5. Public goods experiments

- The problem of voluntary cooperation
- Motives (not) to cooperate
- Measuring conditional cooperation
- The importance of social sanctions
- A public goods game with punishment
- Emotions
- Neural correlates of punishment

Cooperation problems

- Hunting and gathering
- Common pool resources
- Environmental protection
- Teamwork
- Organizations
- Politics & Voting
- Collective Action
- Charities
- Public goods
- …

The voluntary provision of public goods

- Private markets do a very good job supplying an efficient amount of private goods (if contracts are complete and if there is competition).
- However, in general private markets do not supply an efficient amount of public goods.
- Reason: private marginal benefit $\neq$ social marginal benefit (Samuelson 1954).
- Thus: if we have to rely on private provision, there will be an inefficient undersupply of the public good. See also Olson (1965) and Hardin (1968)
- Are the prospects really that bleak?
- Tool: lab experiments

A simple workhorse for studying social dilemmas

- Groups with n members
- Each member has endowment of z "tokens"
- Each group member decides simultaneously about c_i
  - c_i investment in public good
  - private good: $(z - c_i)$
- Payoff function for each group member i:

$$\pi_i = (z - c_i) + \alpha \sum_{j=1}^{n} c_j$$

- Public good: sum of all investments c_j

Example

- $n = 4$; $z = 20$; $\alpha = 0.4$
- Prediction: $c_i = 0$, $\forall$ i , which implies an inefficient level of contribution!

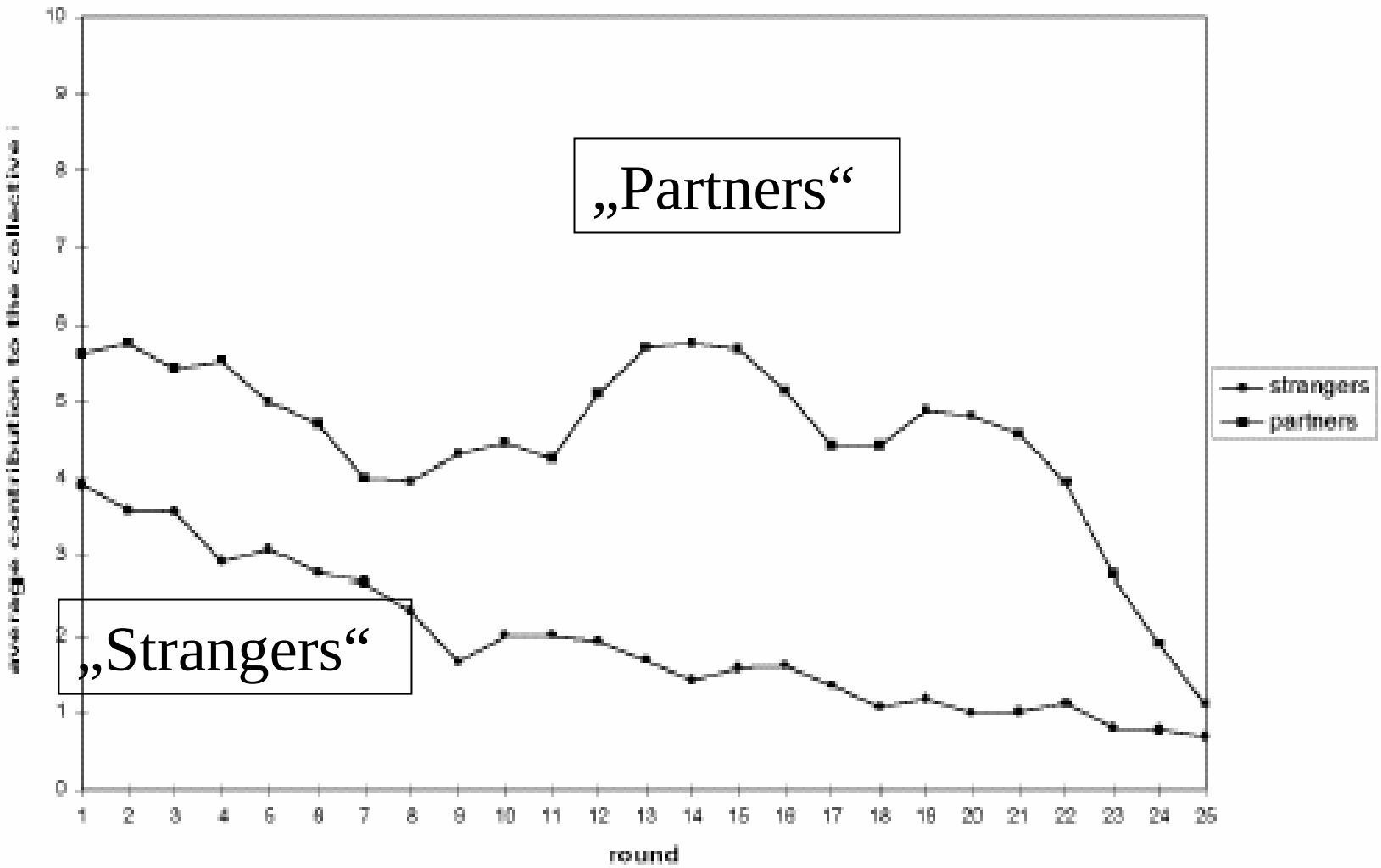
- General problem:
  - If $\alpha < 1$, individual incentive to free ride
  - If $\alpha n > 1$, free riding is inefficient

- α is often called “marginal per capita return” (MPCR)

Two first questions

- Do subjects cooperate at all?
  - Yes, but cooperation rate drops from roughly 40 to 60 percent (of full cooperation) in early periods to virtually zero in later periods
  - In final periods full defection is the most frequent choice
  - This observation has been made very often
- Do “partners” contribute more than “strangers”
  - Yes
  - But also in “Partner” setups cooperation rates drop as play reaches the final period(s)

Do partners contribute more than strangers? Keser / Van Winden SJE 2000



Comparative statics

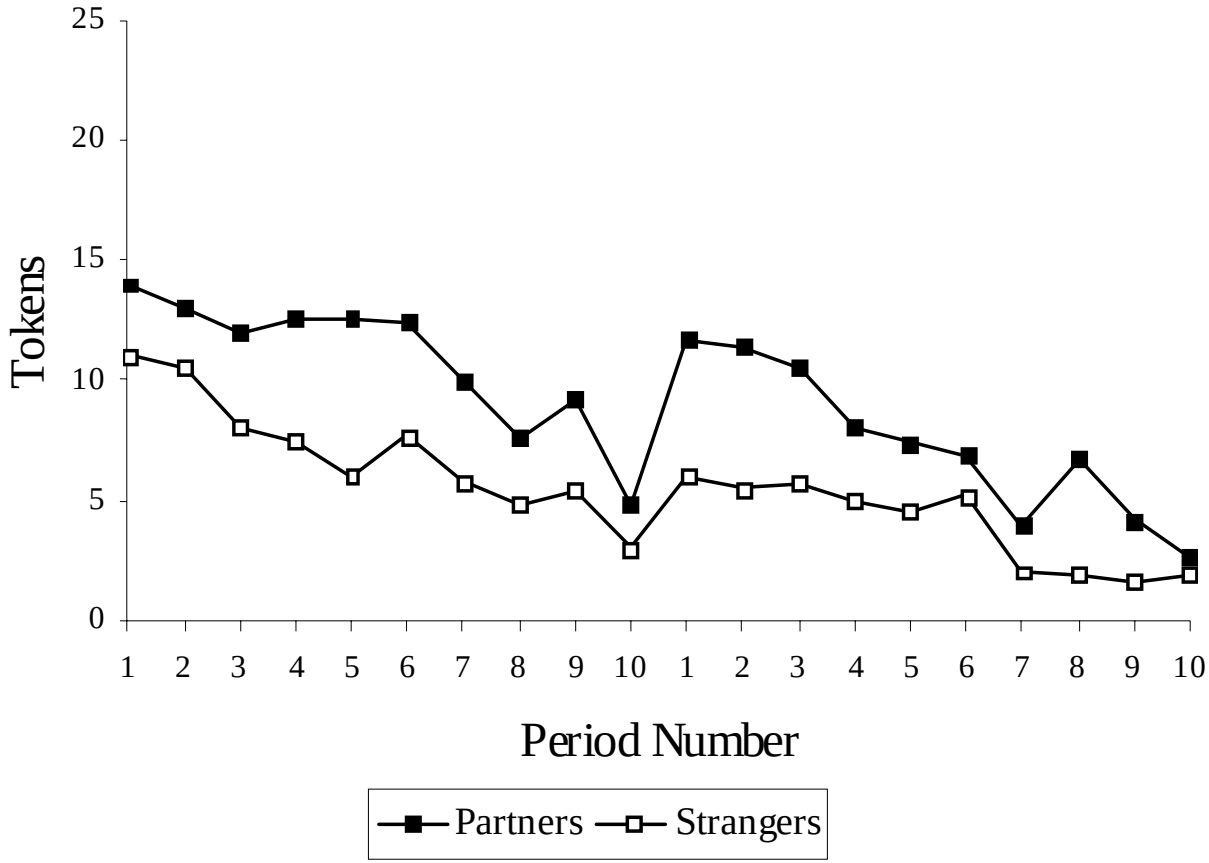
- Group size effect
- Olson (1965) hypothesis: larger groups contribute less
- Impact of marginal per capita return (Isaac, Walker and Thomas, Public Choice 1984)

	MPCR = 0.3	**MPCR = 0.75**
N = 4	19%	57%
N = 10	33%	59%

- Large groups studied in: Isaac, Walker and Williams, *JPubE* 1994.

Learning Hypothesis (Andreoni JPubE 1988)

- Contributions decline as people “learn how to play Nash”
- Test: non-announced “Restart” after 10 periods.



Do people cooperate because they make errors?

- If the Nash prediction is at zero, all errors must be above zero, i.e., they lead inevitably to “cooperation”.
- Cooperation and errors are indistinguishable.
- Test: Non-linear public good such that the Nash equilibrium is an interior solution
  - E.g. concave utility from private activity, such that contribution to public good is optimal after exhaust returns from private activity.
- True errors should unsystematically fluctuate around this prediction.

