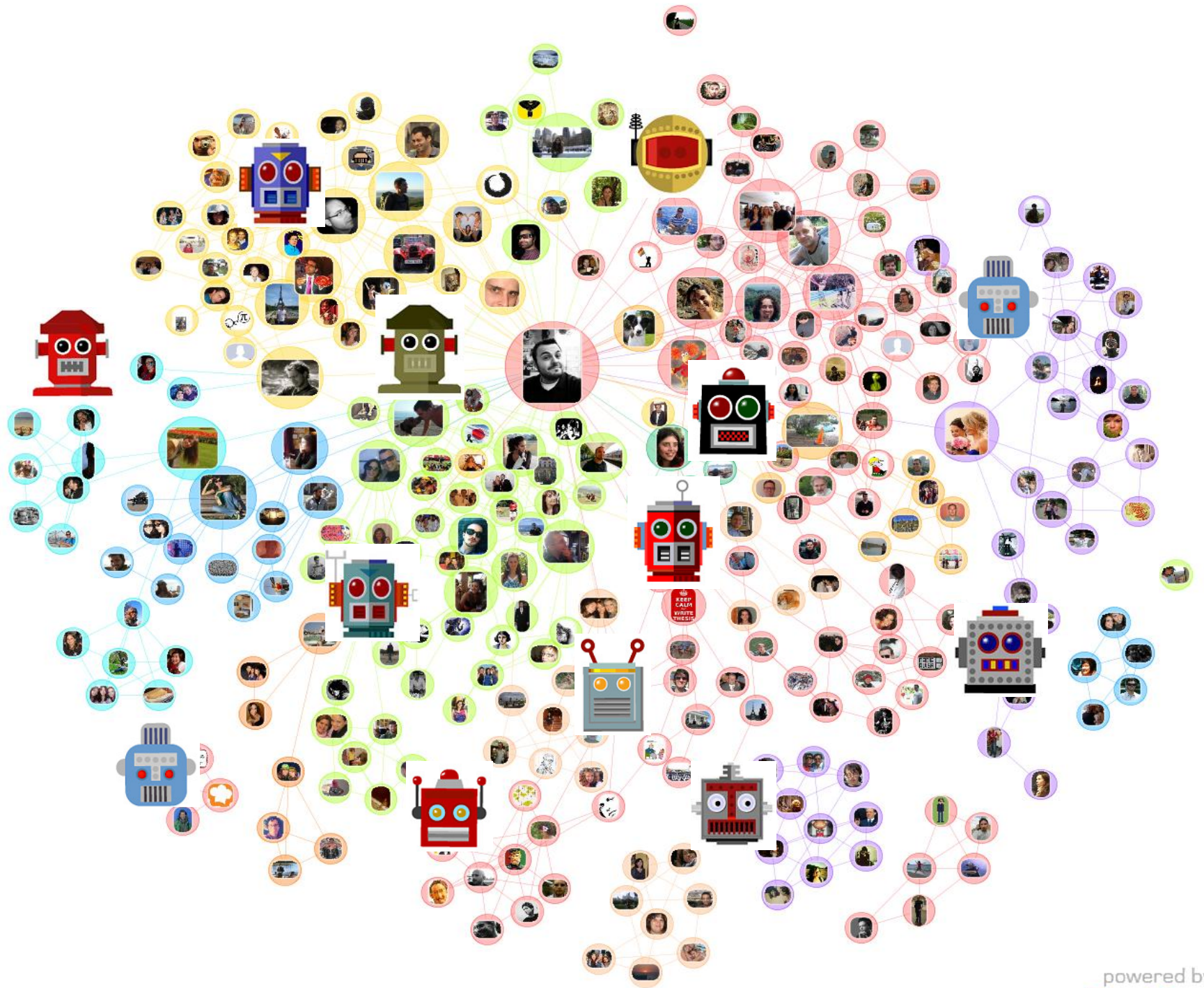


# Sistemas Normativos Autoorganizados

**Daniel Villatoro**

Giulia Andrighetto



# Trends

- ▶ Recent trends
  - Peer Production (wikipedia, open source)
  - Social Networks (facebook)
  - Peer-to-Peer (P2P) systems (bittorrent, skype)
- ▶ Related themes
  - Communities not individuals (social)
  - Sharing, giving, social production without traditional economic incentives
  - New kinds of “commons” new kinds of tools for **managing those commons**

# Why study Social Norms?

- ▶ *“The social norms I am talking about are not the formal, prescriptive or proscriptive rules designed, imposed, and enforced by an exogenous authority through the administration of selective incentives. I rather discuss **informal norms that emerge through the decentralized interaction of agents within a collective and are not imposed or designed by an authority.**”* Bicchieri 2006
- ▶ Self-organization in heterogeneous soc.: virtual & humans



12 M users (Population of Portugal)



22 M users (Population of Australia)



950 M users (Population of Europe, including Russia and Ceuta)



# What has sociology or economics got to do with peer-to-peer systems?

- ▶ P2P systems *are* socio-economic systems
  - Peers cooperate collectively to achieve their goals
  - No peer in the system controls everything
  - Performance results from interactions
  - At the end-of-day users (people) are in control
  - Sociology and economics has studied such phenomena – we should steal what we can!

