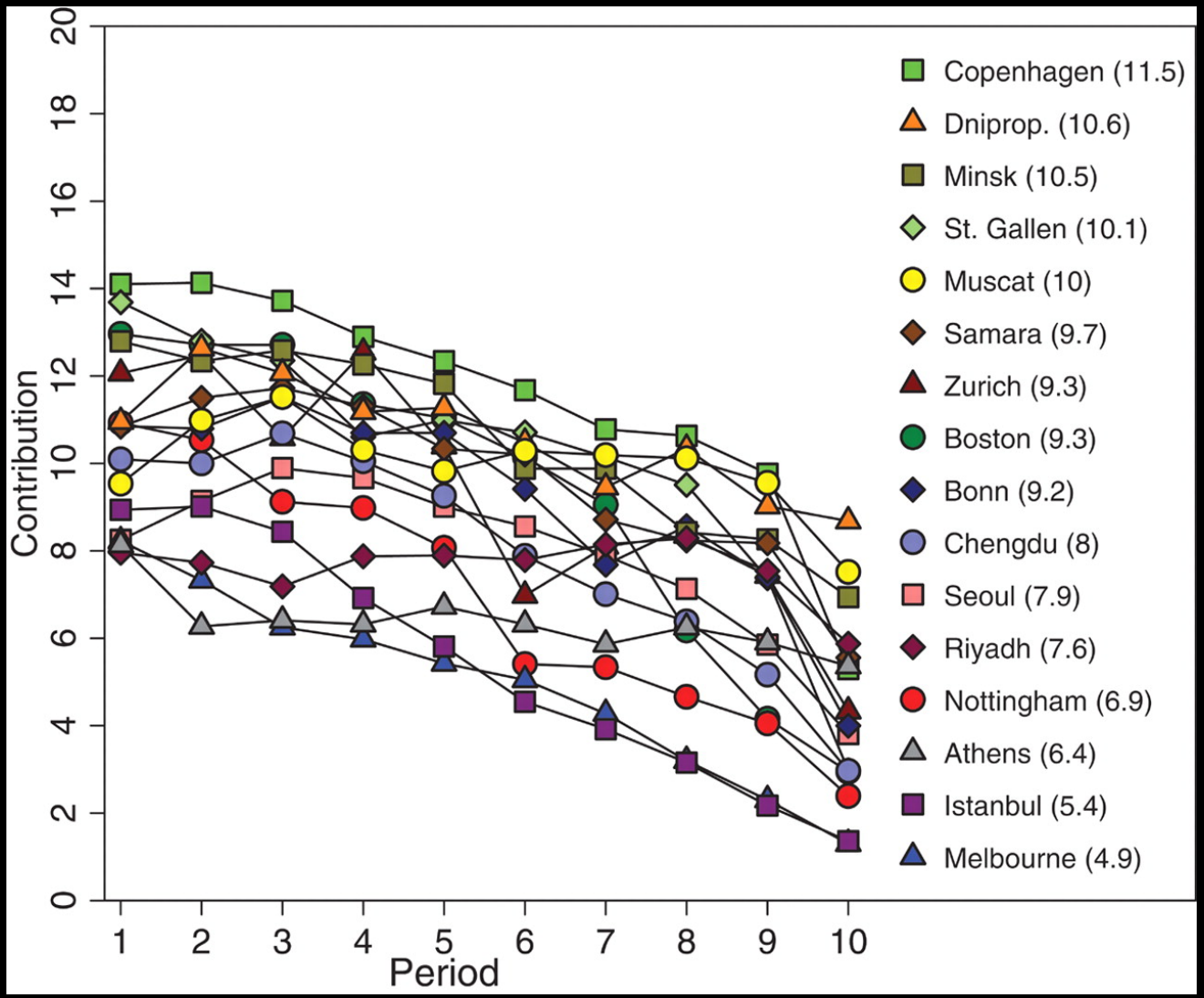
More general: cooperation problems

- Cooperative hunting and warfare (important during human evolution)
- Exploitation of common pool resources
- Clean environment
- Teamwork in organizations
- Collective action (demonstrations, fighting a dictatorship)
- Voting
- Basic economic problem
  - Cooperative behaviour has a positive externality.
  - Hence, private marginal benefit is smaller than social marginal benefit → underprovision relative to the efficient level.