Errors (Overcontribution)
Keser (EconLetters 1996)

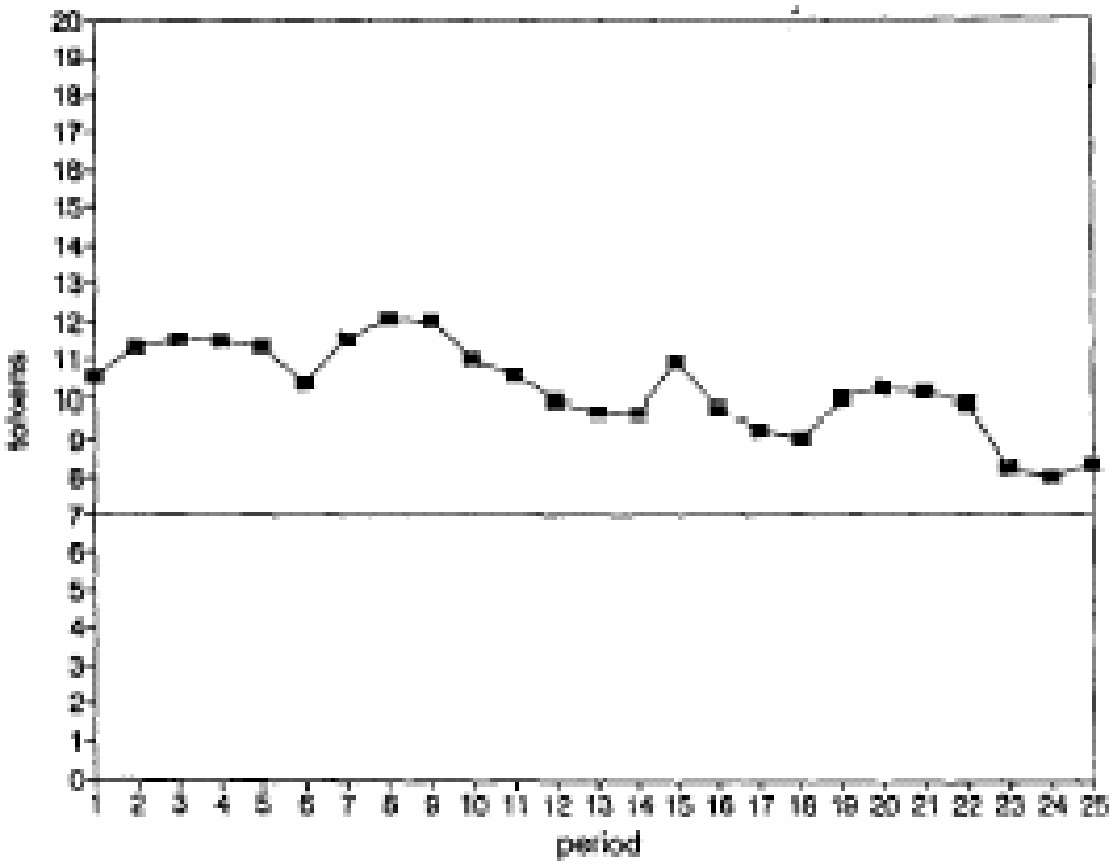


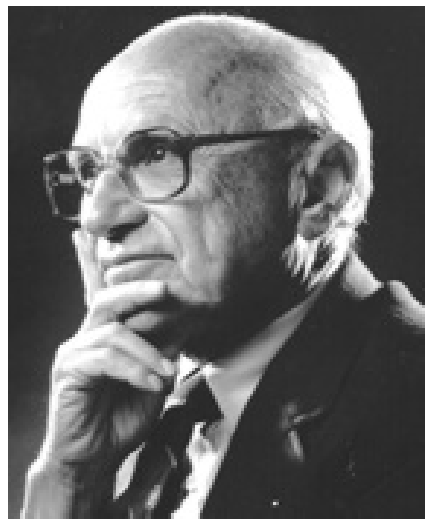
Fig. 1. Time path of the average contribution to activity B.

Conditional and unconditional cooperation

- Palfrey & Prisbrey AER 1997 argue that people cooperate unconditionally, i.e., independent of what the other group members do: “warm glow”
- This used to be the leading explanation why people cooperate
- Today it seems common sense that the true motive is conditional cooperation (reciprocity)

Conditional cooperation is intuitive

- “… we might all of us be willing to contribute to the relief of poverty, provided everyone else did. We might not be willing to contribute the same amount without such assurance.'' Milton Friedman Capitalism and Freedom, 1962, p.191)



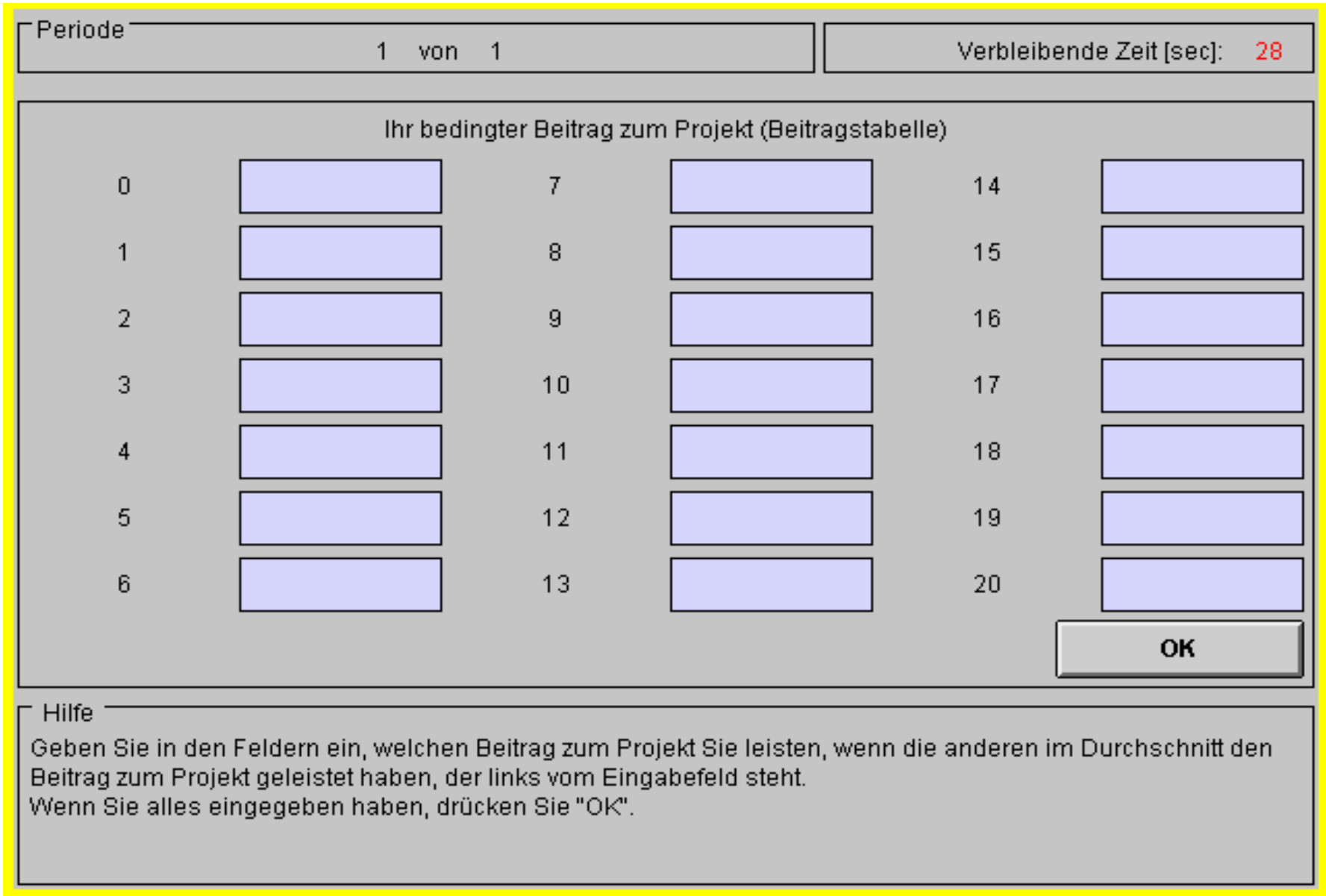
Evidence on Conditional Cooperation

- Psychology
  - Bornstein, Ben-Yossef, J Experimental Soc Psych 1994
  - Dawes, McTavish, Shaklee, J Personality & Soc Psych 1977
  - Kelley, Stahelski, J Personality & Soc Psych 1970
  - Komorita, Parks, Hulbert, J Personality & Soc Psych 1992
  - Messick, Wilke, Brewer, Kramer, Zemke, Lui, J Personality & Soc Psych 1983
  - Wit, Wilke, J Econ Psych 1992
  - Yamagishi, Sato J Personality & SocPsych 1986
- Economics
  - Keser, van Winden Scand J Economics 2000
  - Sonnemans, Schram, Offerman, EconLetters 1999

Using the strategy method to measure conditional cooperation

- This procedure was used in Fischbacher, Gächter, Fehr (Economics Letters 2001) and Falk, Fischbacher (EER 2002)
- Standard public goods situation (n = 4); played only once but with a variant of the strategy method
- Subjects have to make two decisions:
  - An unconditional contribution to the public good between 0 and 20
  - A conditional contribution to the project (conditional on the average contribution of the others – called „contribution table“)

The decision screen (contribution table)



Predictions

- Free riders always put in zero because $\alpha < 1$
- This is inefficient because $n\alpha > 1$

- Conditional cooperators' contributions increase in the average contribution of the other group members.