# Sanctioning

- ▶ From Dagstuhl Seminar on Normative Multi-agent Systems
  - *“A normative multiagent system is a multiagent system organized by means of mechanisms to represent, communicate, distribute, detect, create, modify, and **enforce norms**, and mechanisms to deliberate about norms and **detect norm violation** and fulfilment”*

# Posner's Sanction Classification

- ▶ Automatic Sanctions
- ▶ Guilt
- ▶ Shame
- ▶ Informational Sanctions
- ▶ Bilateral Costly Sanctions
- ▶ Multilateral Costly Sanctions


# Prisoner's Dilemma

- ▶ <http://www.youtube.com/watch?v=p3Uos2fzIJ0>




# Bilateral Costly Sanctions

- ▶ “Winners don’t punish” by Dreber, Rand, Fudenberg and Novak. *Nature* (2008).



	C	D	P
C	$b - c$	$-d - c$	$-\beta - c$
D	$b + d$	0	$-\beta + d$
P	$b - \alpha$	$-d - \alpha$	$-\beta - \alpha$



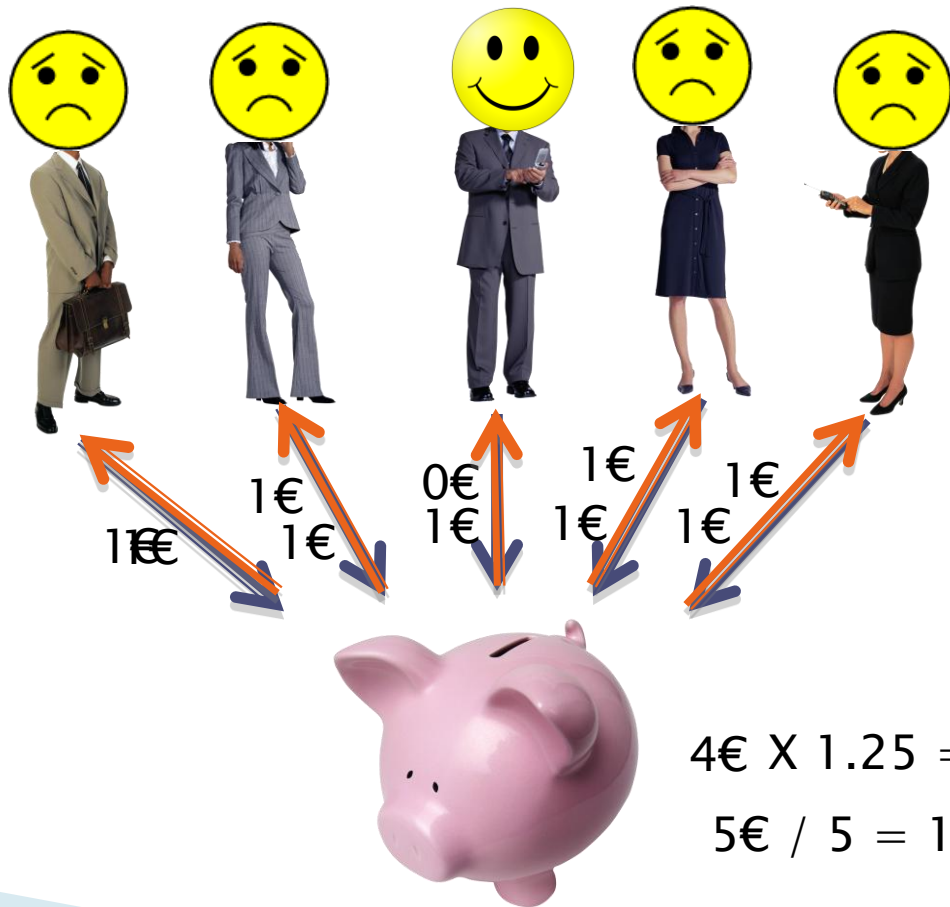
- ▶ Bilateral punishment is expensive and unefficient.

# Multilateral Costly Sanctions

- ▶ What if agents could **self-organize to distribute** the cost of punishment?
  - Distributed punishment promote cooperation in social dilemma situations.
  - Distributed punishment is affordable for the agents.

