Experiments in Economics: The Role of Social Norms and Preferences

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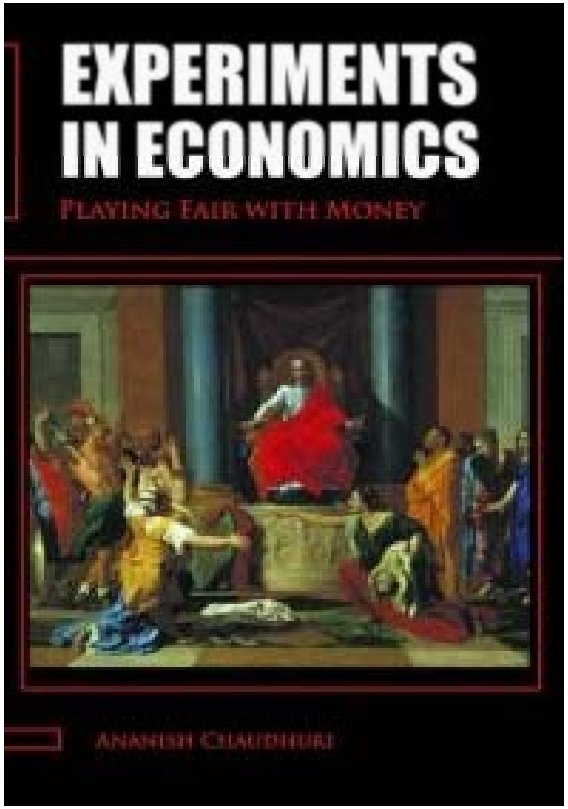
My recent book on the role of social norms in economic interactions



- *Experiments in Economics: Playing Fair with Money*
- *published by Routledge (London and New York), January 2009*

One major output from this line of work

- Provides an easy to follow guide – suitable for a general audience - to economic experiments, specifically those that explore notions of fairness, altruism and trust in economic transactions

- how these findings can influence the way we approach economic problems such as pricing by firms, writing contracts between parties, making voluntary contributions to charity or the provision of micro-credit to small entrepreneurs.

The traditional view in economics

- One possible way of figuring out economic laws ... is by controlled experiments. ... **Economists (unfortunately)... cannot perform the controlled experiments** of chemists or biologists because they cannot easily control other important factors. Like astronomers or meteorologists, they generally must be content largely to observe." (*Samuelson and Nordhaus, 1985, p. 8*)

Experiments in Economics: A Brief History

- In some ways it is precisely this view of economics that is being challenged
- It was not until the last two decades of the 20th century that experimental economics really became a part of the mainstream.
- Prior to that economics was viewed as an essentially non-experimental discipline. This was in sharp contrast to a long and firmly established tradition of experiments in psychology.

Nobel Prize in Economics, 2002 went to Daniel Kahneman and Vernon Smith

Kahnemann

Smith

Nobel Prize in Economics, 2002

- **The Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel 2002**

- **Vernon Smith**: “for the use of laboratory experiments as a tool in empirical economic analysis, in particular, for the study of different market mechanisms”. “**Founder” of experimental economics**.

- **Daniel Kahneman**: “for the introduction of insights from psychological research into economics, in particular with regard to judgements and decisions under uncertainty”. Kahneman’s research is based on psychological experiments and questionnaires. “**Founder” of behavioral economics**.

Experimental versus Behavioural

- Experimental economics is firmly rooted in economic theory and in some ways extends economic theory by importing insights from other disciplines
  - Attempts to test theoretical predictions or compare institutions such as auction formats
    - Camerer, Colin (2003), *Behavioral game theory*, Princeton University Press
    - Chaudhuri, Ananish (2008), *Experiments in Economics*, Routledge

- Behavioral economics, on the other hand, has a pronounced psychological bias; starting with an emphasis on bounded rationality, systematic errors in judgment, cognitive limitations etc.
    - Ariely, Dan (2007), *Predictably Irrational*, HarperCollins

Advantages of (Lab) Experiments – Enhanced Control

- Subjects are randomly assigned to the treatment conditions – rules out selection bias.
- It is known which variables are exogenous and which are endogenous – allowing for causal inferences.
- Experimenter can make *ceteris paribus* changes in the exogenous variables – allows for the isolation of true causes.
- Many variables that cannot be directly observed in the field can be observed in the lab.
  - Especially true when testing game theoretic models

Advantages of (Lab) Experiments – Enhanced Control

- Information conditions and exogenous stochastic processes can be controlled.
  - Important for the testing of models with asymmetric information.

- Better direct controls are often a substitute for complicated econometric methods.

- ***Replicability*** – provides the basis for statistical tests. Critics can run their own experiments.

Objections to lab experiments

- In many experiments the participants are college/university students
  - how *representative* are these students of the population as a whole?
  - Do the decisions made by under-graduate students in laboratory experiments provide clues regarding the thinking of CEOs of multi-national corporations or stock-brokers or even the average person on the street?
  - Do the results obtained from these experiments allow us to make inferences about the behaviour of others outside the laboratory?
  - That is to say do these experimental results have ***external validity?***

Objections to lab experiments

- While participants do get paid for their participation (often at rates that are significantly higher than the going hourly wage rate)

- still the amounts involved are small. Do the decisions made on the basis of these small amounts allow us to generalise about decisions involving millions of dollars?

- Many experiments are run under artificial laboratory conditions where the instructions given to the participants are written using abstract, context-free and non-emotive language.

Objections to lab experiments

- These are all valid criticisms.
- But it is important to note that not all of these are criticisms of the experimental method *per se*.
- Some of these are essentially arguments for carrying out more elaborate experiments with participants drawn from other parts of the population.
- As a result, in recent years experimental economists have started undertaking experiments that are far more elaborate in their design, that involve much larger (and often very large) sums of money.

Objections to lab experiments

- If data generated with student participants is not reliable in predicting behaviour among other parts of the population then one can easily run experiments with participants recruited from those groups.

- And experimental economists routinely and increasingly do so.

- In trying to understand how markets for financial assets often lead to speculative bubbles, experimental economists have had experienced asset traders participate in their experiments.

Objections to lab experiments

- The short answer is that in some experiments student participants behave differently from those with greater experience but in a lot of experiments involving strategic decision making the differences are not as stark as people might think.

- Experience can also be a two-edged sword. People with experience in a particular area might wrongly apply those lessons and their wisdom to a problem that appears similar but is actually quite different.

Objections to lab experiments

- One oft-repeated criticism of the experimental approach is that experiments with university students in the sterile conditions of the laboratory using non-emotive and context-free language may not tell us much about real-life phenomenon.

- In response, experimental economists have also started gathering data using participants other than university students and outside the laboratory.

Objections to lab experiments

- Carefully designed experiments can often be a very useful complement to conclusions drawn on the basis of surveys or natural data.
- They can also serve as a means of testing the robustness of conclusions drawn by other means.
- Increasingly, many experimental economists are resorting to collecting data using both surveys as well as experiments.

Norms and Social Preferences: A Social Dilemma Game

Public Goods

- The environment
- Police/Fire/National Defence
- Highways and beaches
- Public parks/public schools/public libraries/public hospitals

- ***Non-rival in consumption***
- ***Non-excludable***
- ***Generates incentives to free-ride***

Public Goods

- 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

Public Goods

- Cooperative behaviour has a positive externality.
- Hence, the benefit to society exceeds the benefit to the private person providing it.
- This is where the incentive to free-ride comes in
- Private individuals might be willing to incur the cost of providing this if and only if enough others do so.

A Public Goods Game

- Economists (and others) have used a simple social dilemma game to understand behaviour
- The public goods game captures a social dilemma where there is a tension between cooperation and self-interest
- If everyone cooperates then society as a whole is better off but for any particular individual there is an incentive to behave in a self-interested manner

A Public Goods Game

- Group of 4 players
- Each of them have $5
- Can contribute to either a ***private*** account or a ***public*** account
- Money put in the ***private*** account remains unchanged
- Money contributed to the ***public*** account ***doubled*** and redistributed equally among group members

A Public Goods Game

- Social optimum is for each player to invest all $5 into the public account
- A total of $20 which gets doubled to $40
- Redistributed equally gets $10 for each player
- 100% return on initial investment in the public account

A Public Goods Game

- Individual rationality suggests that no player has an incentive to contribute and should “free-ride” on others’ contributions
- Suppose I contribute $1 into the public account, regardless of how much the others are contributing
- $1 gets doubled to $2
- Redistributed equally gets $0.50 for each group member
- In this case I will get $0.50 in return which is less than $1.00 if I do not contribute

A Public Goods Game

- But if others contribute then I am better off hanging on to my own money
- Since I cannot be excluded from enjoying the public good once it is provided
- But everyone thinks that way then no one contributes!
- Non-contribution is then an equilibrium!
  - *Once arrived at it is difficult to break out of the impasse*
  - ***Difficult to provide public goods on the basis of voluntary contributions!***

Catch-22

- *Sharing a tent with a man who was crazy wasn't easy but Nately didn't care. He was crazy, too, and had gone every free day to work on the officers' club that Yossarian had not helped build.*

- *Actually, there were many officers' clubs that Yossarian had not helped build, but he was the proudest of the one on Pianosa. It was a sturdy and complex monument to his powers of determination. Yossarian never went there to help until it was finished; then he went there often, so pleased was he with the large, fine, rambling shingled building. It was truly a splendid structure, and Yossarian throbbed with a mighty sense of accomplishment each time he gazed at it and reflected that none of the work that had gone into it was his.*

Catch-22
Yossarian talking to Major Major Major Major

"Suppose we let you pick your missions and fly milk runs," Major Major said. "That way you can fly the four missions and not run any risks."

"I don't want to fly milk runs. I don't want to be in the war any more."

"Would you like to see our country lose?" Major Major asked.