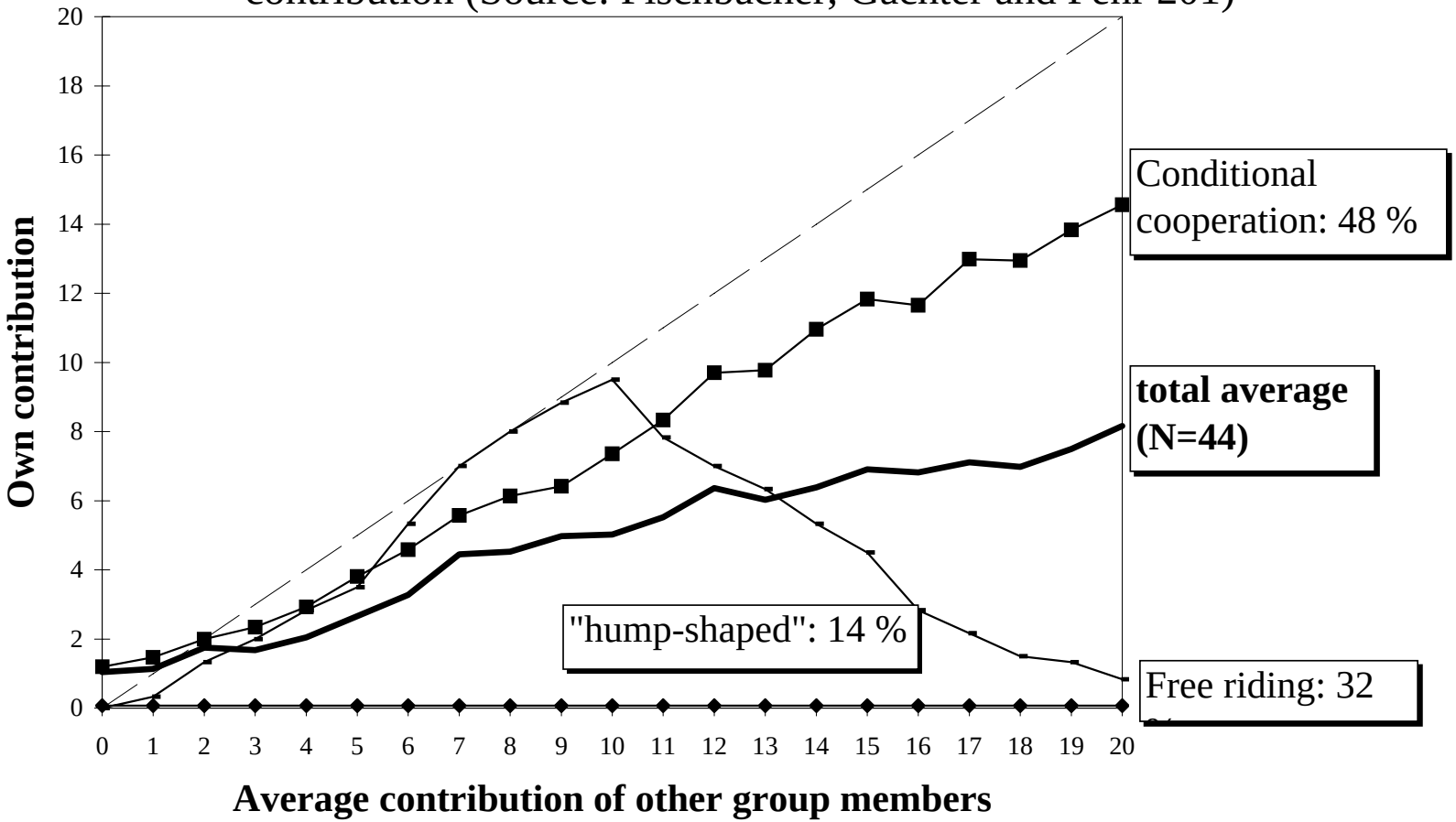
Incentives

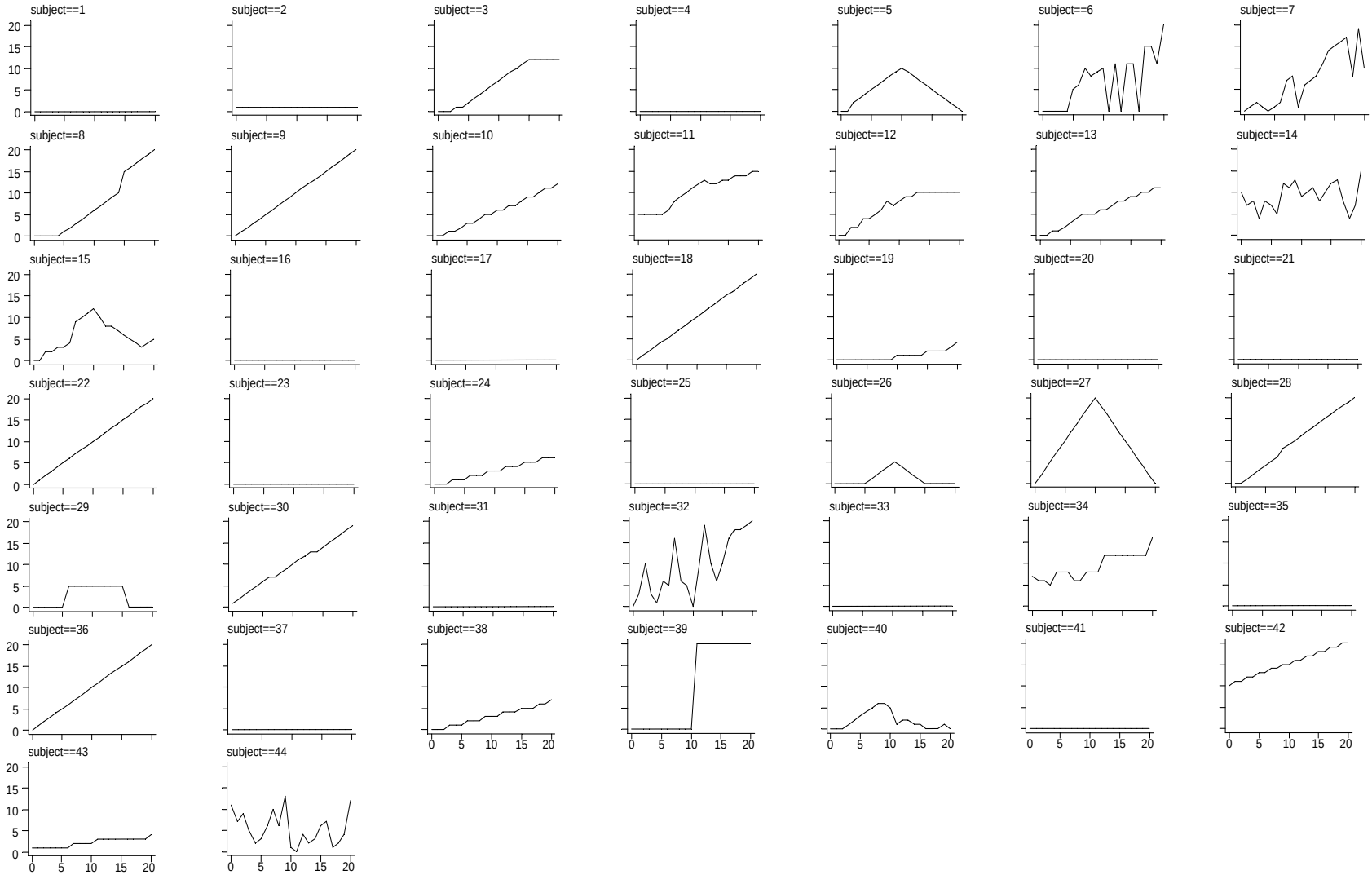
- For a randomly selected group member his/her contribution schedule is relevant for the decision; for the 3 others, their particular unconditional contribution is relevant

- You have to have this because if everybody makes a conditional choice on the others' conditional choices the play of the game is not determined

Conditional cooperation
Fischbacher, Gächter, Fehr (EconLetters 2001)

Own contribution as a function of other members' average contribution (Source: Fischbacher, Gächter and Fehr 201)





Contribution other group members

Contribution schedules per subject

Interaction of selfish and reciprocal players

- If selfish and reciprocal players interact, one would expect that eventually cooperation breaks down.
- Reciprocal players contribute conditional on what others do. Put differently: The only way to punish free riders is to withdraw contributions.

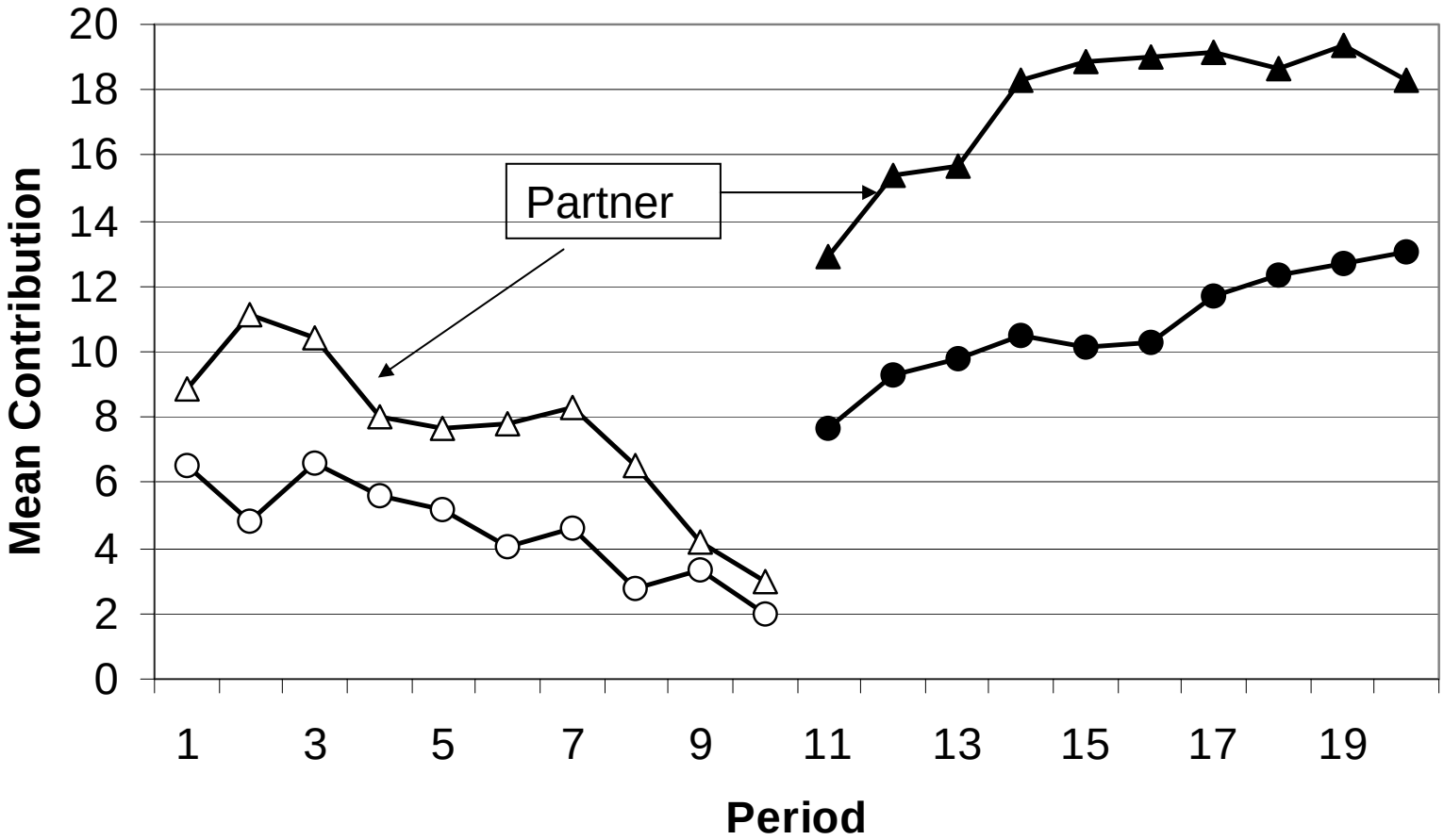
Interaction (continued)