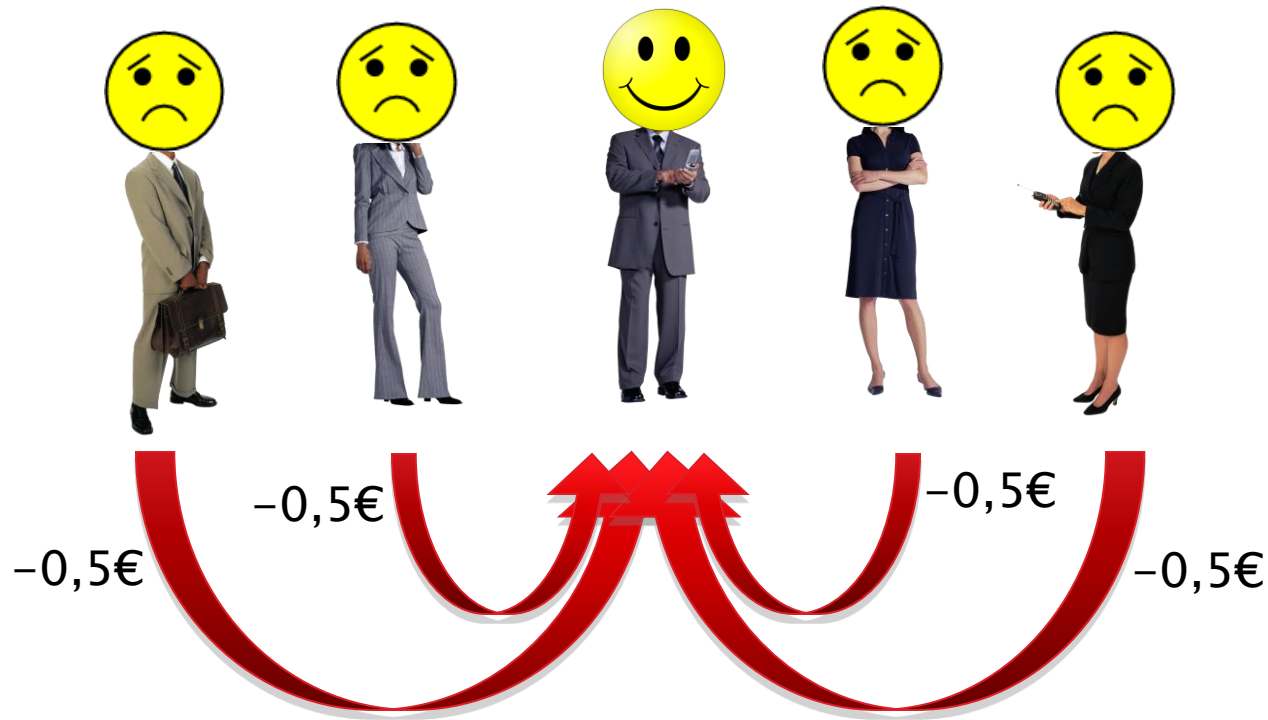
# Public Good Dilemma

- ▶ Who cooperates?