"We won't lose. We've got more men, more money and more material. There are ten million people in uniform who can replace me. Some people are getting killed and a lot more are making money and having fun. Let somebody else get killed."

"But suppose everybody on our side felt that way."

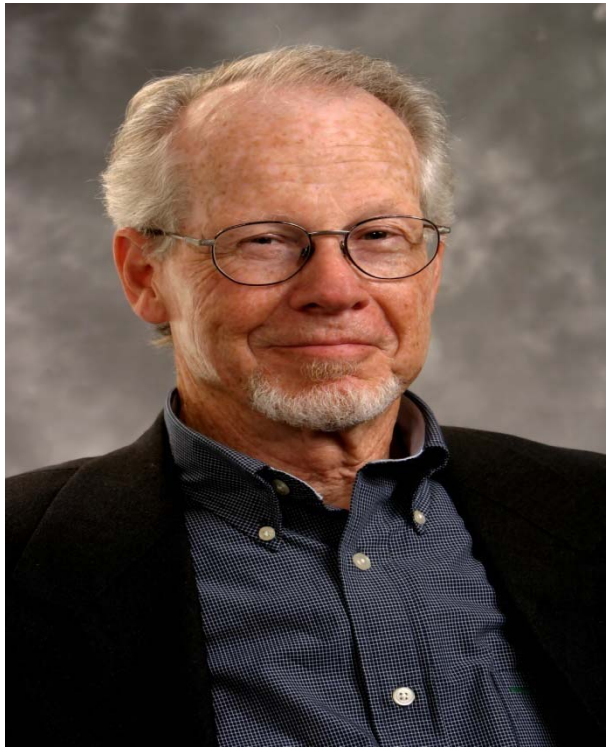
"Then I'd certainly be a damned fool to feel any other way. Wouldn't I?"

Nobel Prize in Economics, 2009

The Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel

Elinor Ostrom

Oliver Williamson



Ostrom's Nobel Prize in Economics, 2009

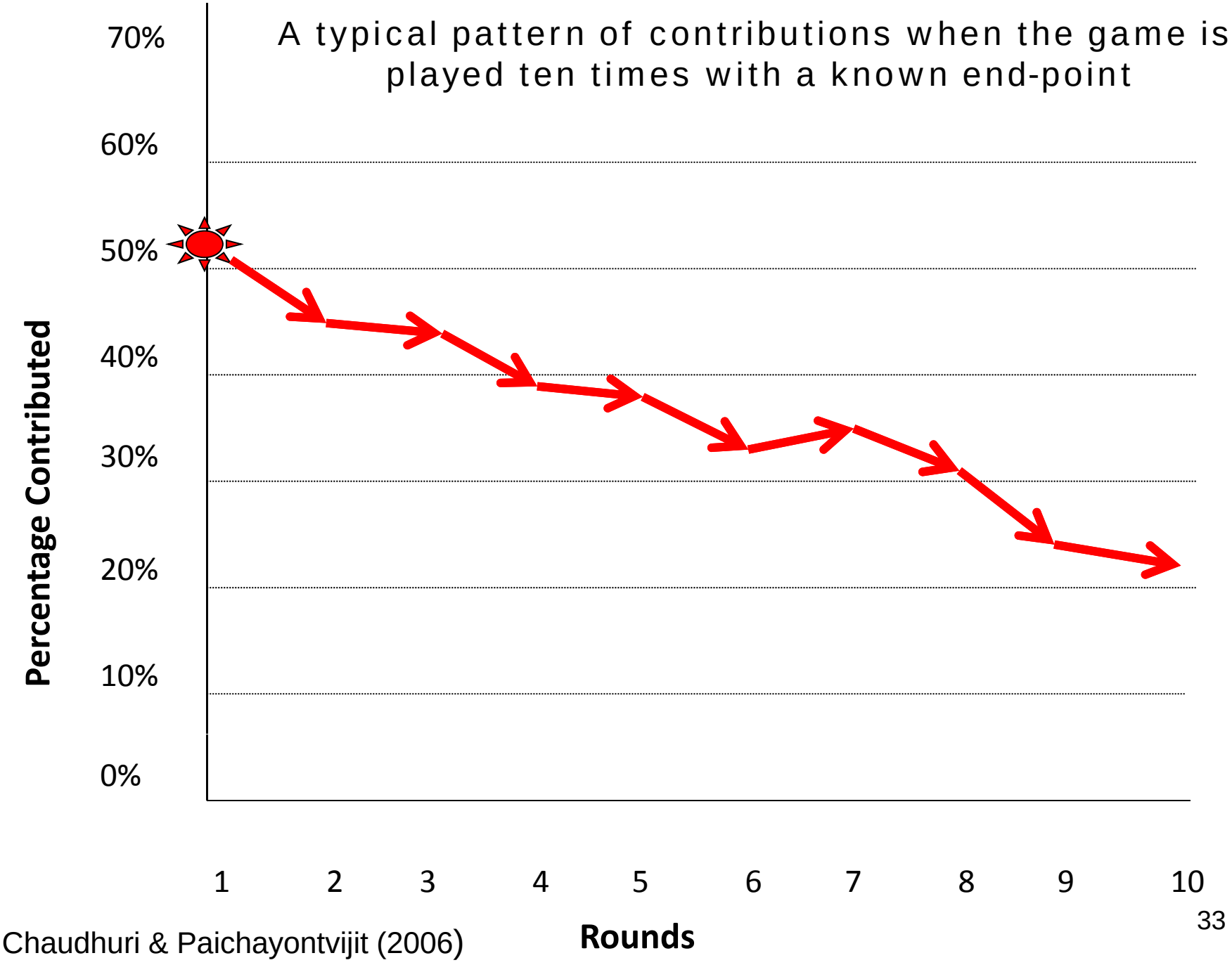
- Ostrom's work - based on hundreds of case studies and numerous detailed controlled experiments - shows that the self-interest based prediction is almost always incorrect and that humans, left to themselves, are much better at tacking such problems than traditional economic theory suggests.

Ostrom's Nobel Prize in Economics, 2009

- In Nepal, Elinor Ostrom and her colleagues have collected data about the rules and general management strategies used to manage over 200 irrigation systems.
- Some of these are managed by government agencies (agency managed irrigation systems or AMIS) while some are managed by the farmers (farmer managed irrigation systems or FMIS).
- They find that compared to AMIS, FMIS are able to achieve a higher agricultural yield, a more equitable distribution of water and better maintenance of the irrigation systems.
- There are striking differences in the way the two systems are managed. Under AMIS infractions are recorded by government officials while under FMIS they are recorded by the farmer-monitors. Furthermore, the AMIS tends to rely more on fines for infractions than FMIS.
- Rules and quotas are followed 65% of the time in FMIS compared to only 35% of the time in AMIS. Thus rules and sanctions designed by the farmers themselves tend to be more effective than those imposed by government officials.

Previous empirical studies

- In one-shot versions of the game contributions average 40% - 60% (Andreoni, 1988, Isaac, McCue and Plott, 1985, Isaac, Walker and Thomas, 1985)
- However, there are wide variations in individual contributions
- In finitely repeated games, average contributions typically start somewhere in the 40% - 60% range and then decline over time



Chaudhuri & Paichayontvijit (2006)

Puzzles

- Why do people cooperate at the beginning and free-ride later?
- If they are going to free-ride why do they not start to do so immediately?
- We have already argued that free-riding is the self-interested course of action
  - So maybe that is easier to understand
- But how about the ones who contribute a lot?
  - Are they being purely altruistic?

Two separate but related queries

- Why do the contributions decay over time?
  - An answer to the first question, in turn, can lead us to an answer the second question
- How can we sustain cooperation over time?
  - In order to contribute participants must be convinced that others will do too
  - Any mechanisms that sustain optimistic beliefs will enhance cooperation
  - Beliefs about others' behaviour play a crucial role

What explains this pattern of decaying contributions?

- Andreoni (1988) proposes two hypotheses:

- Learning
  - People may not realize that free-riding is the dominant strategy at the outset but need to "learn" this by repeating the action
- Strategies
  - "Rational" players realize that free-riding is the dominant strategy but believe that with some probability others are playing a "tit-for-tat" strategy; in that case you might want to "mimic" the TFT player and contribute to the public account in the beginning but free-ride later in the game.
    - ***Kreps et al. (1981) "Rational Cooperation in a Finitely Repeated Prisoner's Dilemma"***

Andreoni (1988): Strategies Hypothesis

- Uses a "***partners***" versus "***strangers***" approach to study strategic play

- "***Partners***" – group composition remains unchanged for the entire session of the experiment

- "***Strangers***" - subjects are randomly re-matched at the end of each round

Andreoni (1988): Strategies Hypothesis

- Suppose a subject learns in round *t* that free-riding is a single shot dominant strategy

- In the ***partners*** set up, players are able to signal to other players and hence they might choose to continue their cooperation

- In a ***strangers*** set up, this signaling mechanism is not available hence there is no incentive to continue cooperation

Andreoni (1988): Strategies Hypothesis

- If a subject is in a ***partner protocol*** and playing strategically, she may continue to contribute to the public account

- But if she is in a ***stranger protocol***, she has no incentive to continue cooperation because every game for a stranger is an end-game