A public good game

- *n* players
- Contribute *x* out of endowment *ω*
- Contribution costs *c(x)*
- Total contributions converted to output per capita o(X), where $X=\Sigma x_i$
- A person's utility $U_i=\omega-c(x)+o(X)$
  - O' is also called *marginal per capita return (MPCR)*
- Simple Linear Case: $U_i=\omega-x_i+mX$
- Individually rational strategy:
  - Corner solution: invest all if m>1, else nothing
- Efficient solution (collectively rational):
  - Total utility $U_t=\Sigma u_i=\Sigma\omega-\Sigma x_i+m\Sigma X$
  - $dU_t/dx_i=-1+mn$
  - Invest all if m>1/n, else nothing

Public goods: Experimental results



Hermann et al. (2008) *Science*

N=4 MPCR = 0.4
y = 20 Partner design

- Contributions start relatively high
- Fall over time
- Culture obviously matters

Group size

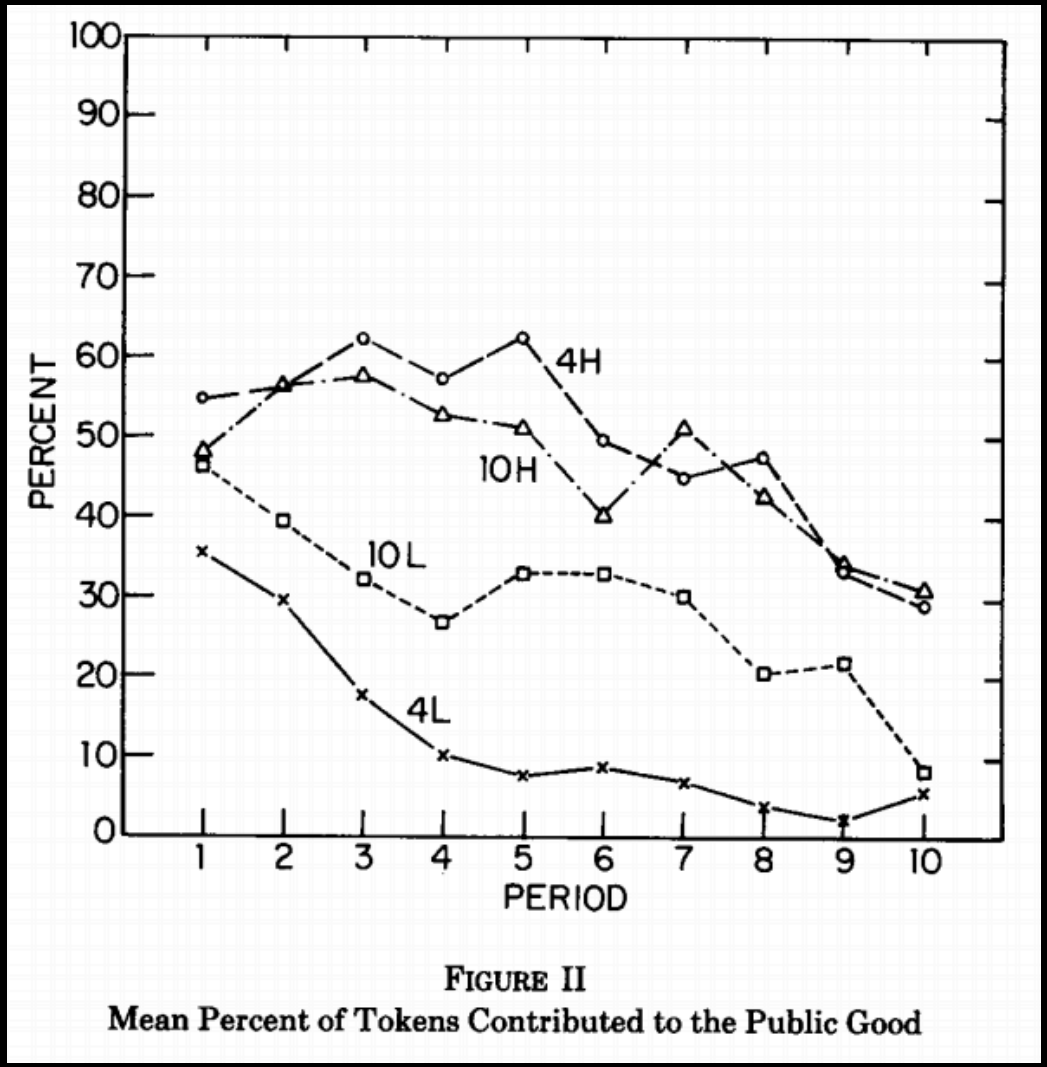


FIGURE II
Mean Percent of Tokens Contributed to the Public Good

Isaac and Walker (1988) QJE

experiment	Group size	MPCR
4L	4	0.3
4H	4	0.75
10L	10	0.3
10H	10	0.75

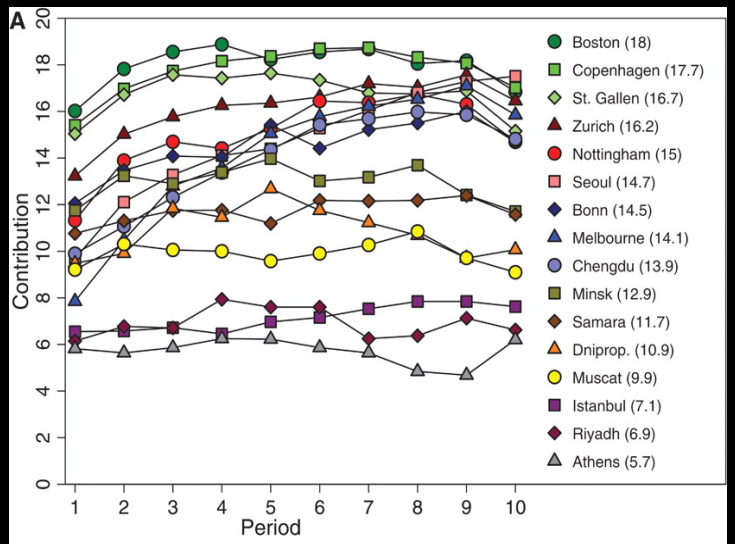
Mitigating group size effects

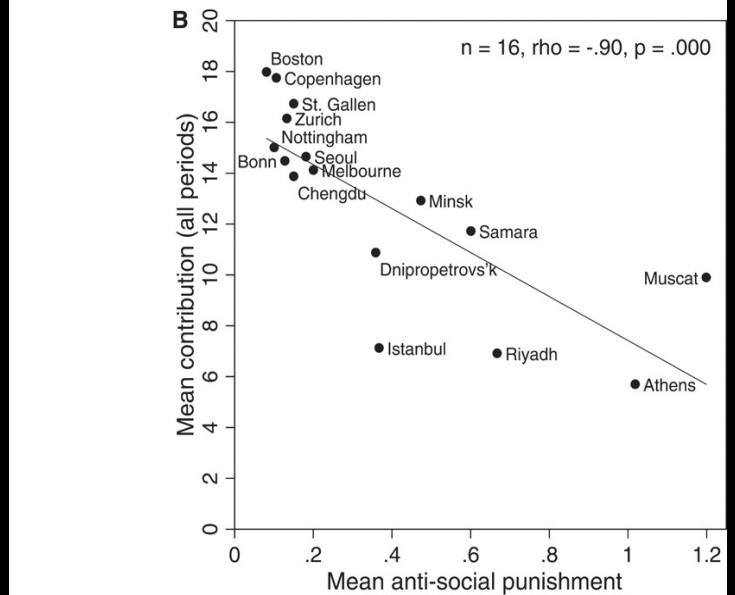
- In minimum effort games
  - N people choose effort, outcome depends on the smallest effort
  - $U = \min_j\{x_j\} - cx_i$, $c<1$
  - Any common effort level is Nash
  - The greater n, the lower the effort
- Weber (2006) Managing growth to achieve efficient coordination in large groups, *AER*
  - Add people one by one to the group
  - Effort remains much higher than if you started off with a big group
- In public goods?