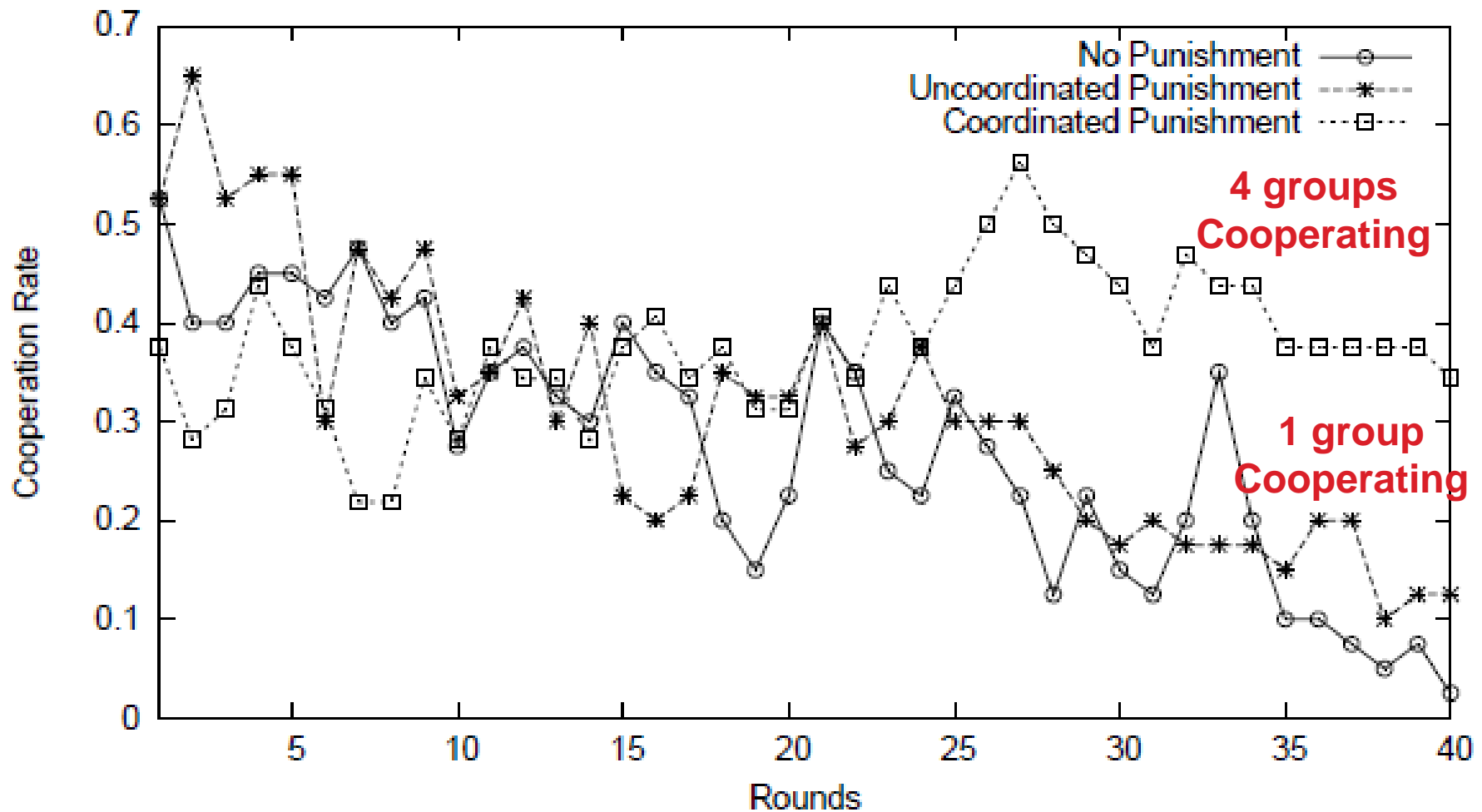


# 2nd Order Social Dilemma

- ▶ How should we punish?



# First Experiments with Humans



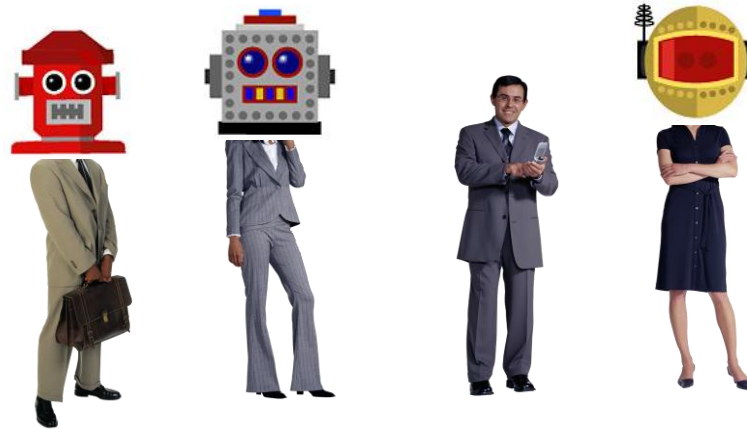
- Experiments with J. Brandts (IAE - CSIC), H. Solaz and E. Fatas (Lineex- UV).

# What happened?

- ▶ Too many decisions:
  - When to cooperate?
  - When to punish?
  - What to do when I am punished?
  - How do I choose whom to punish?
- ▶ Disentangling motivations:
  - Punisher Motivation
  - Punished Motivation