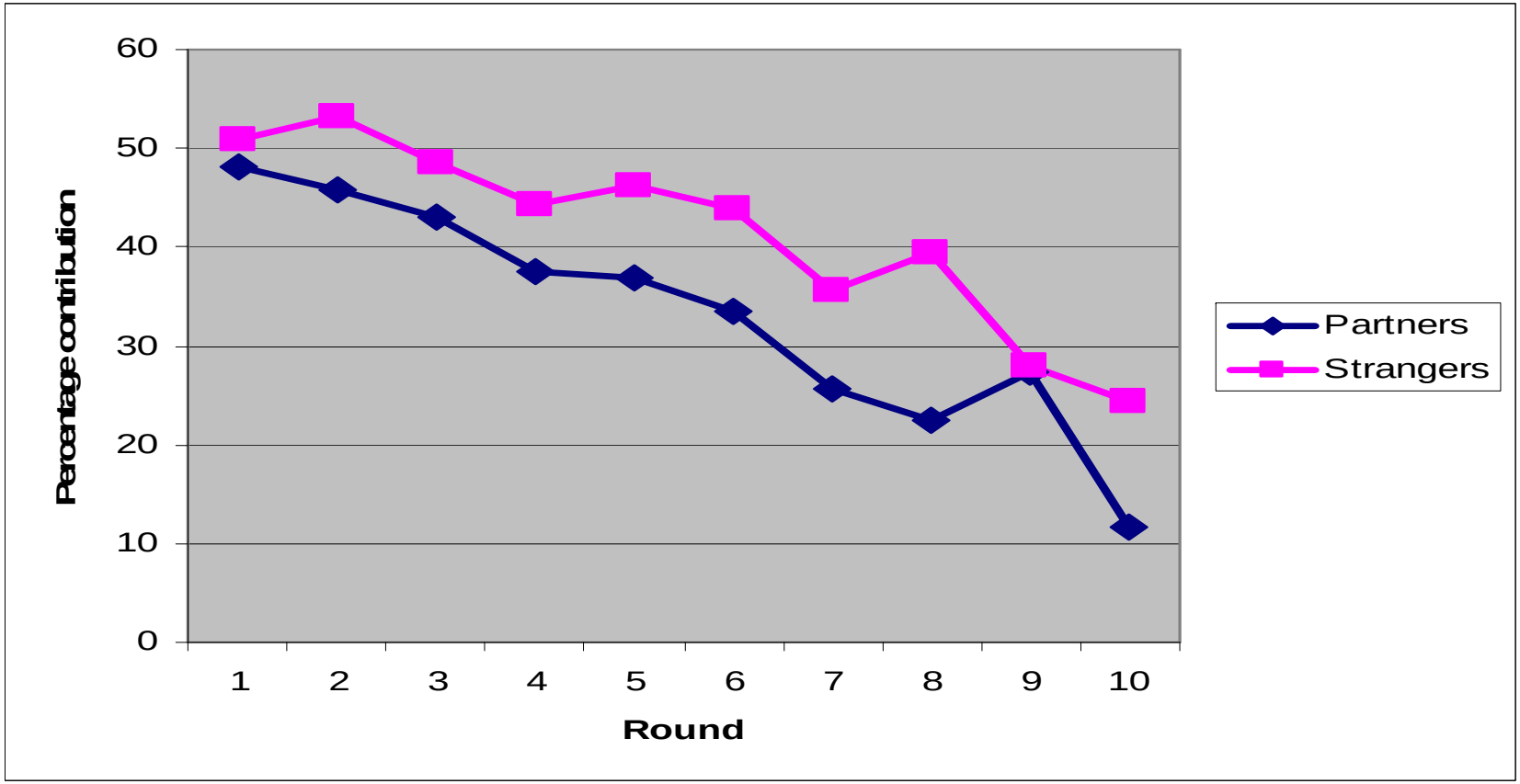
- This suggests that the ***partners*** treatment should elicit ***higher contribution*** than the ***strangers*** treatment

Andreoni (1988): Learning Hypothesis

- To study the ***learning hypothesis***, the experiment includes a surprise ***"restart":***
  - subjects are asked to play for 3 more rounds after the initial set of 10 rounds

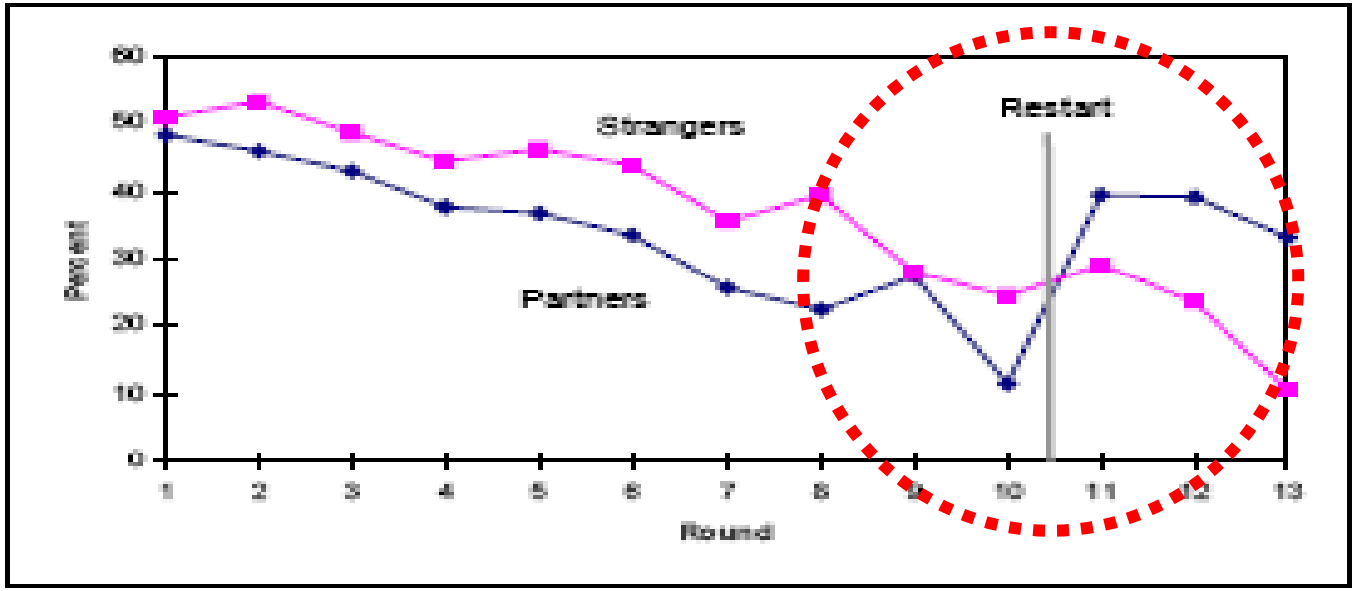
- If learning is primarily responsible for decay then both partners and strangers should be unaffected by the restart

Andreoni (1988) - % contributed over time



- Strangers contribute more than partners
- The percentage of partners choosing to free-ride is greater than the percentage of strangers who free-ride
- Both of these findings contradict the strategies hypothesis

Andreoni (1988) – *Re-start*



A. Andreoni (1988): Percent of Endowment in the Public Good

- Contributions jump-up following the re-start
- The re-start has a longer lasting effect on partners
- We have replicated the “partner with a surprise re-start” experiment
- We found that contributions increased by 12%

Subsequent studies

Study	Which Group Gives More?		
	Partners	Strangers	Neither
Andreoni (1988)		•	
Croson (1996)	•		
Palfrey and Prisbrey (1996)		•	
Weiman (1994)			•
Keser & van Winden (2000)	•		
Burlando & Hey (1997), UK:		•	
Italy:	•		
Brandts & Schram (2001)			•
Brandts, Saijo & Schram (1997), US:	•		
Spain:		•	
Japan:			•
The Netherlands:			•
Sonnemans, Schram & Offerman (1999)	•		

Andreoni (1988): Hypothesis

- The “partners” versus “strangers” approach does not yield definitive conclusions for the “*strategies hypothesis*”

- We suggest that this is because people play this game differently than visualized by Andreoni (1988)

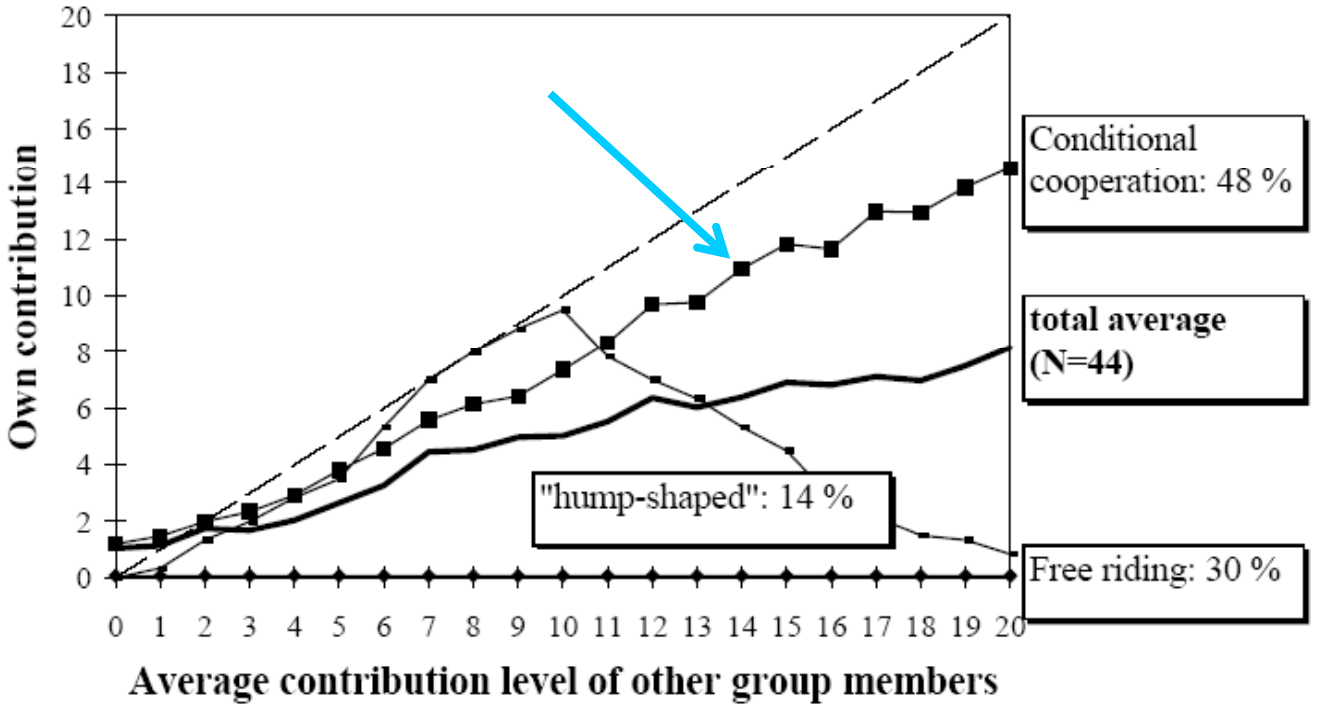
  – This is not to suggest that there is no strategic play whatsoever; certainly some people might behave in this manner
  – but we argue this is ***not*** the primary driving force behind the decay in contributions

Conditional Cooperation

- Players are asked to choose
  - An ***unconditional contribution***
  - A ***conditional contribution***, i.e., for ***every given average contribution of the other members*** they decide how much to contribute.
    - A selfish player is predicted to always choose a conditional contribution of zero.