The big question

- People in real societies *do* seem to be cooperating (to various degrees)
- How can this happen?
  - Punishment (as in experiment)
  - Social norms?
  - Genetic predisposition to cooperate, against individual rationality?
  - Communication?

Public goods with punishment





Hermann et al. (2008)
Science

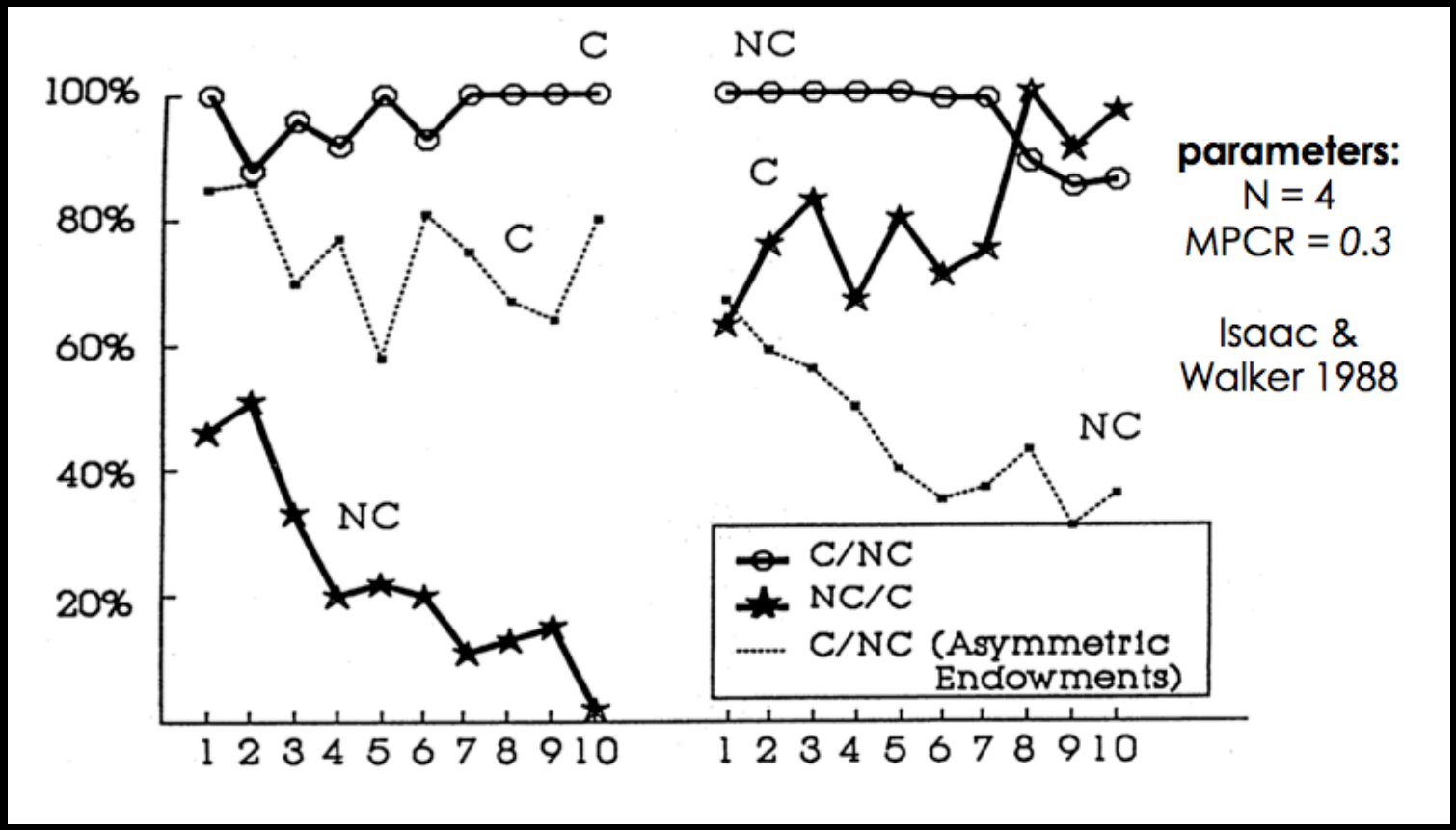
N=4 MPCR = 0.4
y = 20 Partner design
Punishment 3 times costlier to punisher than pubished