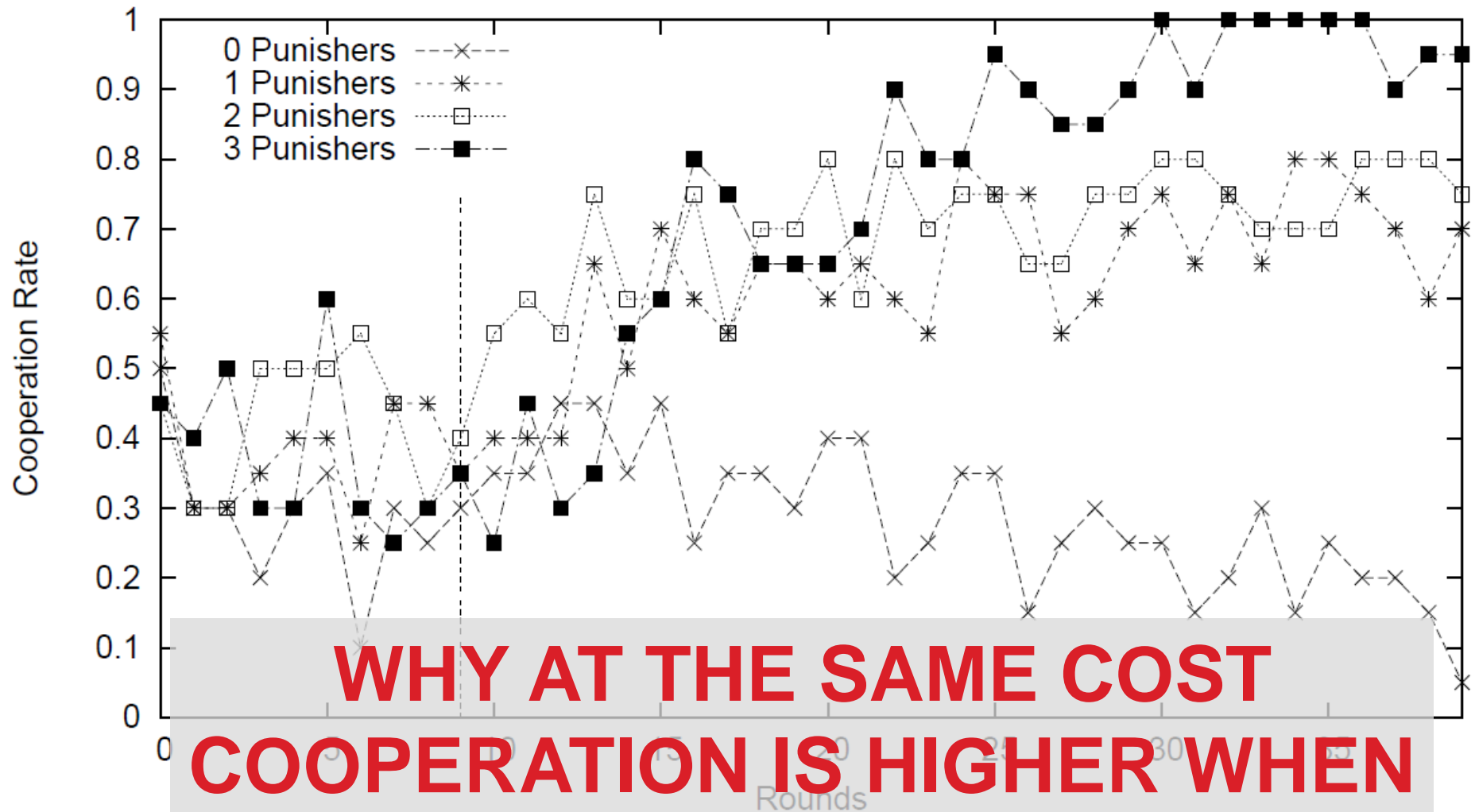


# Using some dummy agents



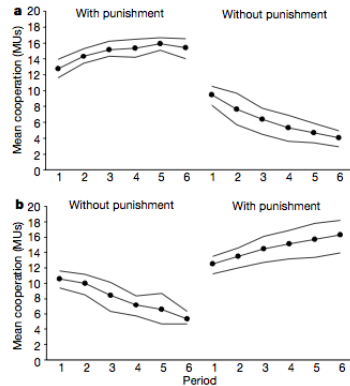
- ▶ 4 different experimental treatments:
  - 0 punishers
  - 1 punisher.
  - 2 punishers.
  - 3 punishers.

# Results

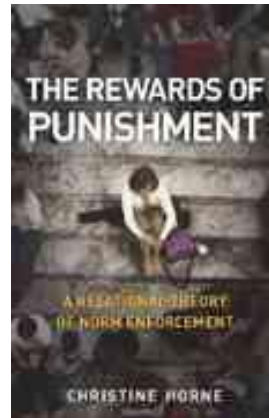


**WHY AT THE SAME COST  
COOPERATION IS HIGHER WHEN  
IMPOSED BY THE MAJORITY?**

# Other clues



Fehr and Gächter, 2000



Horne, 2009



REVIEW ARTICLE

## Punishment in animal societies

T. H. Clutton-Brock & G. A. Parker

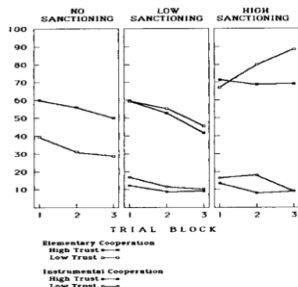
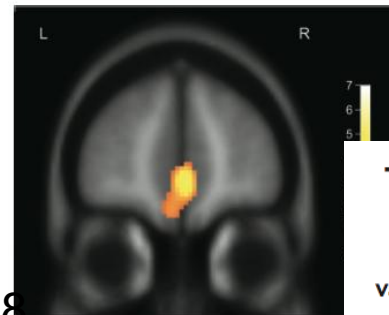
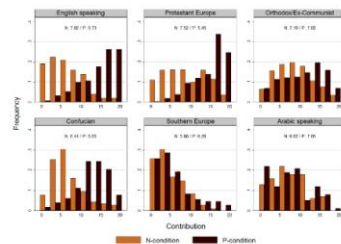


Figure 1. Average elementary and instrumental cooperations.