Conditional Cooperation

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



Conditional Cooperation

- My student (Meg Paichayontvijit) and I replicate this finding
- Furthermore conditional cooperators are more cooperative when informed about the presence of other conditional cooperators in the group
- Beliefs about others' cooperation seem fundamental to sustaining cooperation

Our Hypothesis

- Learning can be one of two types:
  - ***Introspective Learning***
    - You learn on your own simply by doing something again and again
  - ***Social Learning***
    - You learn by observing the actions of others
    - Of course an important question here is what it is exactly that you are learning by observing others

Experimental Design

- Subjects are put into groups of 4
- In each round each subject is endowed with 10 tokens which can be placed in either a *private account* or a *public account*
- Tokens placed in the private account remain unchanged while tokens placed in the public account are doubled and redistributed among the group members

Experimental Design

- Before the game starts, subjects are asked to answer the following question:

  *"**What is the average contribution to the public account that you expect from the other three members of your group in round 1**?"*

- Each subject is paid according to the accuracy of her prediction using a quadratic scoring rule

Treatments

- ***Treatment 1: Round-by-Round feedback*** Treatment:
  - 24 rounds, ***feedback every round***
  - Usual design in prior studies
  - 36 subjects
- ***Treatment 2: Intermittent feedback*** Treatment :
  - 24 rounds, ***feedback every 4 rounds***
  - 60 subjects
  - This allows us to hone in on the role of "***Social learning***"

Treatments

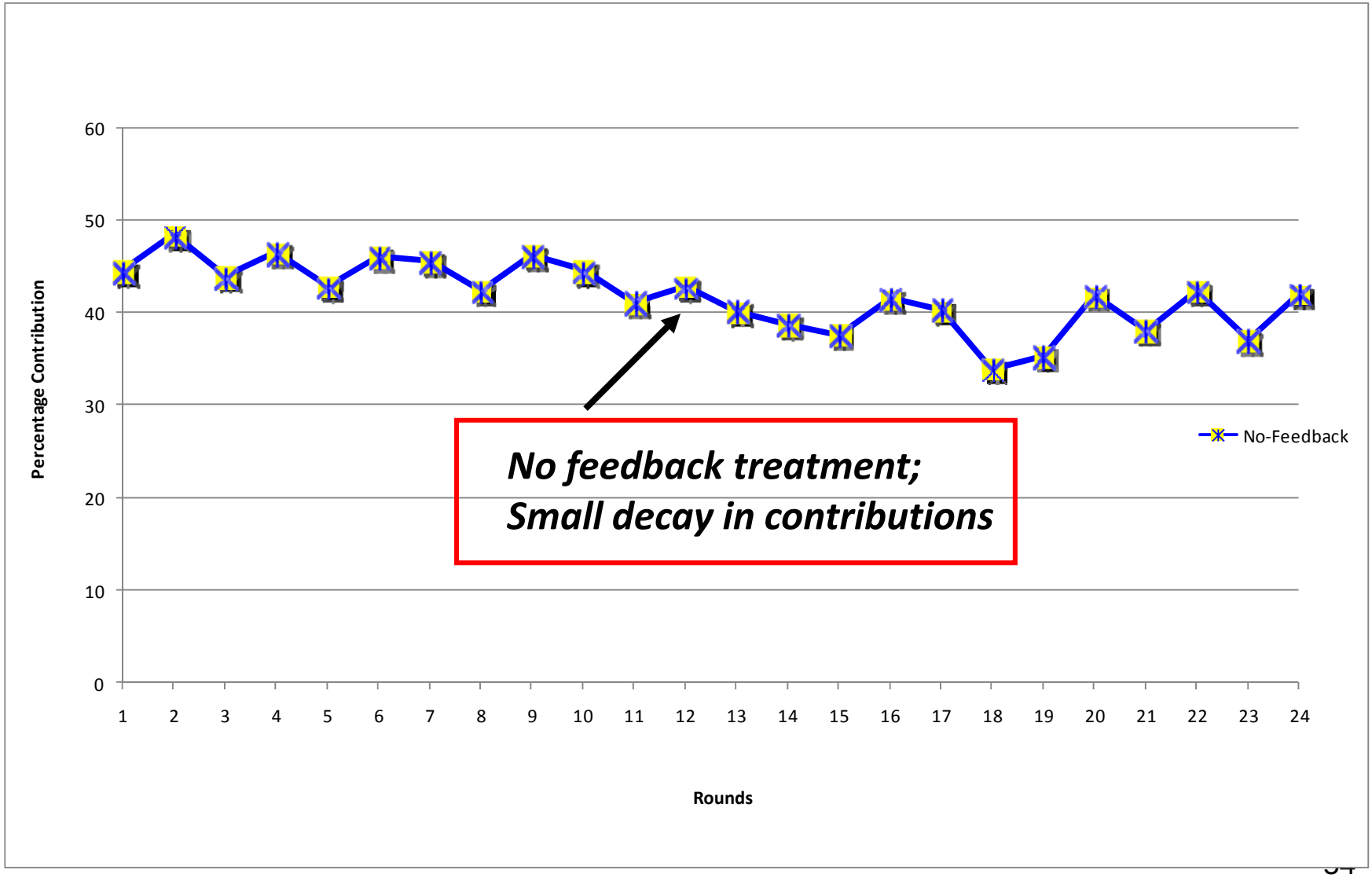
- ***Treatment 3: No feedback*** Treatment:
  - 24 rounds ***without any feedback***
  - Subjects make 24 decisions without learning about contributions to the public account or their earnings as the game progresses
  - Get to see all the information at the very end of the session
  - Will allow us to hone in on the role of "***Introspective learning***"
    - *Do subjects learn the dominant strategy just by making their decisions a number of times without learning about what others are doing?*
  - 64 subjects

Results

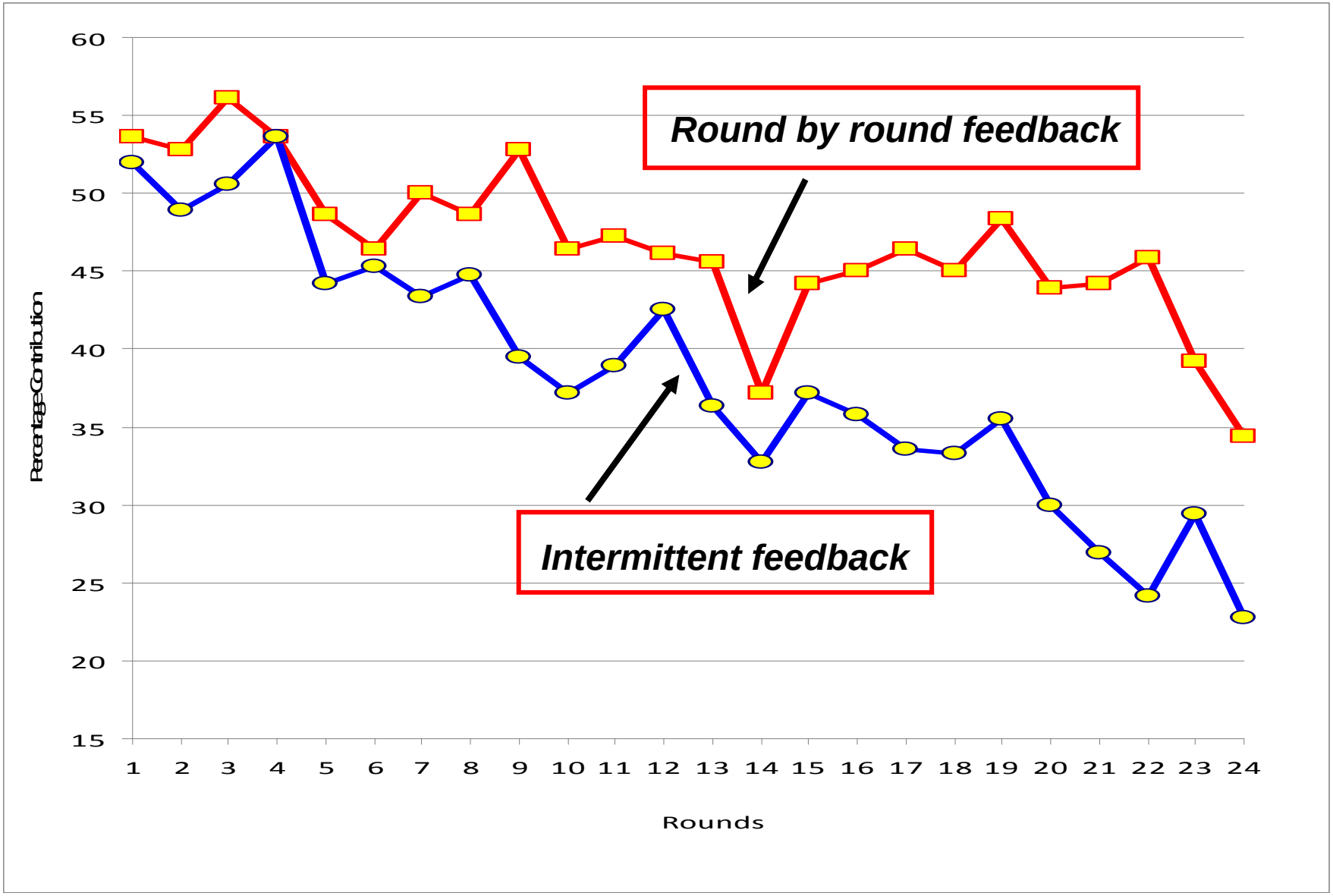
- I will start by looking at the pattern of contributions across the different treatments