- Contributions start relatively high and remain there
- Sometimes even go up!
- Culture obviously matters again

Excursus: evolutionary theory

- Why have people evolved to be cooperative when it's a dominated strategy?
  - definitely not evolutionarily stable (Maynard Smith and G. Price, *Nature*, 1973)
- A group selection argument (although this might upset Richard Dawkins)
  - Two villages in the whole world, Argavars and Bualogros
  - Weather and food supply very unstable
  - A's are cooperating, B's don't
  - Who survives?

Communication in public goods



Treatment C: Communication between periods
If rationality common knowledge, no effect of communication… So?

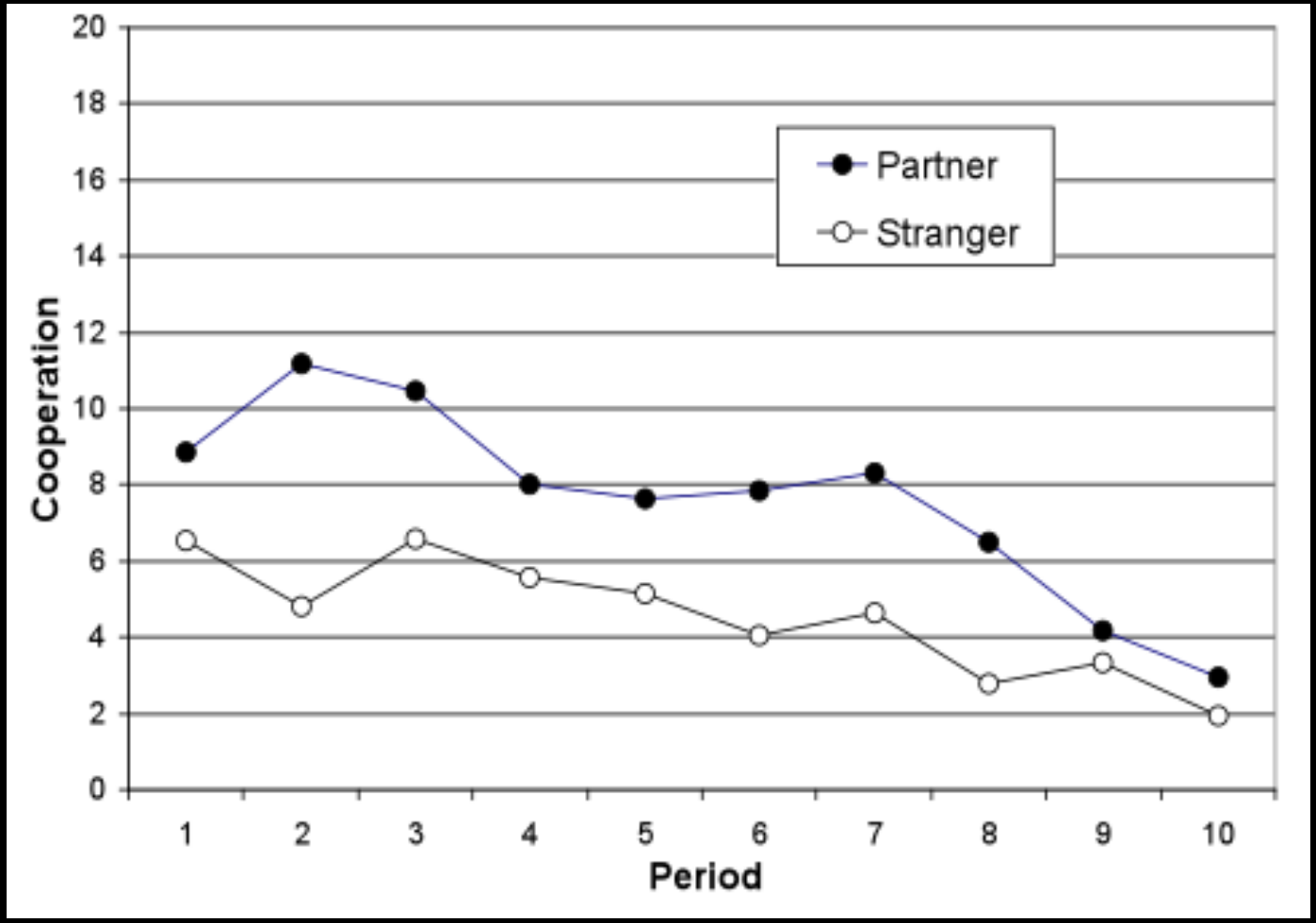
Ongoing project: Mission

- Some people just want to contribute to the public good
  - have a sense of duty or mission
    - modelled as extra utility when "doing the right thing"
- How to measure?
- Implications?
  - Cascades
  - Policy implications (raise the minimum sense of duty in the population)

Why do people cooperate?

- Strategic cooperation(Kreps et al.,JET 1982)
  - There are strategic (rational) and tit-for-tat players.
  - Strategic players cooperate (except in the final period) if they believe they are matched with tit-for-tat players.
  - Strategic players mimic tit-for-tat players (i.e. they co-operate) to induce other strategic players to cooperate.
  - Holds for certain parameter values.
  - Test? (e.g. Fehr & Gächter 2000, Croson 96, Andreoni 88)
- Social preferences
  - Altruism, “warm glow”, “efficiency”-seeking motives.
  - Conditional cooperation, Reciprocity.
- Maladaption

Strategic cooperation: partners vs strangers



Fehr & Gaechter 2000 AER

parameters:
N=4
MPCR = 0.4
y = 20

6 partner groups 2 stranger sessions with 6 groups each

Why does cooperation decline over time?

- Endogenous errors?
  - More on that later
- Strategic cooperation if group composition is constant?
- Social preferences: conditional cooperation
  - Subjects are conditionally cooperative and learn that there are free-riders in the group.
  - As a response they punish other group members by choosing lower cooperation levels.