- In a sparse environment, conditional cooperative players cannot achieve high contribution levels.
- What happens if they are given the chance to punish free-riders? (Fehr and Gächter AER 2000, Carpenter 2000, Falk et al. "Informal sanctions", WP 2001)
- Fehr/Gächter 2000: Stage 1: $\pi_i = (20 - c_i) + 0{,}4 \sum_{j=1}^{n} c_j$
- Stage 2: Players decide simultaneously whether to assign punishment points to the other players after they observed (anonymously) how much the others contributed.
- Each punishment point reduces the Stage 1-Payoff of the punished subject by ten percent. Punishment is also costly for the punisher (roughly 1:3 relation)

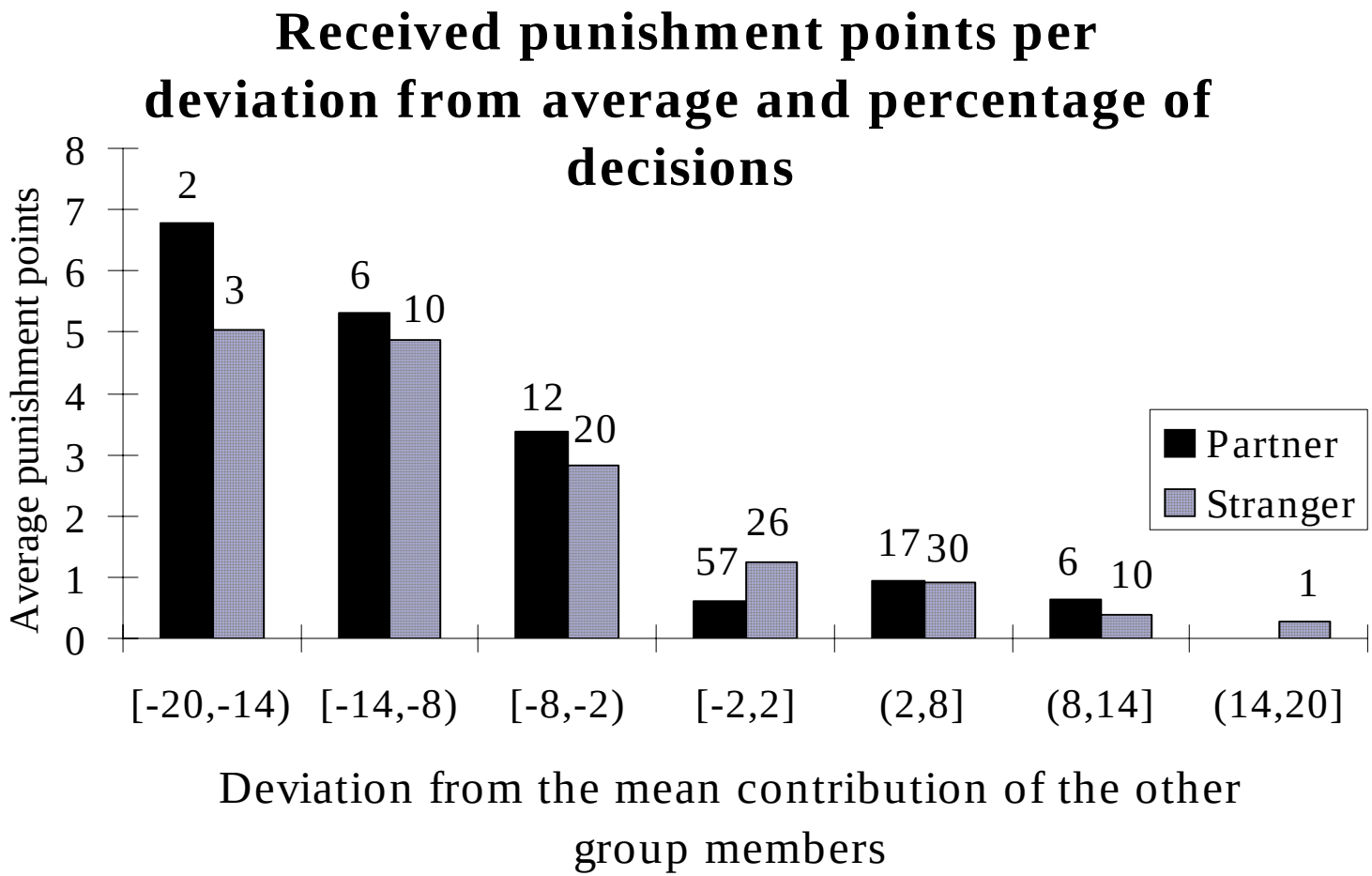
Interaction (continued)

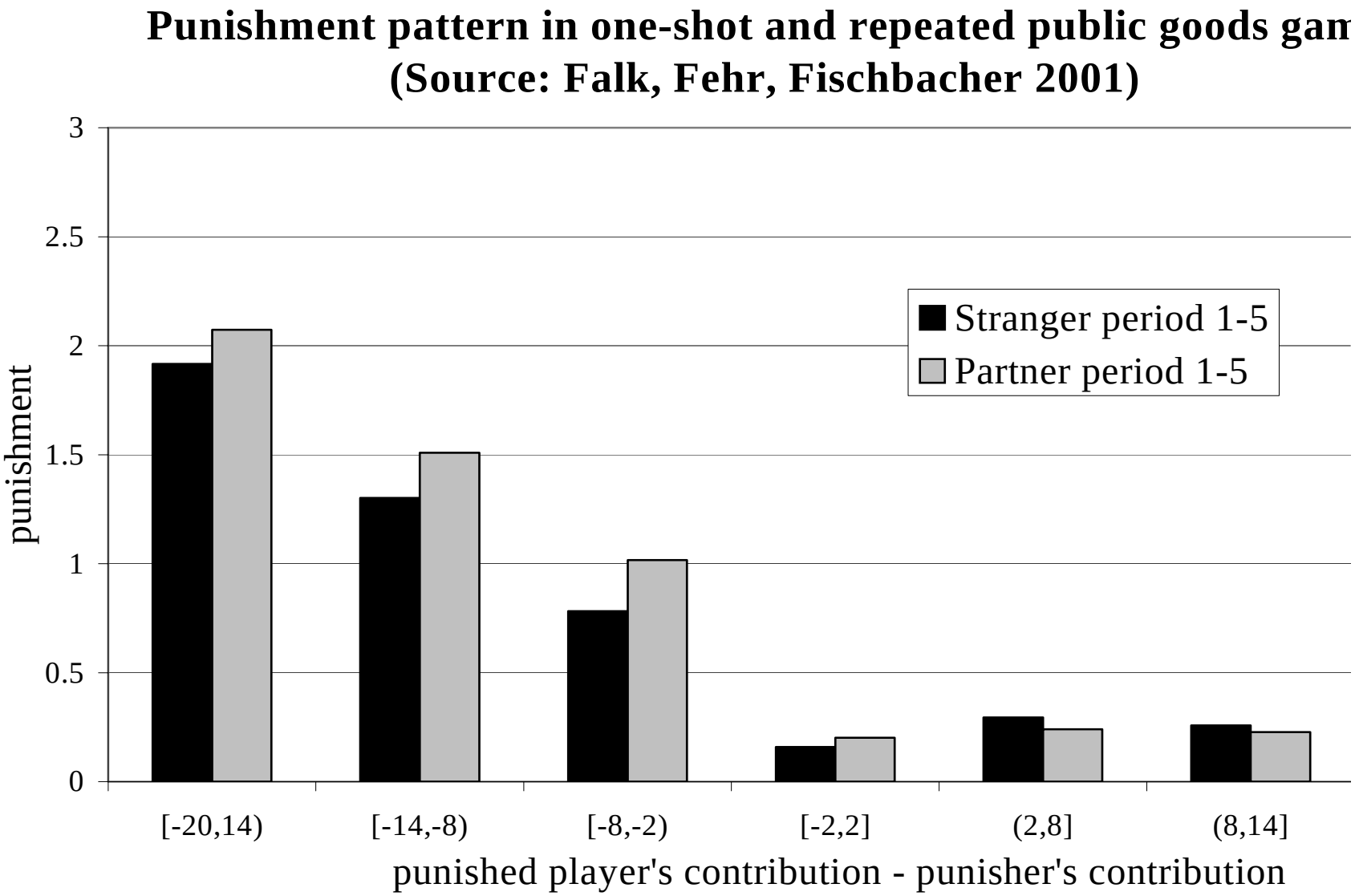
- Punishment is very frequent.
- The less a player contributes the more he is punished.
- While cooperation declines without a punishment opportunity, cooperation is stable or increases with a punishment opportunity. Reciprocal players effectively discipline free-riders.
- 82.5% of the subjects contribute the whole endowment in the final period of the Partner treatment when there is a punishment option while the majority fully defects in the final period when there is no punishment option.