- Then I will look at how people with differing beliefs about others' contributions behave

Pattern of contributions over time



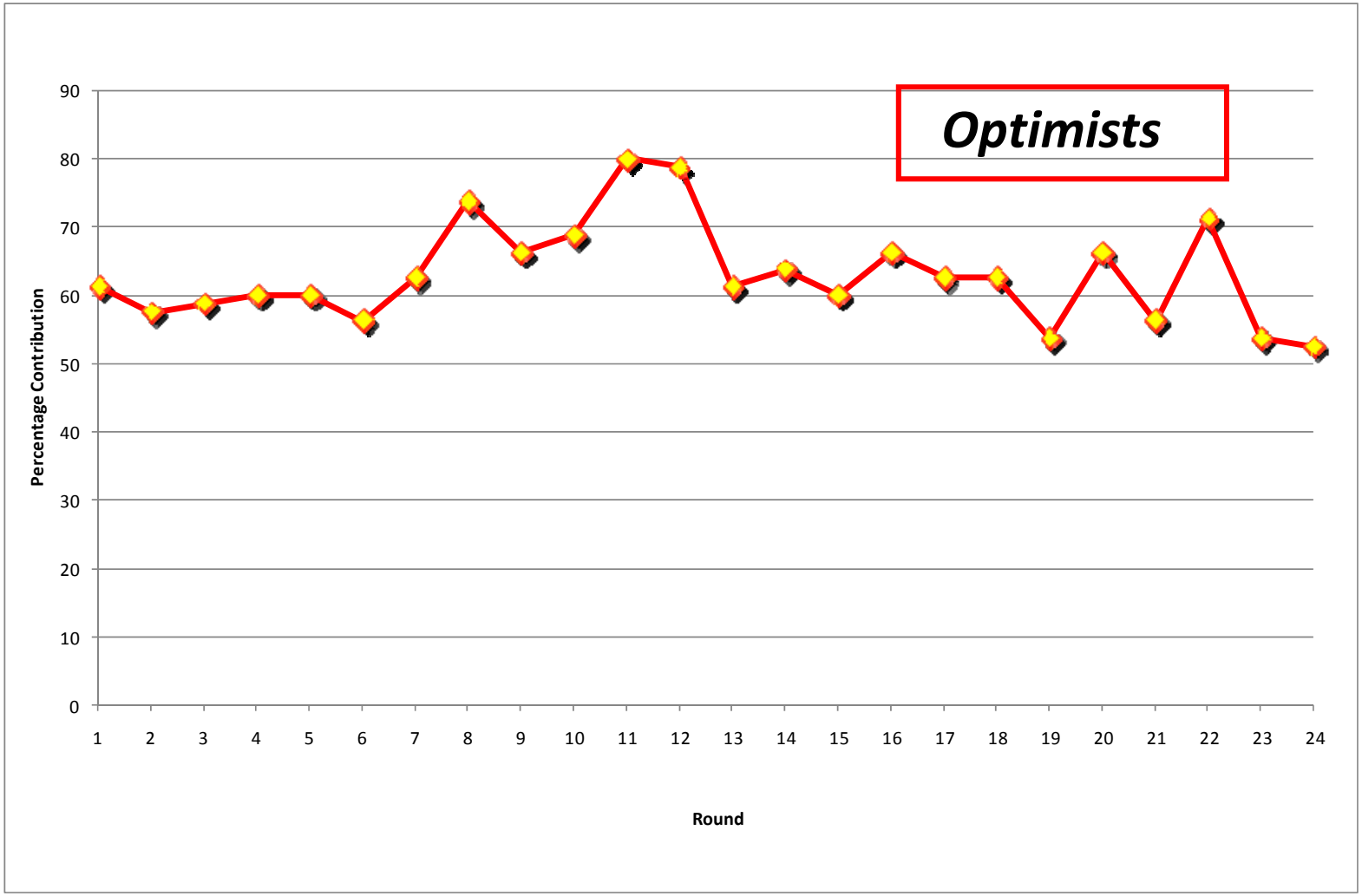
Pattern of contributions over time



Beliefs

- We have data on each subject's beliefs about the contributions of others
- We use subject responses to this question to classify them into different categories
  - Along the lines of Gunnthorsdottir, Houser and McCabe (2007)
- Those who expect group members to contribute between
  - ***0 – 3 tokens ("pessimists")***
  - ***4 – 6 tokens ("realists")***
  - ***7 – 10 tokens ("optimists")***

Contributions in the no feedback treatment by the three types



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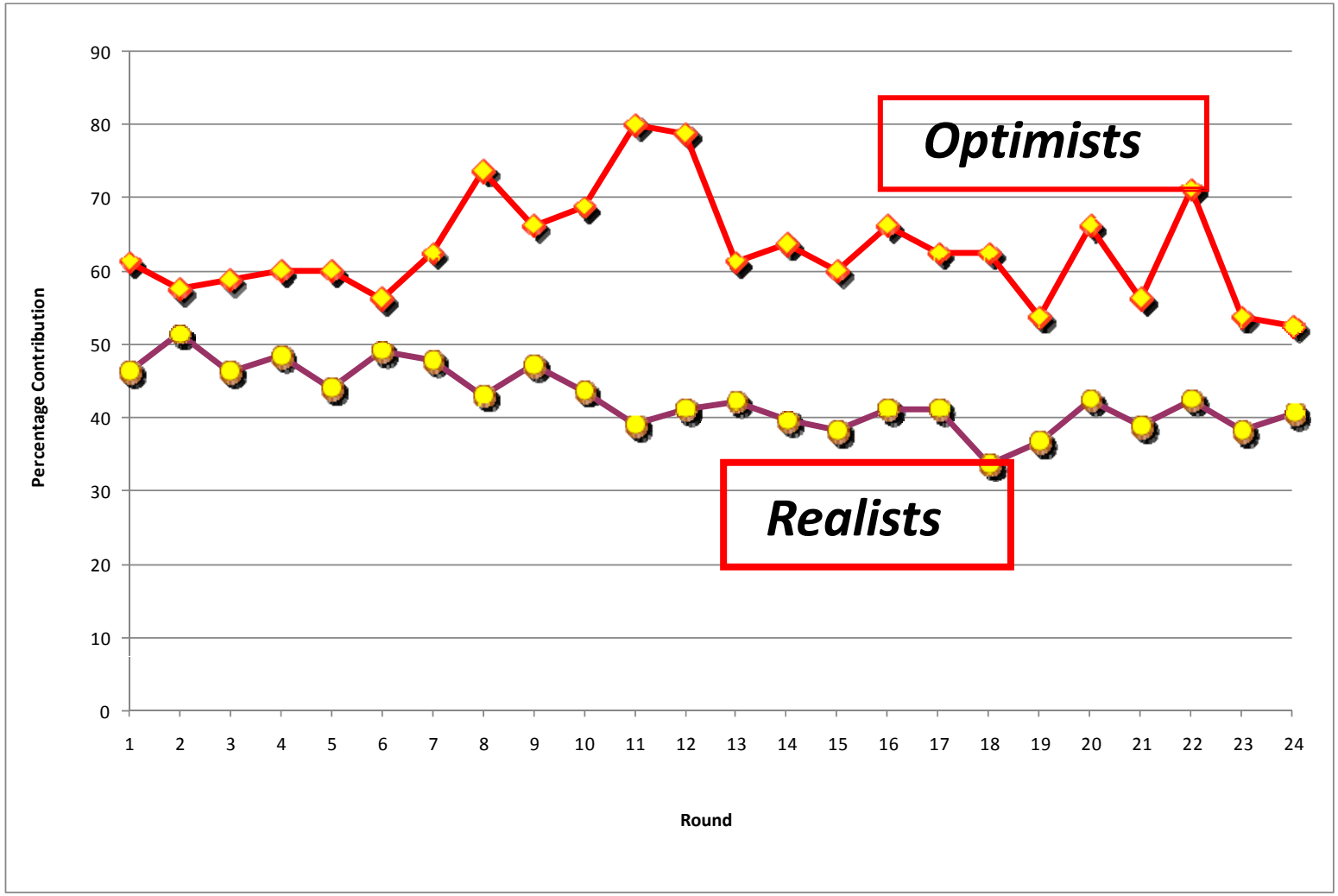
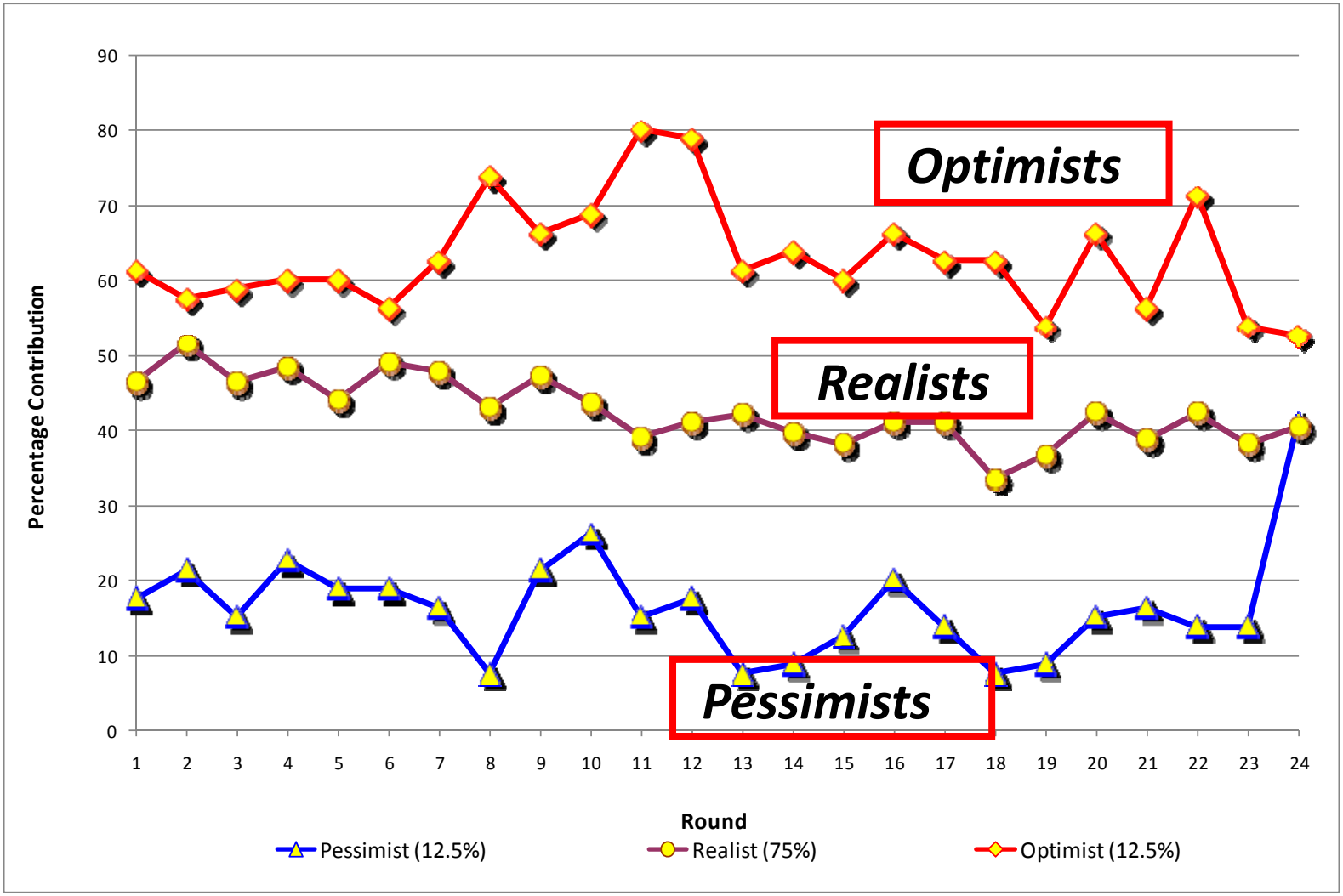