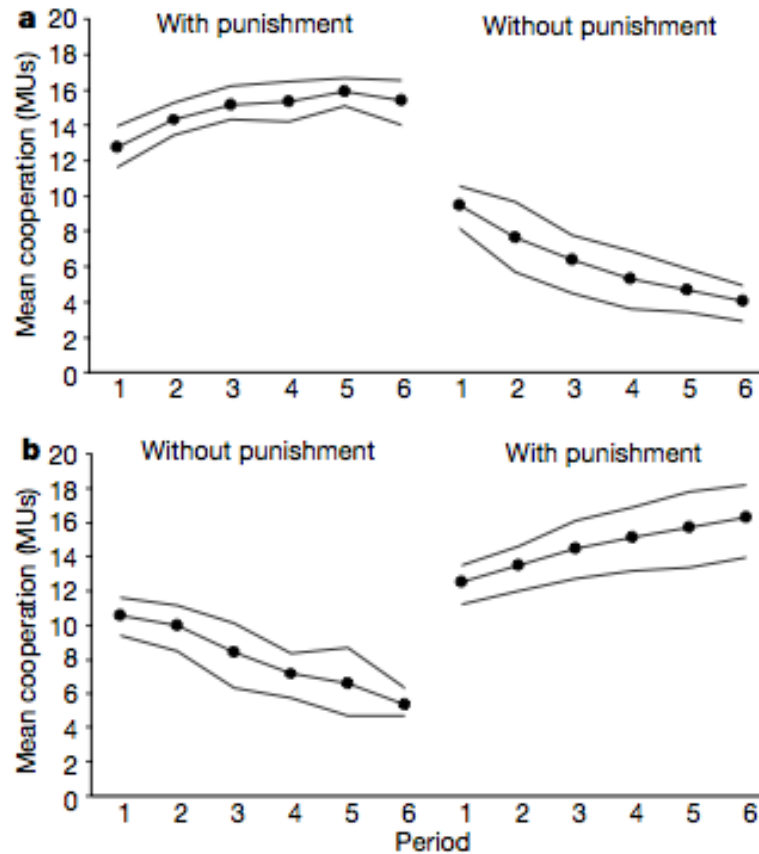
Yamagishi, 1986 Herrmann et al., 2008



## The Neural Basis of Altruistic Punishment

Dominique J.-F. de Quervain,<sup>1\*†</sup> Urs Fischbacher,<sup>2\*</sup>  
Valerie Treyer,<sup>3</sup> Melanie Schellhammer,<sup>2</sup> Ulrich Schnyder,<sup>4</sup>  
Alfred Buck,<sup>3</sup> Ernst Fehr<sup>2,5†</sup>

# Cooperation and Punishment in Public Goods Experiments

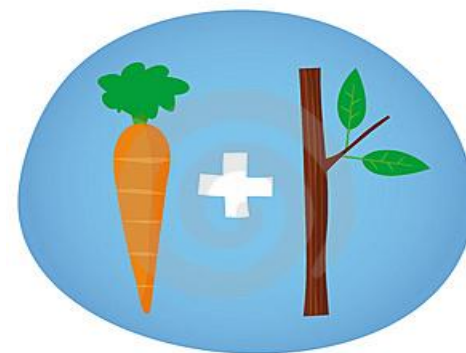


[Fehr and Gächter 2000]

# Carrot and Stick Approach to Punishment

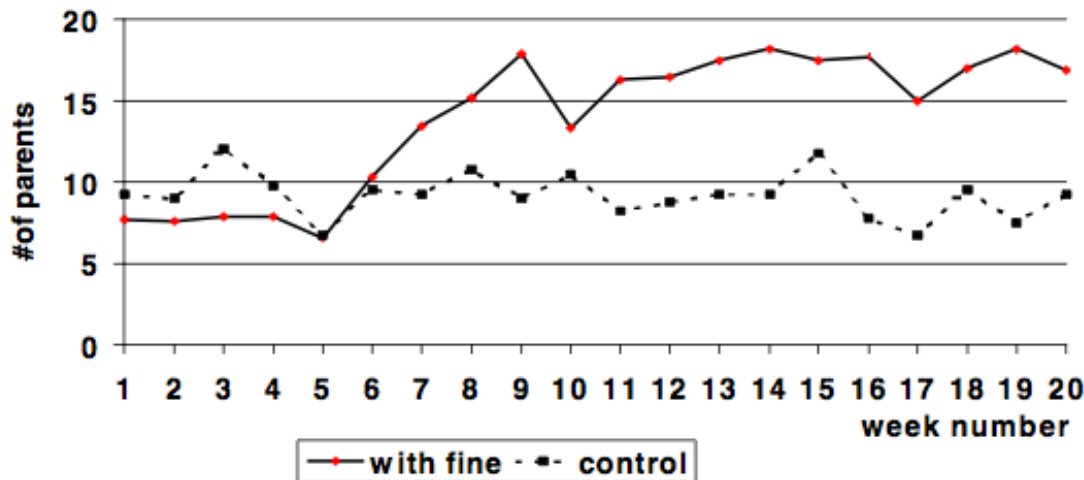
*Individuals obey or break the norm depending on the price of violation, i.e. the severity of punishment discounted by the probability that it will be imposed [Becker, 1968].*

Utilitarian framework:  
human action is instrumentally oriented and  
utility-maximizing



# The Carrot and Stick Approach to Punishment Under Attack

Experimental and real world evidence show that in some circumstances, punishment has no effect or even worst a **detrimental effect** [Gneezy & Rustichini, 2000; Fehr and Rockenbach, 2003; Li et al. 2008]



Gneezy &  
Rustichini, 2000



# The signalling power of punishment

Depending on how it is designed and implemented, punishment conveys distinct messages which frame the decision environment in different ways.