Partners and Strangers - cooperation
Fehr & Gächter (AER 2000)



Partners and Strangers - punishment
Fehr & Gächter (AER 2000)




Punishment pattern in one-shot and repeated public goods gam
(Source: Falk, Fehr, Fischbacher 2001)
3
2.5
2
1.5
1
0.5
0
punishment
Stranger period 1-5
Partner period 1-5
[-20,14)
[-14,-8)
[-8,-2)
[-2,2]
(2,8]
(8,14]
punished player's contribution - punisher's contribution

Enforcement of norms

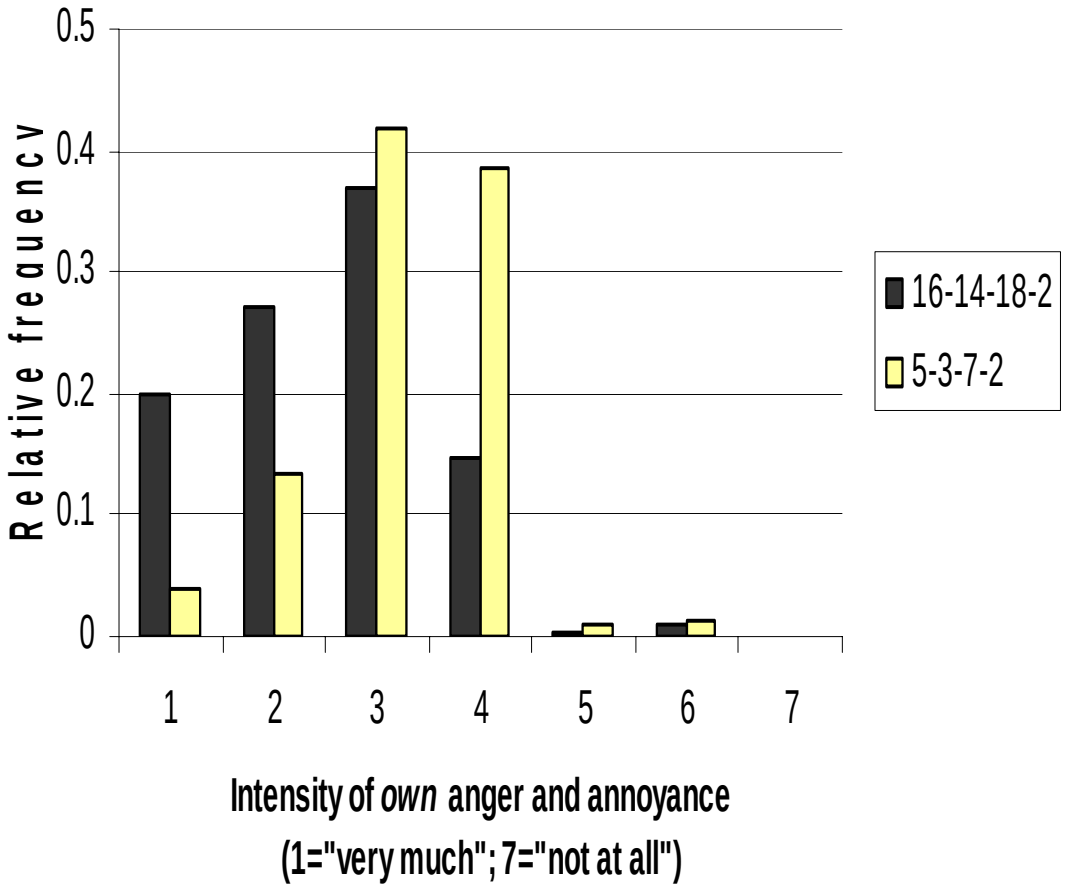
- The fact that subjects are willing to sanction free-riding behavior has important consequences for the enforcement of norms and incomplete contracts
- In some sense, these informal sanctions are part of a society's social capital
- Whether this is beneficial depends on the content of a norm
- For example
  - Team incentives work better than according to standard view (norm = work hard)
  - Tournament incentives work less well, because here cooperation means collusion and reduction of effort.
  - Less littering, less crime, less butting into line in a long queue, tougher strikes of workers, more voting etc.

Emotions

- Emotions may be a mechanism that sustains cooperation and punishment.
- Hypothesis: free riding may cause strong negative emotions among the cooperators and these emotions, in turn, may trigger their willingness to punish the free riders.
  - Elster (JEL 1998); Hirshleifer (1986); Frank (1988); Bosman & van Winden (EJ 2002).
- Difficulty: how to measure emotions?
- One possibility is vignette technique (Fehr and Gächter).
- Ask for
  - Own emotions towards free rider
  - Expected emotions of others if one free rides.

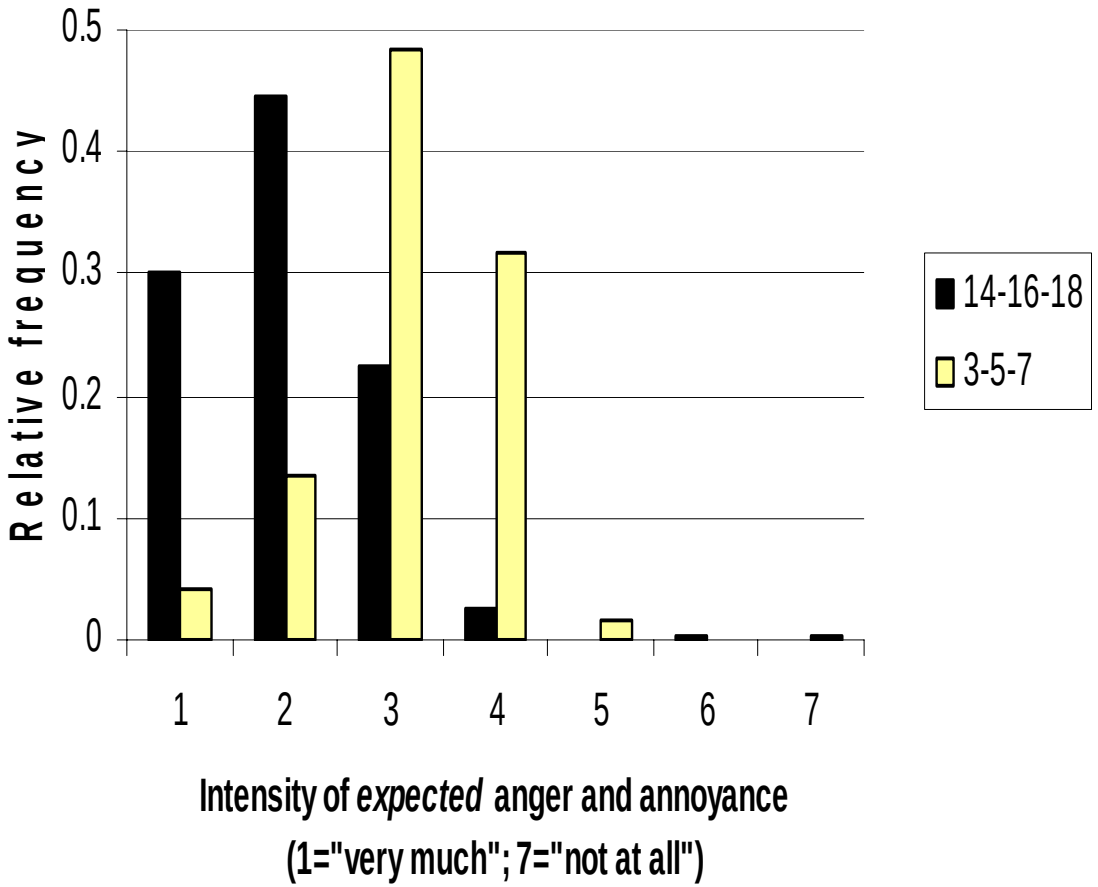
Own emotions towards a free rider

"You decide to invest 16 [5] francs to the project. The second group member invests 14 [3] and the third 18 [7] francs. Suppose the fourth member invests 2 francs to the project. You now accidentally meet this member. Please indicate your feeling towards this person".



Expected emotions in case of free riding

"Imagine that the other three group members invest 14, 16 and 18 [3, 5 and 7] francs to the project. You invest 2 francs to the projects and the others know this. You now accidentally meet one of the other members. Please indicate the feelings you expect from this member towards you".



Neural Basis of Altruistic Punishment
or
The Swee Taste of Revenge
(Quervain et al. , 2004)

- Why do people punish norm violators, even when it is costly for themselves?
- Crucial for understanding the basis of human cooperation (see public goods evidence above).

Design

- 2 players, each endowed with 10 MU's.
- A-player moves first, can keep the points or transfer all 10.
- Transferred points are quadrupled (A:0; B:50).
- B-player can send back nothing, or half (25 points).
- After B-player's decision, enter punishment stage
  - Both receive an additional 20 points
  - A-player informed about B's decision
  - A-player can choose whether to punish or not.
  - Maximum can deduct is 20 points
  - Spending 1 point deducts 2 points from B

Treatments

- T1: B has a choice, punishment is costly.
- T2: B has a choice, punishment is free.
- T3: B has a choice, punishment symbolic.
- T4: B has no choice, punishment is costly.

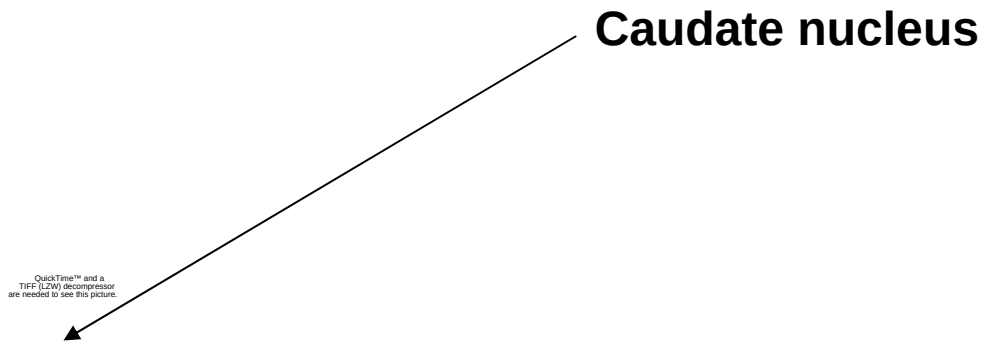
- Each A-player experiences all 4 treatments, in random order.
- A-player is informed about which treatment prevails, before learning outcome from B-player stage.
- B-players did not know for sure which treatment would prevail when made choice (A-player knows that B-player did not know).