Contributions in the no feedback treatment by the three types



Social learning analysis

- We propose that a possible explanation for the decay is learning about the heterogeneity of types, where the type is characterized by initial beliefs

- We use the intermittent feedback treatment to examine the social learning hypothesis

- This allows us to focus on how subjects respond to ***new information***

Random effects Tobit regression for the intermittent feedback treatment

Contribution in round *t* by subject *i* is determined by the following latent equation:

$$C_{it} = \beta_0 + \beta_1 C_{it-1} + \beta_2 Round + \beta_3 optimist * Round + \beta_4 pessimist * Round + \beta_5 NewInfo + \beta_6 NewInfo * optimist + \beta_7 NewInfo * pessimist + \varepsilon_{it}$$

(+) (-) (+) (-)

NewInfo– dummy for the rounds after subjects receive feedbacks; 5,9,13,17,21

- ***The realists and the optimists decrease their contributions over time, while the pessimists increase their contributions with respect to the realists***
-
- ***When the optimists receive the information on how much their group members have been contributing in the past four rounds, they decrease their contributions***

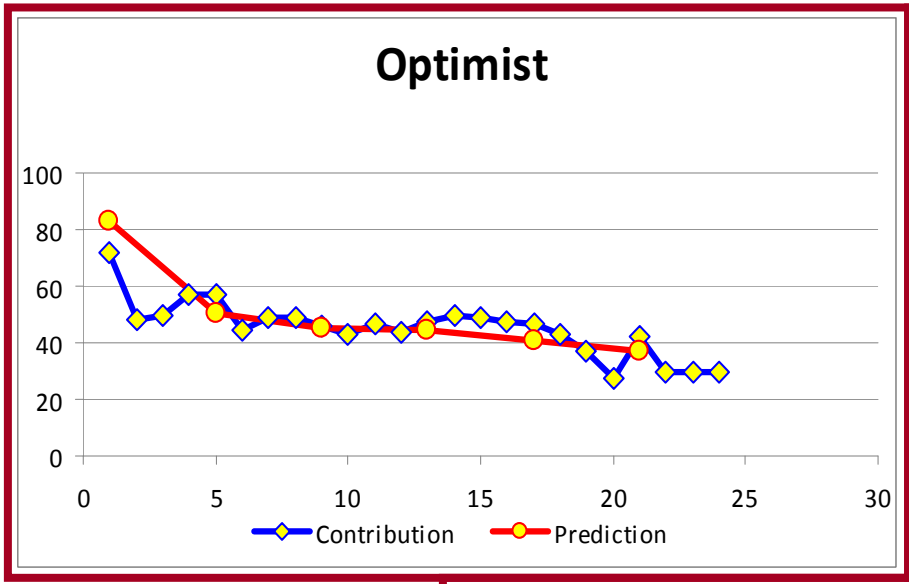
Role of beliefs in social learning

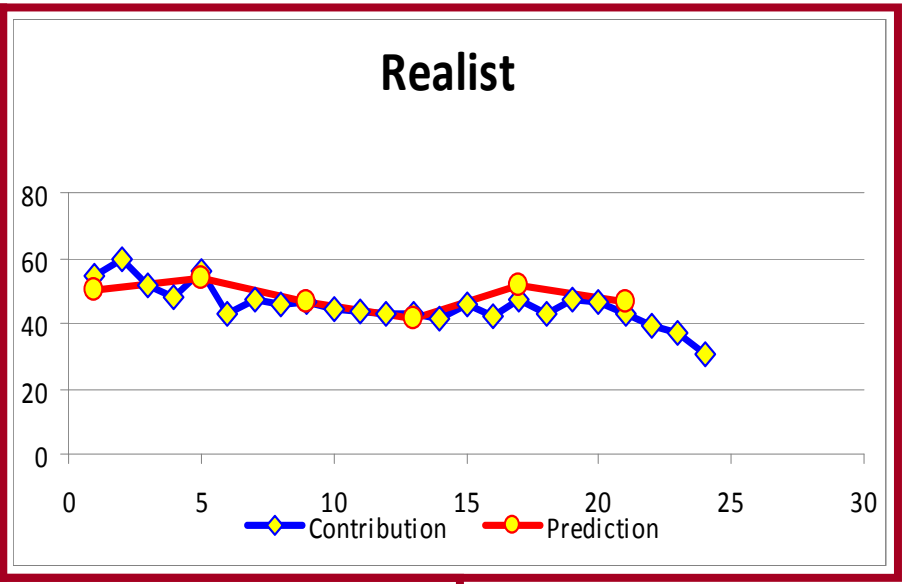
- We propose that one's contribution is determined by what she thinks the other group members will contribute

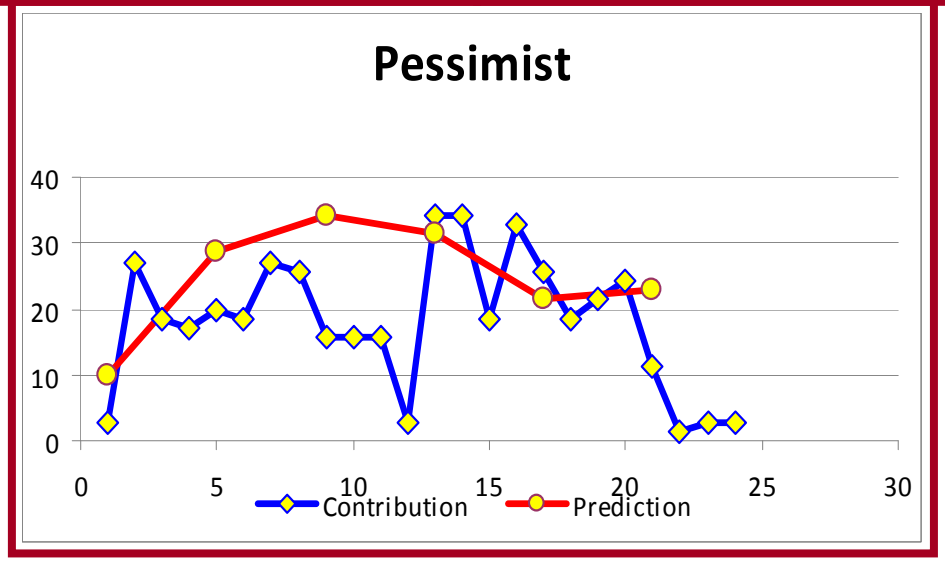
- If she believes others will contribute high to the public account then as a response she will also contribute high

- **Our hypotheses:**
  - We suspect that one's belief depends on the past contributions by the other group members
  - Subsequently, the contribution depends on the belief

Impact of belief on contribution







Conclusion

- We argue that the familiar pattern of decay in laboratory public goods games is caused by a different line of reasoning rather than “strategic” behaviour

- It is obvious that the contributions decay by much more when subjects get to see what the others are doing compared to when players do not get to observe the contributions of others

  – Comparison of the treatments with feedback with the no feedback treatment allows us to draw this conclusion

- Thus we conclude that ***social learning*** is responsible for the decay in contribution

Conclusion

- But the reality behind what the subjects learn is more complex than simply figuring out the dominant strategy of free riding

- Rather a subset of subjects are genuinely interested in keeping contributions high. What is happening, though, is that over time subjects learn the difficulty of coordinating at high contributions since some members of the group do free ride

- This causes subjects to revise their expectations and start lowering their own contributions

A cooperation and punishment experiment

Punishment	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Costs	0	1	2	4	6	9	12	16	20	25	30

Two “partner” sessions:

(1) no punishment – punishment

(2) punishment – no punishment

Each part of the sequence lasted 10 periods.