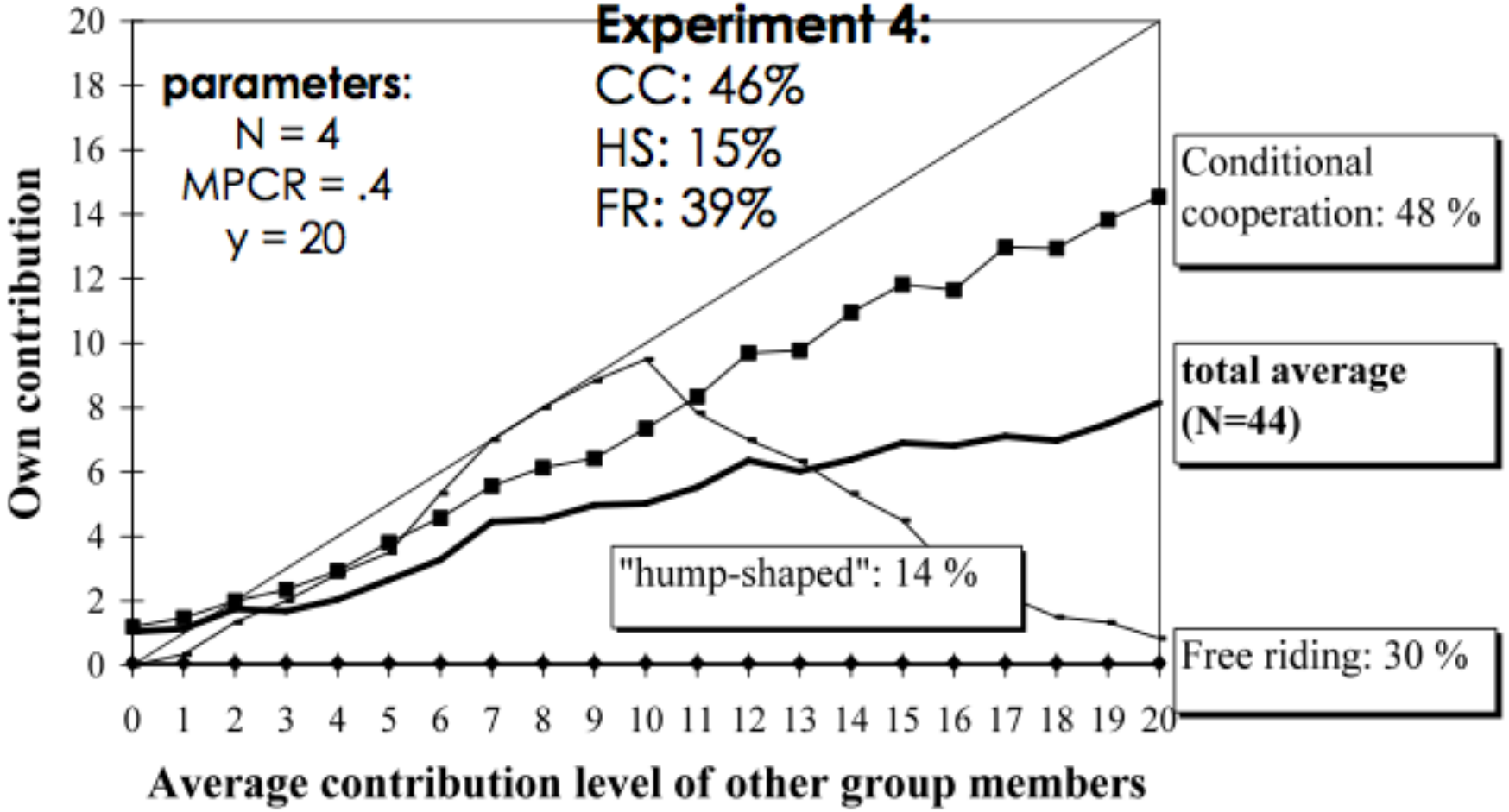
How to examine conditional cooperation

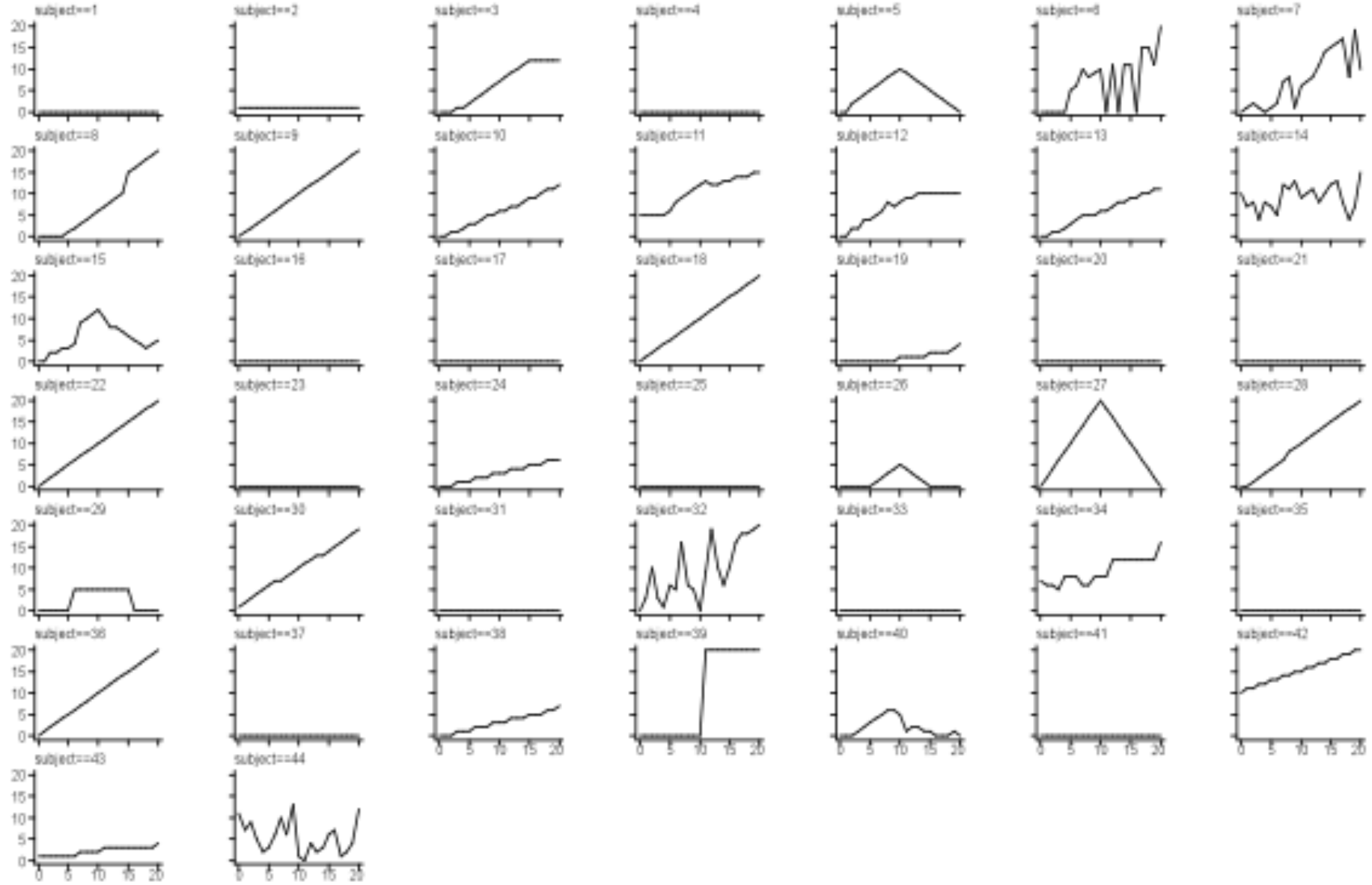
- How does contribution vary over time: contribution(t) = f (contribution(t-1)).
  - Problem: How can we disentangle the general decline of cooperation from conditional cooperation?
- Changes in contributions depend on whether the other‘s contributions were above or below the own contribution. (Keser, van Winden, 2000)
- Ask subjects for a belief about the other players‘ contribution.
  - Does the contribution depend on the belief? (Croson, 1998)
  - Problem: False consensus effect (assuming that what I do is “normal”)
- Allow the correction of the decision.
  - Kurzban & Houser (2002); Levati & Neugebauer; (2001); Güth, Levati & Stiehler (2002)
  - Problem: There is an incentive to choose higher contributions for strategic reasons.

Direct evidence of cond. coop

- Fischbacher, Gächter & Fehr (2001) Econ Lett
- One-shot game
- Subjectschoose...
  - An unconditional contribution
  - A conditional contribution, i.e., for every given average contribution of the other members they decide how much to contribute.
- At the end one player is randomly chosen. For her the contribution schedule is payment relevant, for the other three members the unconditional contributions is payment relevant.
  - A selfish player is predicted to always choose a conditional contribution of zero.
  - Note that a selfish player may have an incentive to choose a positive unconditional contribution if she believes that others are conditionally cooperative.

Average own contribution level for each average contribution level of other group members (Source: Fischbacher, Gächter & Fehr EL 2001)





Contribution other group members

Contribution schedules per subject

Results

- Unconditional cooperation is virtually absent.
- Heterogeneity:
  - Roughly half of the subjects are conditional cooperators.
  - Roughly one third is selfish.
  - A minority has a “hump-shaped” contribution schedule
- Question: Can the observed pattern of conditional cooperation explain the unraveling of cooperation?
  - Assume adaptive expectations. Subjects believe that the other group members behave in the same way as in the previous period.
  - This implies that over time the conditional cooperators contribute little although they are not selfish.
  - This result holds qualitatively for any kind of adaptive expectations.