Brain Stuff

- A-players are given 1 minute to deliberate about their punishment decision, after informed about B-player's choice.

- Brains are scanned during this one minute using Positron Emission Tomography (PET).
  - Subjects are instructed to "think intensely" about their decision.

Results


Caudate nucleus
QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.

Results

- Punishment is associated with activation of brain area related to reward processing.
  - Head of caudate nucleus.

- Stronger when B-player's choice was intentional, and when punishment is not just symbolic.

- Strength of activation predicts the amount of punishment an individual imposes.

Interpretation

- People punish norm violators because doing so is pleasurable/ provides relief.

- This reinforcing aspect of punishment may be crucial for explaining unprecedented ability of humans to sustain cooperation.

Raising the veil of anonymity

- Most experiments we have talked about so far have involved subjects interacting anonymously.

- This helps minimize uncontrolled incentives that might exist, if subjects can anticipate interacting outside of the lab, after the experiment.
  - Uncontrolled, these incentives could cause subjects to avoid behaviors that make others mad.
  - Avoid embarrassing behaviors.
  - Etc.

Raising the veil of anonymity

- This is an advantage, if the goal is to study behavior in the absence of these incentives.
  - For identifying non-selfish behavior, eliminating selfish repeated-game incentives is crucial.
  - Outside of the lab, difficult to observe interactions in conditions of anonymity.

- If the goal is to study how people behave when anonymity is partially or totally removed, this is not appropriate.

- Relaxing anonymity can be done in a controlled way
  - Allow only certain types of information to be known.
    - E.g., gender, or race.
    - Still minimal chance of post-experiment incentives.
    - Isolate the effects of different types of information.

Social Groups and Cooperation

- One potentially important determinant of willingness to cooperate is group boundary.

Discrimination in a Segmented Society
(Fershtman and Gneezy, 2001)

- For willingness to cooperate, one potentially relevant individual characteristic is ethnicity.

Questions addressed by FG (2001):

- Is there differential treatment based on ethnic affiliation?
- Does the discrimination reflect group bias, or is one group systematically discriminated against?
- Does behavior reflect a taste for discrimination, or strategic response to stereotypes about behavior of ethnic group?
- Are ethnic stereotypes accurate?

Experiment 1: Trust Game

- 2 player sequential game, P1 and P2.
- P1 endowed with 20, P2 with 0.
- P1 can give P2 up to 20 (investment).
- Each invested point is tripled.
- P2 is informed about the investment, and can give points back to P1 (but does not have to)
- Standard prediction:
    - P2 gives nothing back to P1 (independent of investment)
    - Therefore P1 invests nothing

Experiment 1: Trust Game

- Treatment 1: Same ethnicity
- Treatment 2: Different ethnicity
- Treatments implemented by showing **name** of other player on decision sheet.
  - Ethnicity identifiable based on name.
- Subjects were Israeli college students.
- P1 and P2 players from different colleges.
- Two main ethnicities: Western or Eastern Jews.
- Procedure:
  - Roughly equal number of male and female students asked to participate as P1.
  - Chosen to have balance of East/West names.
  - Name of P2 indicated on decision sheet.

Experiment 1: Trust Game

- Procedure continued..
  - After P1 players made choices, students at other colleges approached in class, asked to participate as P2.
  - See name of P1 on sheet.
  - P2 players decided how much to return, paid confidentially in cash.

Results of Trust Game

- Significantly lower transfers sent to individuals with Eastern ethnic names (males only).
  - 17.16 on average to Western
  - 5.12 on average to Eastern
- Not group bias, but rather systematic discrimination against Eastern Jews.
  - Both Western and Eastern Jews are less trusting of Eastern Jews.
- No evidence that women discriminate against Eastern Jews! Only a male phenomenon.

Results from Trust Game

- Eastern Jews are not less trustworthy!
  - Back-transfers are the same as for Western, conditional on size of P1's transfer.

- What is going on?
  - Taste for discrimination: people simply dislike helping Eastern Jews.
  - Unfounded stereotype: people believe (incorrectly) that Easterners less trustworthy.

Experiment 2: Modified Dictator Game

- 2 player sequential game, P1 and P2.
- P1 endowed with 20, P2 with 0.
- P1 can transfer up to 20 (investment).
- **Each invested point is tripled.**
- P2 is informed about the investment, but can do nothing
- Standard prediction:
    - P1 gives nothing to P2.

- Treatment: Again, name of other player is known, indicates Eastern or Western origin.

Results: Modified Dictator Game

- Distributions of transfers very similar, regardless of ethnicity of P2.
  - Slight evidence of taste for discrimination, but not enough to explain trust game results.

- Conclusions:
  - Experiments help establish existence of unfounded ethnic stereotype.

Writing an Experimental Economics Paper

- Introduction
  - What is the research question and why is it important or interesting?
  - Previous evidence on this question
    - Briefly discuss one or two key papers on this topic. Some discussion of previous literature is mandatory for acceptable paper.
  - How is your experiment different?
    - Explain why your experiment helps add to knowledge, relative to previous evidence.
      - If previous evidence from field, why experiment?
  - Briefly summarize your results, in two or three sentences.

Writing an Experimental Economics Paper

- Experimental Design
  - Describe the game or choice situation used in the experiment.
  - Describe the procedure, I.e., details of how the experiment was conducted
    - Payment method
    - Location: Mensa?
    - How were instructions give: verbally or written.
    - Etc.
  - Describe the subject pool

Writing an Experimental Economics Paper

- Results
  - Descriptive statistics:
    - Reporting averages of relevant variables, or show distributions.
    - Reader should get the feeling that they know what the data looks like.
  - Analysis
    - Compare key variable (s) across treatments, perform statistical tests.
    - Reject or accept null hypothesis, which answers research question.

Writing an Experimental Economics Paper

- Conclusion
  - What has been learned from the experiment?
  - What are possible directions for future research?

Remember: 8 page limit, including tables and figures. If there is an appendix, this will count too.

Due on the last day of lecture, July 12th.

Impact of Group Membership on Cooperation and Norm Enforcement

(Goette, Huffman, and Meier, 2006)

- Fact 1: Success of an organization depends partly on individuals' non-selfish motives
  - Putting in extra effort, and cooperating, even when this does not affect compensation.
  - Sanctioning inefficient behavior of other workers, even though costly to do so.
- Fact 2: An organization constitutes a social boundary, or group (there are also groups within organizations, e.g., project teams).
  - Group boundaries affect the circle of people with whom an individual interacts on a daily basis.

- Hypothesis 1: The social, or group aspect of organizations has an important benefit
  - Fosters willingness to behave non-selfishly toward own group members.
  - Can lead to efficient behavior even when normal financial incentives are ineffective.

- Hypothesis 2: Group membership has a dark side.
  - Leads to hostility towards outsiders.

The Impact of Group Membership on Cooperation and Norm Enforcement

Evidence from Random Assignment to Real Social Groups

Lorenz Goette
(University of Zurich, and CEPR)

David Huffman
(IZA, Bonn)

Stephan Meier
(Federal Reserve of Boston)

Motivation

- Success of an organization depends on individuals working efficiently with each other.
- But in many cases, efficient actions only occur if workers have non-selfish, pro-social motives.
  - E.g. information sharing when it is impossible to tell if one is withholding something.
  - Providing effort when it will not be rewarded.
  - Sanctioning uncooperative behavior by others, even if punishment is costly.
  - Repeated interaction can lead to cooperation in the absence of non-selfish motives, but this is not the focus here.

Motivation

- In organizations, people typically work in groups.
  - E.g. different divisions in a company, or different teams on a project.

- This affects the circle of individuals with whom an individual interacts on a daily basis.
  - May lead to the formation of social ties, e.g., socializing with group members after work.

Research Questions

1. Does group membership foster non-selfish cooperation between group members?
   - In economics, the unit of analysis for understanding organizations is typically the individual.
   - Our hypothesis is in line with an alternative paradigm:
     - Social identity theory in psychology (see Haslam, 2001).
     - Work on economics of identity (Akerlof and Kranton, 2002).
     - Literature on social capital (see Durlauf, 2004).
   - In this paradigm, group membership transforms individuals:
     - Leads to roles, norms, and values that foster cooperation and pro-social behavior.

Research Questions

2. Does group membership have a dark side?
   - Another longstanding hypothesis from sociology and psychology: strong group ties may have a cost.
   - Lead to reduced cooperation, or even outright hostility, towards outsiders (Hewstone et al., 2004; Durlauf, 1999).

- The main methodological contribution of this paper:
  - An experimental design that avoids important confounds in the previous evidence on these hypotheses.

Previous Literature 1

- Studies using existing social groups.
  - Finding 1: cooperation/trust is higher within groups.
    - E.g. religious groups (Fershtman and Gneezy, 2000), residents of different city districts (Falk and Zehnder, 2005), and many others…
  - Finding 2: Hostility between groups exists.
    - College fraternity members (Kollock, 1998), and clans in Papua New Guinea (Bernhard and Fehr, 2005), spend points to reduce the payoff of outsiders.

➢ Problem with identifying effect of group membership *per se:*

- Groups differ strongly in terms of, e.g., ethnic or religious composition, and are typically formed endogenously.

Previous Literature 2

- Laboratory experiments in Social Psychology.
  - Randomly assign individuals to a "minimal group"
    - Tajfel and Turner (1979) and others.
  - Finding 1: small but significant increase in cooperation within groups.
  - Finding 2: no evidence of hostility.

➢ How would results change if groups had social content, i.e., real social interactions? Would there be hostility?

Previous Literature 3

- Classic “Robbers Cave” experiment (Sherif et al., 1961)
  - At summer camp in Robber’s Cave State Park, boys randomly assigned to one of two groups.
  - Groups participated in camp activities separately for the first stage of the camp
  - Finding 1: hostility in the form of name calling and pranks, when groups brought together for competitive games.

  - How would results change If repeated game incentives were not in effect, i.e., in an anonymous, one-shot game?

A (Battle-) Field Experiment

- We conduct an experiment in which individuals are randomly assigned to real social groups of 20 to 30 people.
- This assignment occurs within an organization, the Swiss army, as part of 4-week officer training program.
- While training, individuals work exclusively with their group.
- No institutionalized competition between groups.

- 3 weeks after the beginning of training, we conducted choice experiments: one-shot simultaneous PDs, with and without 3rd-party punishment.