Subjects in the first part of the sequence did not know that there is a second part.

Three “Stranger” sessions:

two times punishment – no punishment.

Once no punishment – punishment.

Cooperation with and without Punishment
(Fehr & Gächter AER 2000)

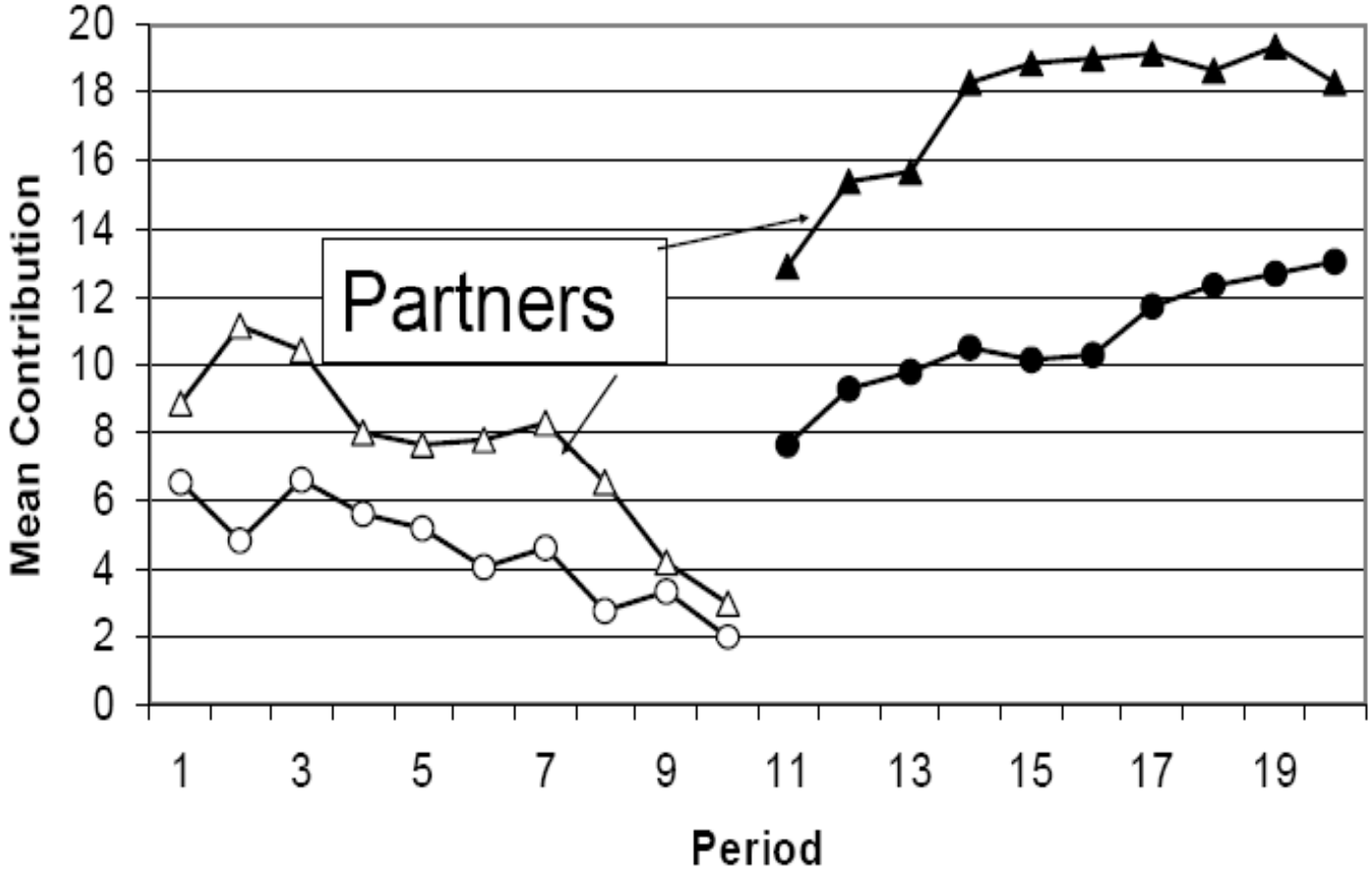
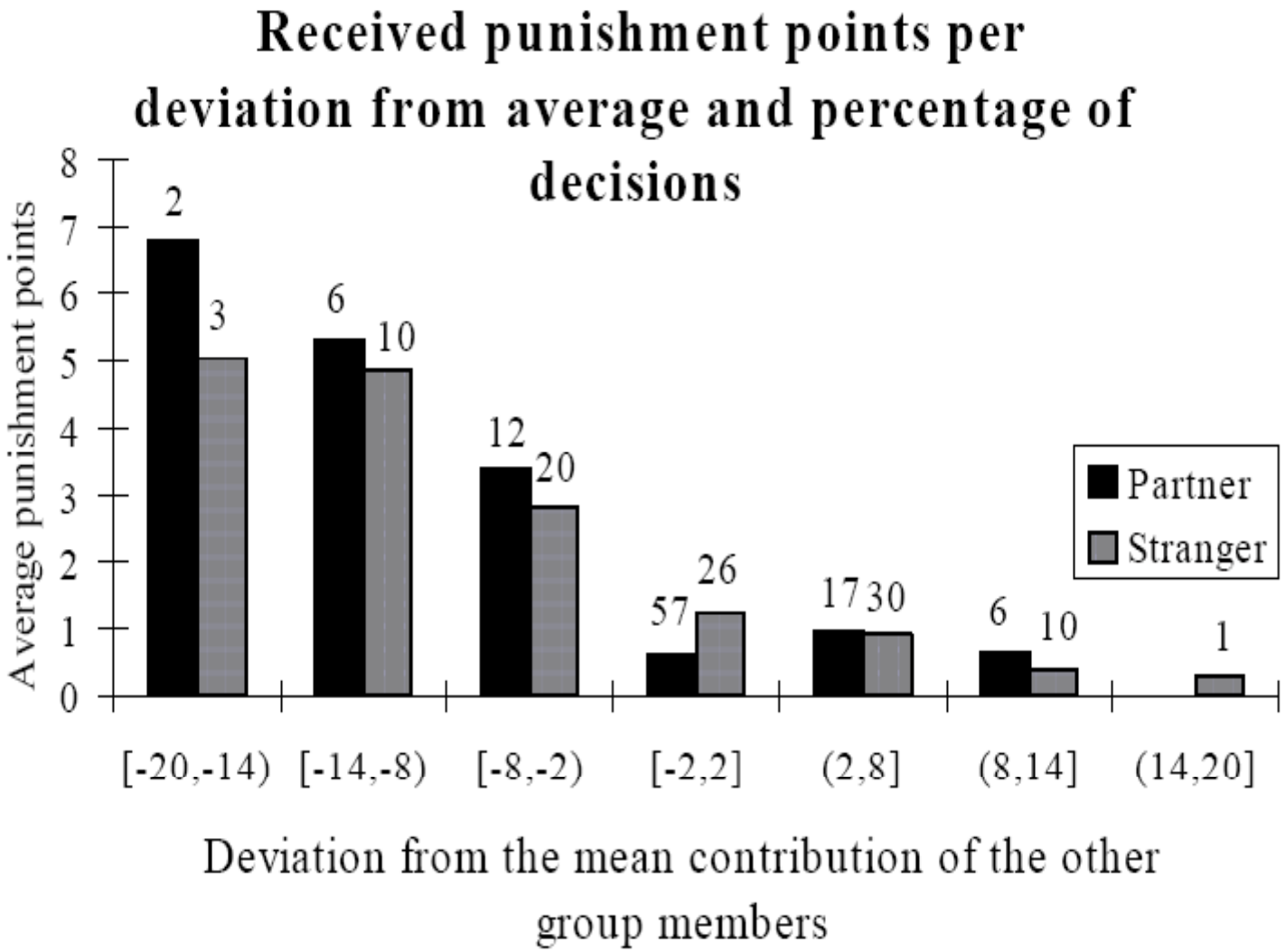


TABLE 3—MEAN CONTRIBUTIONS IN THE STRANGER-TREATMENT

Sessions	Mean contribution in all periods		Mean contribution in the final periods	
	Without punishment opportunity	With punishment opportunity	Without punishment opportunity	With punishment opportunity
1	2.7	10.9	1.3	9.8
	(5.2)	(6.1)	(4.3)	(6.8)
2	4.0	12.9	2.3	14.3
	(5.7)	(6.4)	(4.3)	(5.0)
3	4.5	10.7	2.0	13.1
	(6.0)	(4.9)	(3.8)	(4.0)
Mean	3.7 (18.5%)	11.5 (57.5%)	1.9 (9.5%)	12.3 (61.5%)
	(5.7)	(5.9)	(4.1)	(5.6)

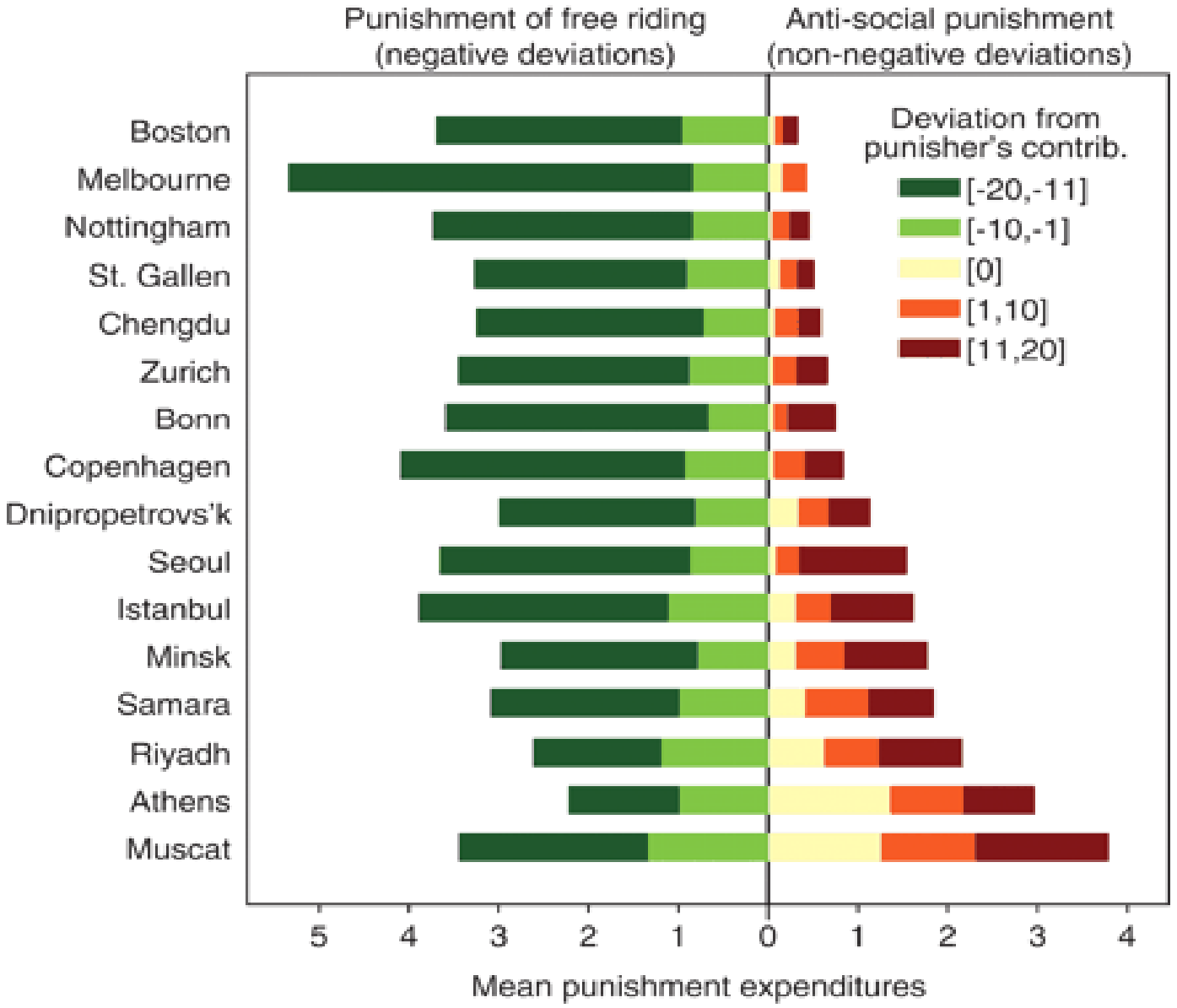
Notes: Numbers in parentheses are standard deviations. Participants of Sessions 1 and 2 first played the treatment with punishment opportunities and then the one without such opportunities. Participants of Session 3 played in the reverse order.


Received punishment points per deviation from average and percentage of decisions
Average punishment points
0
1
2
3
4
5
6
7
8
2
3
6
10
12
20
57
26
17
30
6
10
1
Partner
Stranger
[-20,-14)
[-14,-8)
[-8,-2)
[-2,2]
(2,8]
(8,14]
(14,20]
Deviation from the mean contribution of the other group members

Possibility of perverse (anti-social) punishments?

- Meta norms (Axelrod, 1986)
  - No longer enough to punish free-riders
  - Must now also punish non-punishers and so on
  - But see Boyd and Henrich (2002)
- Significant amounts of punishment of cooperators by free-riders if targeted punishment allowed
- Anti-social punishment reduces cooperation!

Possibility of perverse (anti-social) punishments?



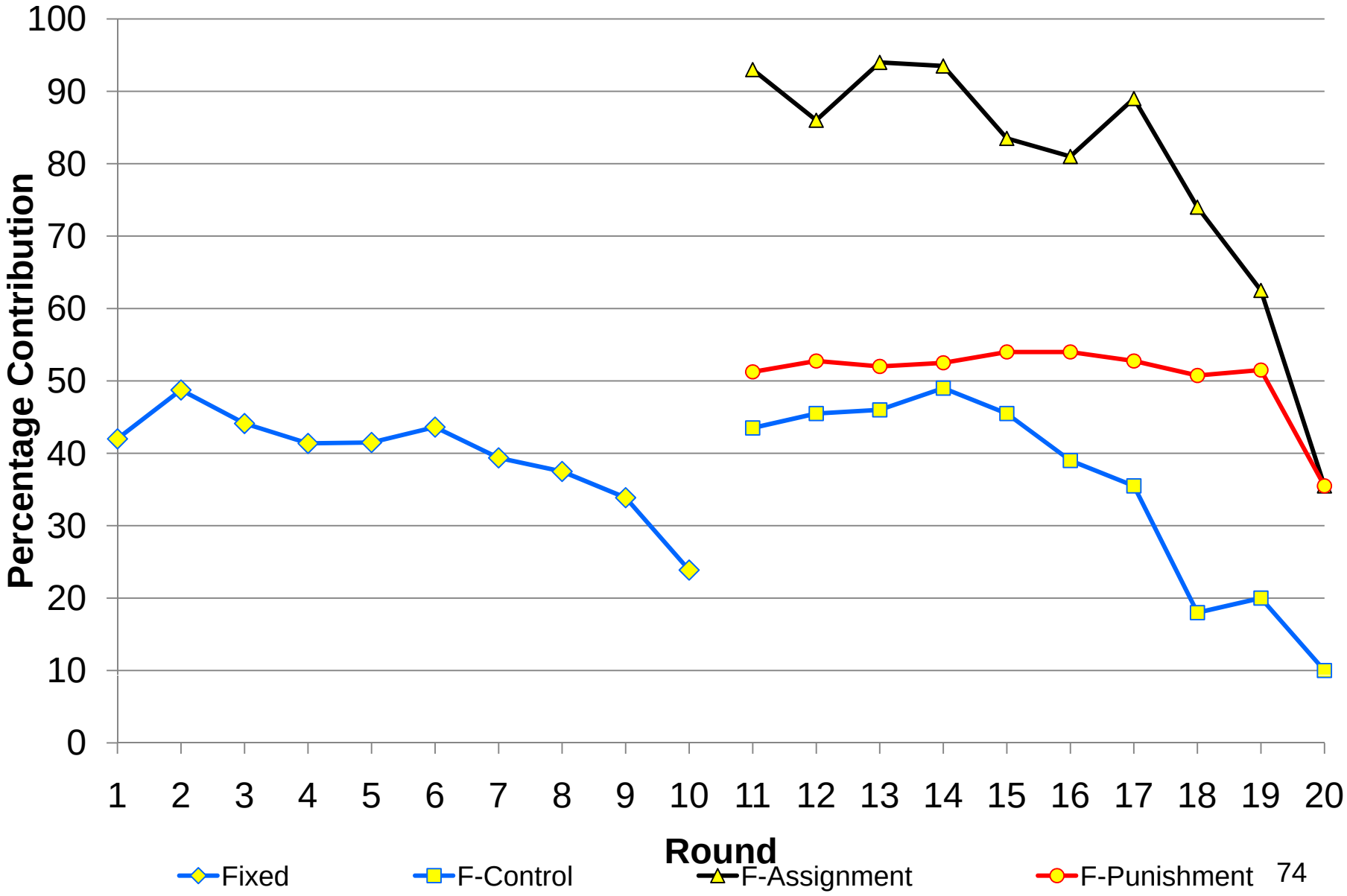
Other mechanisms

- Communication
- Communication coupled with punishment
- Assortative matching of cooperators
- My recent work:
  - Recommendation versus punishments
  - Recommendations more benign
  - Have no implications for earning whereas the punishment cost gets subtracted from earnings

Recommendations versus punishments

- First 10 rounds without any intervention
- Treatment 1:
  - Control; Rounds 11 – 20 same as the first 10 rounds
- Treatment 2:
  - Recommendation each round from round 11 onwards
    - ***"You should contribute 10 tokens in each round. NOTICE*** *that if all participants in a group follow the message then every participant will make 100% return on their contributions. For example, if in a particular round all 4 players in your group contribute all 10 tokens to the public account, then each group member will receive 20 tokens in return of their investment of 10 tokens. You will be helping yourself and everyone else in the group if you contribute all 10 tokens in every round."*
- Treatment 3:
  - Punishment each round from round 11 onwards
- Fixed versus Random groups

Fixed groups



Random Groups