Main Findings

1. Greater cooperation within groups, as measured in a one-shot PD game.
   - After only 3 weeks, in anonymous one-shot interaction.
   - Consistent with in-group favoritism, but also hostility.
2. In PD with 3rd-party punishers, no evidence of between-group hostility in the form of harsher punishment of out-group.
3. Group membership does have an impact on norm enforcement:
   - Individuals punish defection more harshly if the victim of defection is from their own group.

Outline

- Motivation.
- Officer training
- Experimental design.
- Results.
- Conclusion.

Officer Training in the Swiss Army

- Basic Training Program
  - 7 weeks, separate for each branch of service (infantry, artillery, etc.)
  - Promotion to Private, First Class. Option to become officer candidate.

- Candidates Training Program
  - 10 weeks, separate for each branch of service
  - About 1/4 are selected for promotion to Corporal

- Joint Officers Training Program
  - 4 weeks, all branches of service brought together for the first time.
  - Promotion to Lance Corporal at the end of of JOTP

- Advanced Officer Training
  - 15 weeks, separate locations again, by branch of service
  - Promotion to Lieutenant at the end of AOT

The JOTP

- At the beginning, the army administration randomly groups officers into platoons of 20 - 30.
  - Stratified randomization by branch of service, to encourage contact and exchange of viewpoints.
  - During the day, participants spend all of their time with their platoon.
  - Training involves leadership exercises, logistics training, and coursework, e.g. in foreign policy.
  - No institutionalized competition between platoons; all evaluations occurred previously, in candidate training.

The Joint Officers Training Program

TABLE 1—TEST OF RANDOMIZATION

	Branches of Service				Education			Age
	Infantry	Mechanised Infantry	Rescue Units	Other	Apprenticeship	High School	Other	
Mean	23.3%	12.8%	18.0%	45.8%	31.4%	55.6%	12.8%	21.58
s.d. across platoons	5.5%	6.2%	7.6%	10.6%	11.8%	9.7%	11.1%	0.53
p-value	0.93	0.6	0.52	0.41	0.36	0.41	0.073	0.41

Experimental Procedure

- A total of 208 subjects (11 platoons) took part.
- Conducted with pencil and paper, in a large auditorium.
- 4 sessions.
- Each session began with the experimenter saying “good afternoon”, and all of the subjects yelling “good afternoon, sir!” in response.
- 2 experiments, and a short questionnaire.

- Exchange rate: 4 points = 1 CHF = $0.78.
- Payments sent by mail to home address after JOTP was over.

The Subjects

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Manipulation Check: Social Ties

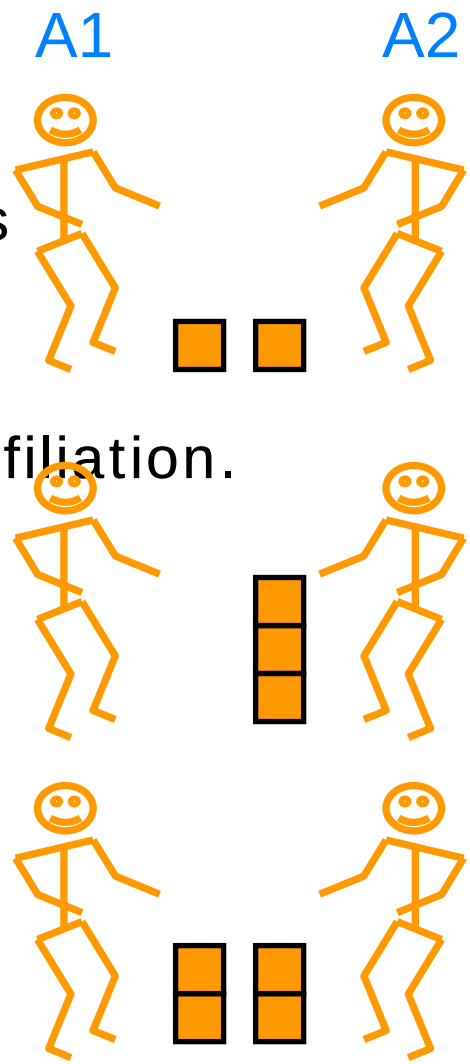
TABLE 2: OFF-DUTY TIME SPENT WITH MEMBERS OF DIFFERENT PLATOONS (# OF TIMES PER WEEK)

	Own platoon	Other platoon
Mean	2.24	0.6
Fraction with zero times per week	7%	53%
Fraction with more than one time per week	47%	7%

Notes: Number of observations = 216. The two distributions are significantly different according to a Wilcoxon Signed-Rank test ($p < 0.001$).

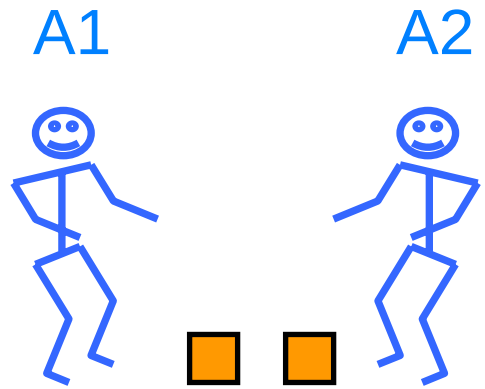
Choice Experiment 1: Simultaneous PD

- Subjects play the role of A1 or A2.
  - Both subjects start with 20 points.
  - Simultaneous decision: keep or pass points.
  - Passed points are doubled.
  - Anonymous, except know platoon affiliation.
- If A1 passes on and A2 does not:
  - A1 gets nothing, A2 gets 60.
  - A total of 60 points are earned.
- If both A1 and A2 pass on their points:
  - Both subjects get 40 points.
  - A total of 80 points are earned.

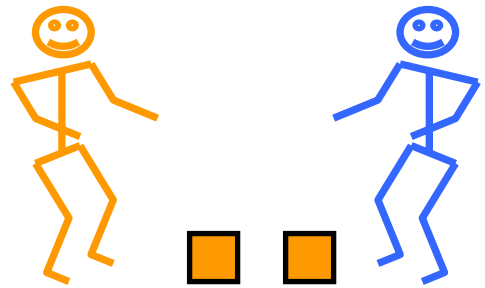


Two Treatments in Experiment 1

- Within-group treatment
  - Both players from the same platoon.



- Between-group treatment.
  - Players from different platoons.

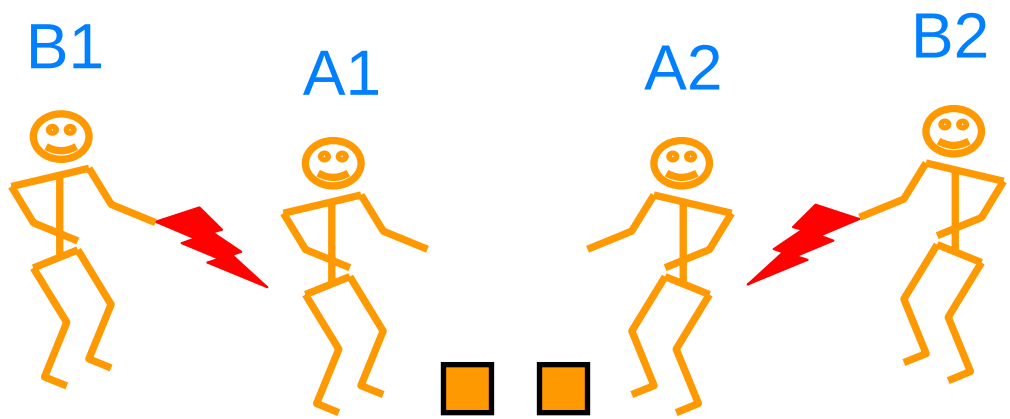


Group Assignment and Cooperation

TABLE 3 COOPERATION AND BELIEFS IN IN-GROUP AND OUT-GROUP TREATMENT		
	Fraction willing to cooperate	Average expected cooperation rate
In-group treatment	69.4 %	56.8 %
Out-group treatment	50.0 %	40.5 %
Test of difference	Fisher's exact test $p < 0.05$	t-test: $p < 0.001$

Experiment 2: Adds 3rd-Party Punishment

- Subjects from experiment 1 are re-matched into new pairs, to once again play the role of an A1 or A2.
- New subjects are added, to play the roles B1 and B2.
- Players B1 and B2 each receive an endowment of 70 points.
  - Keep all 70, or spend points to deduct points from associated A-player.
  - Each point spent deducts 3 points from the A-player (max. of 10).
  - The B-players choose deduction amounts for each possible combination of actions by the A-players (strategy method).



Treatments in Experiment 2

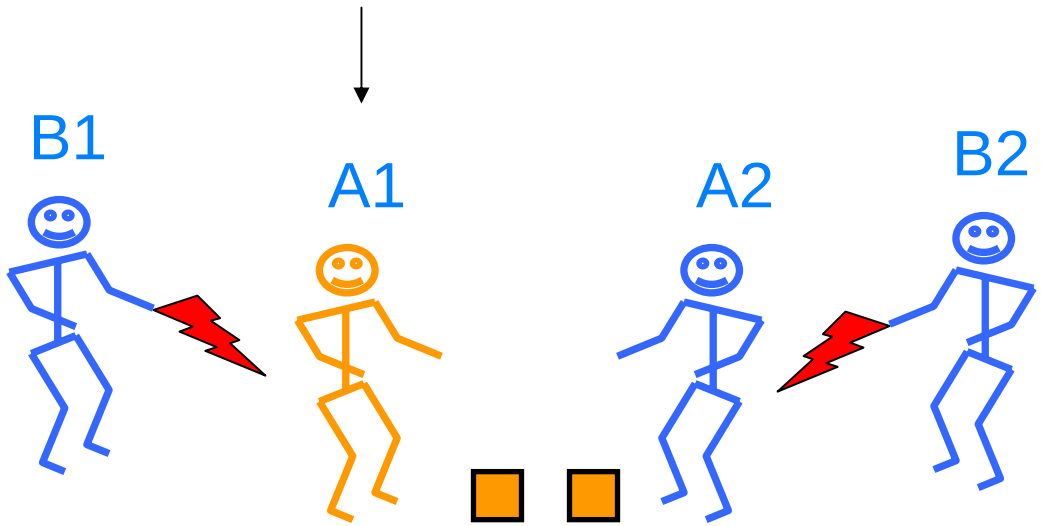
- We display results for the punishment decisions of B1, conditional on the actions of A1 and A2.

- We implemented four different combinations of group affiliations for A1, A2, B1, and B2.
  - There are 8 possible combinations, but we chose not to study the impact of B2's affiliation on B1's decisions.

Group Composition and Punishment

- We consider two types of motives for punishment, arising from different group compositions.
  - One has to do with the group identity of A1, the person being punished.
  - The other has to do with the group identity of A2.

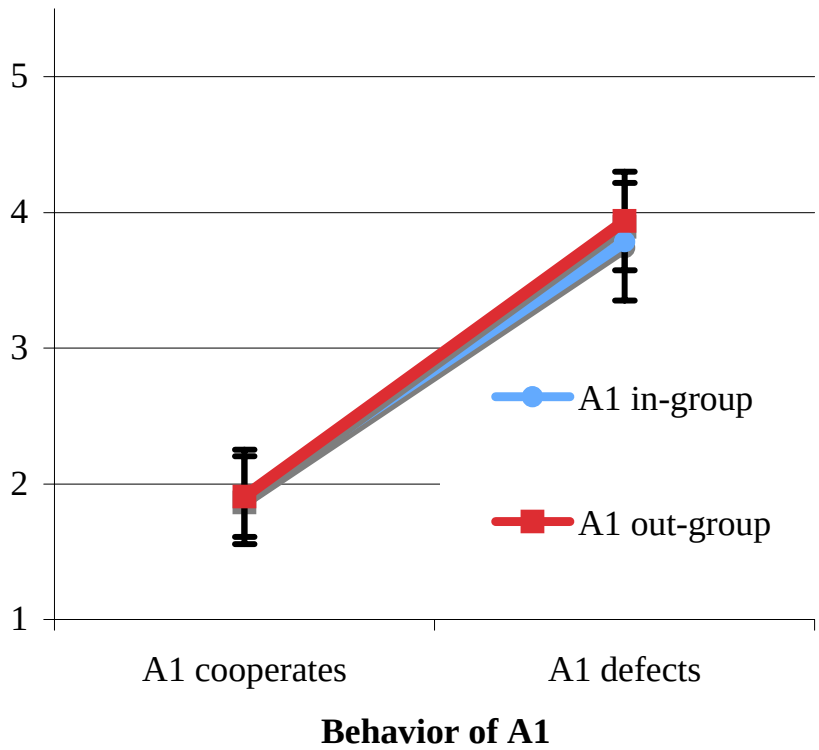
1. **Hostility:** B1 punishes A1 more if A1 is from the out-group.



No Evidence of Hostility Between Groups

- B-players do not punish out-group members more harshly.

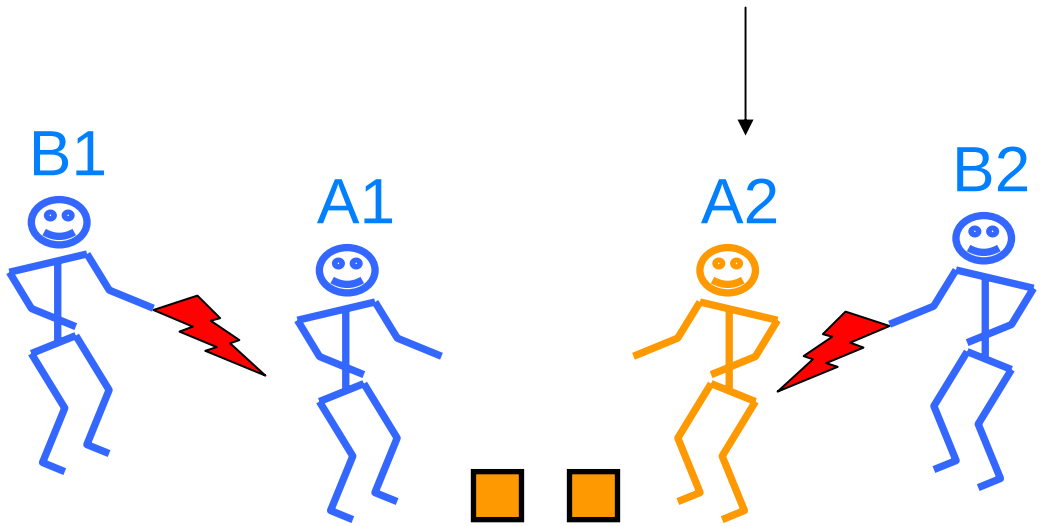
Figure 1: Norm Enforcement and the Identity of A1



Group Composition and Punishment

- We consider two types of motives for punishment, arising from different group compositions.
  - One has to do with the group identity of A1, the person being punished.
  - The other has to do with the group identity of A2.

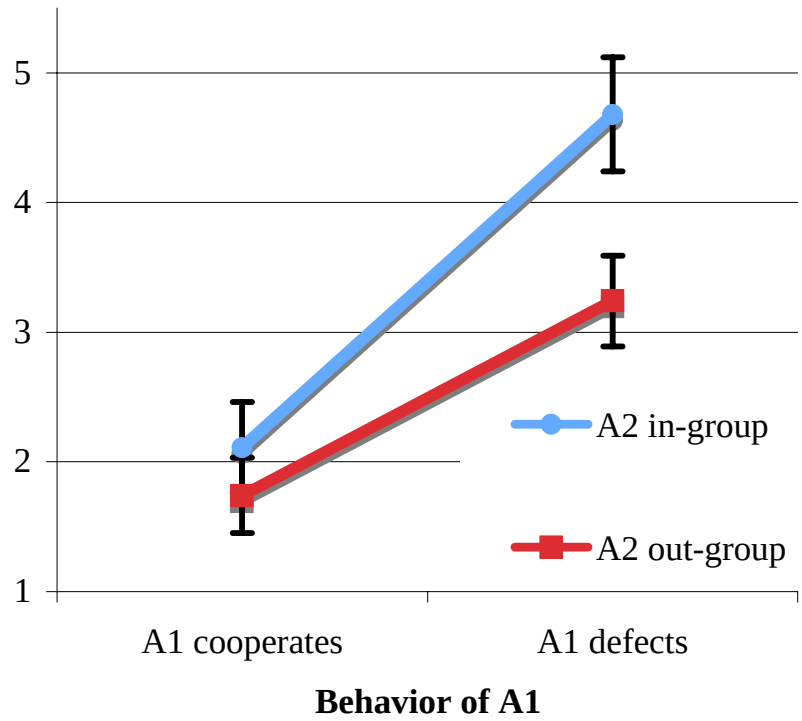
2. Retaliation: B1 punishes A1 more if A2 is from the in-group.



Evidence of Retaliation

- B player punishes more harshly when someone defects on the in-group.

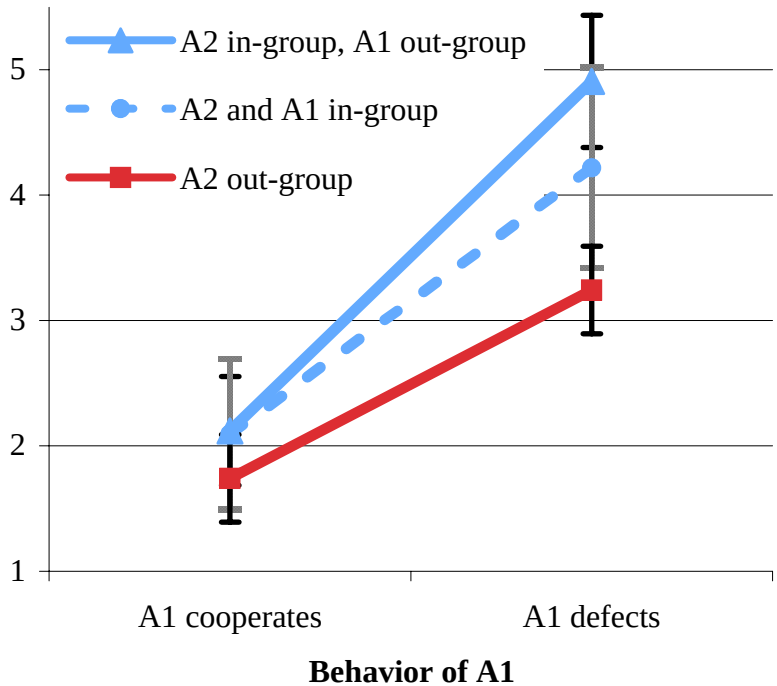
Figure 2: Norm Enforcement and the Identity of A2



Interaction Effect?

- B-players are slightly more sensitive to identity of A2 when A1 is from the out-group (not significant).

Figure 3: Norm Enforcement and the Identity of A2



Regressions (corroborating graphical results)

TABLE 4—DEDUCTION POINTS VARYING THE IDENTITY OF A1 AND A2

Variable	Column 1	Column 2	Column 3	Column 4
A1 from platoon of B1 (=1)	0.077	0.055	0.622	0.113
	(0.624)	(0.487)	(0.830)	(0.604)
A2 from platoon of B1 (=1)	1.44**	0.372	1.97**	0.427
	(0.610)	(0.505)	(0.782)	(0.678)
A1 *and* A2 from platoon of B1 (=1)			-1.33	-0.14
			(1.440)	(1.050)
Constant	3.28***	1.77***	3.56***	1.8***
	(0.566)	(0.371)	(0.626)	(0.394)
R squared	0.136	0.0261	0.142	0.0262
N	221	222	221	222

Notes: Dependent variable: deduction points. Coefficients of OLS-regression. Robust standard errors adjusted for clustering on individuals in parentheses. Treatment effects are absorbed. Columns 1 and 3 show the cases where A1 defects, and columns 2 and 4 show the cases where A1 cooperates.

Level of significance: ** $0.01 < p < 0.05$, *** $p < 0.01$

Conclusions

- Our results show:
  - The Swiss Army is an awesome fighting machine.
  - Random assignment to a social group leads quickly to formation of social ties.
  - Also leads to greater cooperation within a group.
    - After only 3 weeks, in an anonymous, one-shot game, and even though the group will dissolve in 1 more week.
  - Group assignment does not lead to hostility, i.e. higher punishment of the out-group across the board.
  - Group assignment does affect norm enforcement: greater willingness to enforce a norm of cooperation towards one's own group.