When implemented merely as the imposition of a cost



## Utility-driven decisions

# Sanction

In addition to imposing a cost for the wrongdoing, sanction intentionally **signals** that this conduct is not approved of because it violates a social norm

Scolding, indignation, blame have the effect of focusing people's attention on a) the existence and violation of a norm; b) the high rate of surveillance; c) causal link between violation and sanction; d) sanctioner is a norm defender; etc.

Utility-  
driven  
decisions



Social  
norm -  
driven  
decisions

# Updating Norm Salience

The actions of others provide information about how important a norm is within that social group:

- the amount of compliance and the cost people are willing to spend to obey;
- the surveillance rate, the frequency and intensity of punishment,
- the enforcement typology (private or public, 2nd and 3rd party, punishment or sanction, etc.)
- the efforts and costs expended to educate the population to a certain norm, e.g. publicity campaigns;
- the credibility and legitimacy of the normative source.

A specific social norm is more or less salient depending on how it fits with the social norms and values previously accepted by the individual.



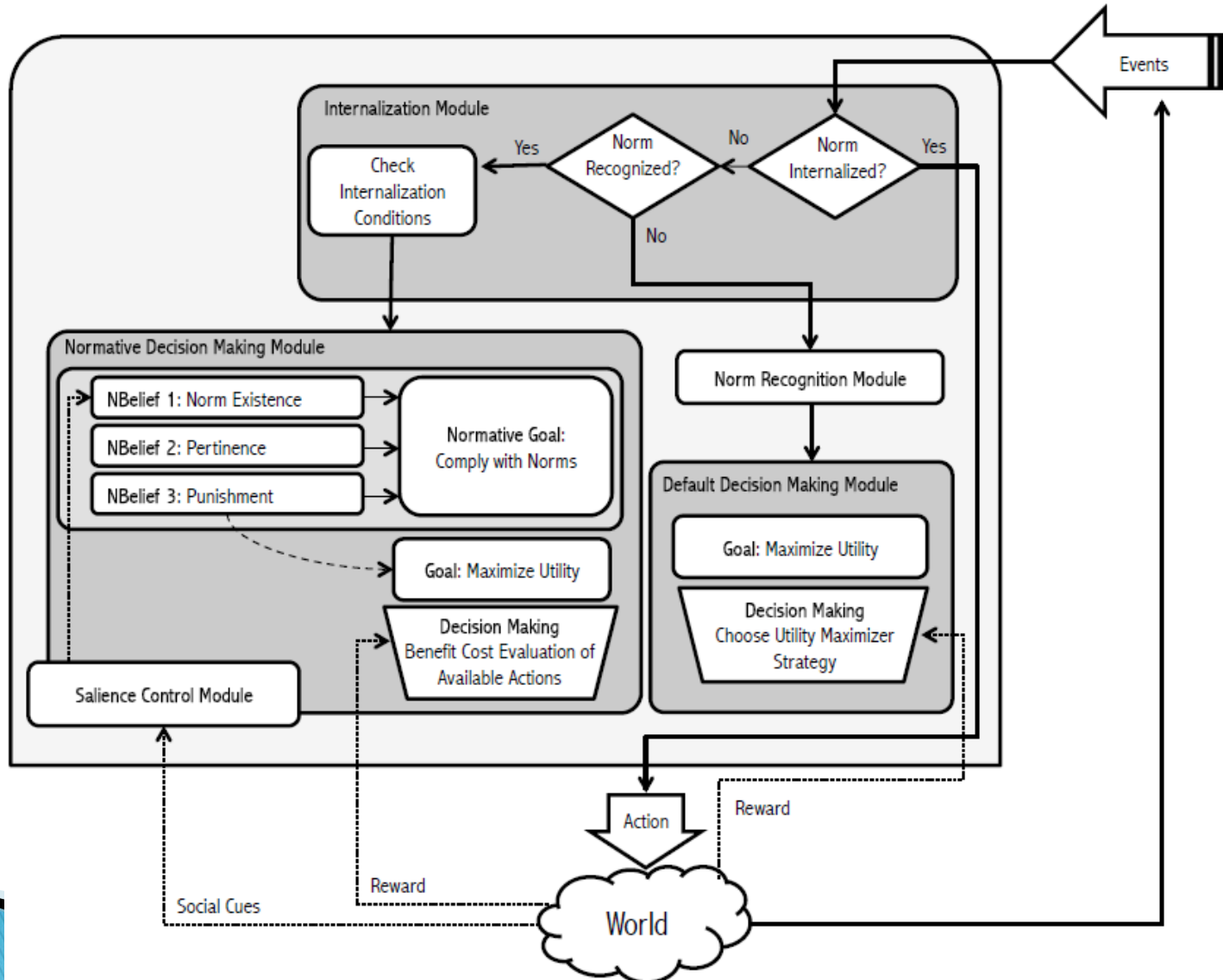
# Irish Spurn Plastic Bags



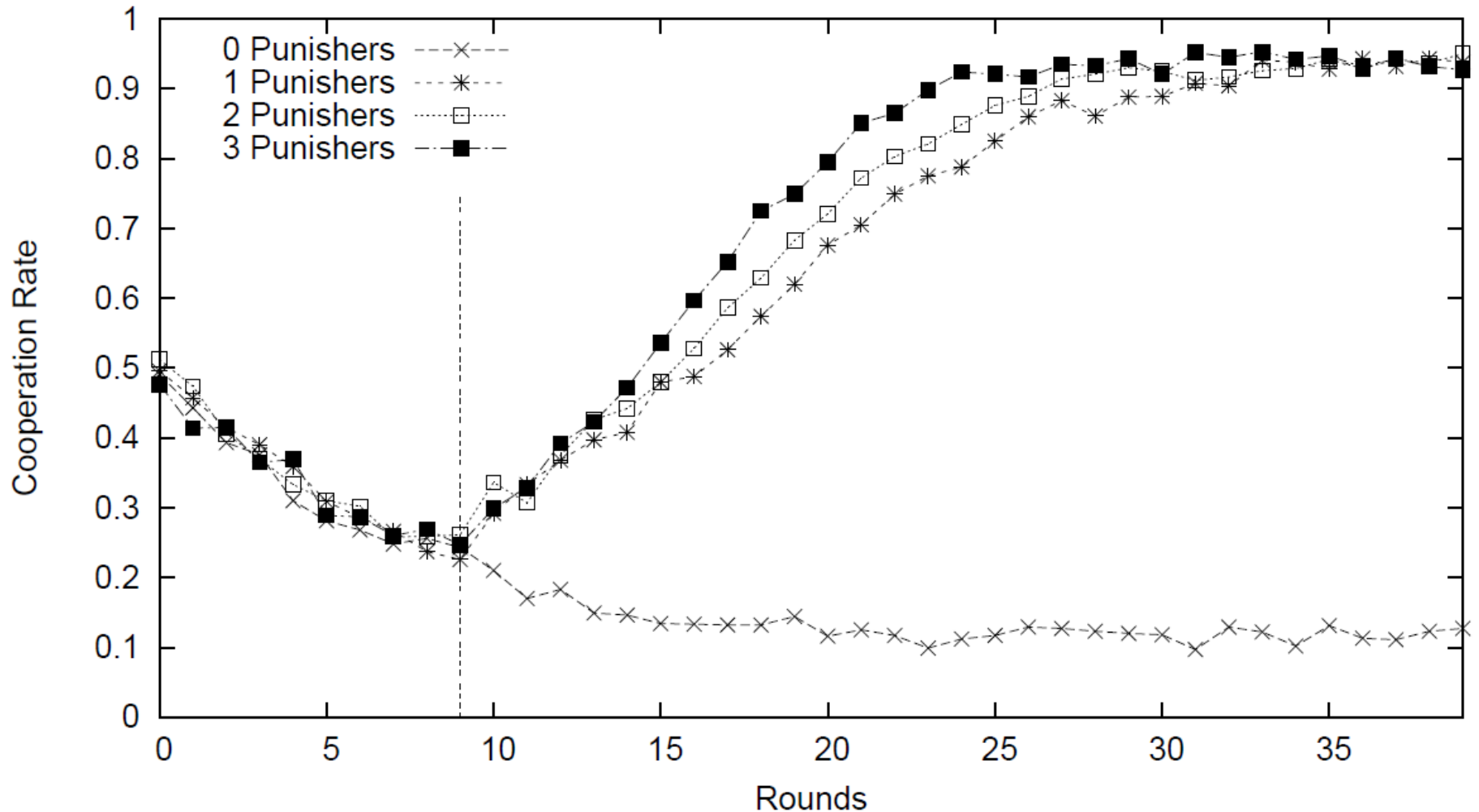
- 2002: small **tax** on plastic grocery bags enacted in Ireland
- in two weeks tax resulted in a **94% decline** in plastic bags use
- The Irish plastic bag tax was preceded by a substantial **publicity campaign**
- Informal enforcement: “Plastic bags were not outlawed, but carrying them became **socially unacceptable**”, “When my roommate brings one in the flat it **annoys** the hell out of me”

[Rosenthal, E. 2008.]

# EMIL-I-A

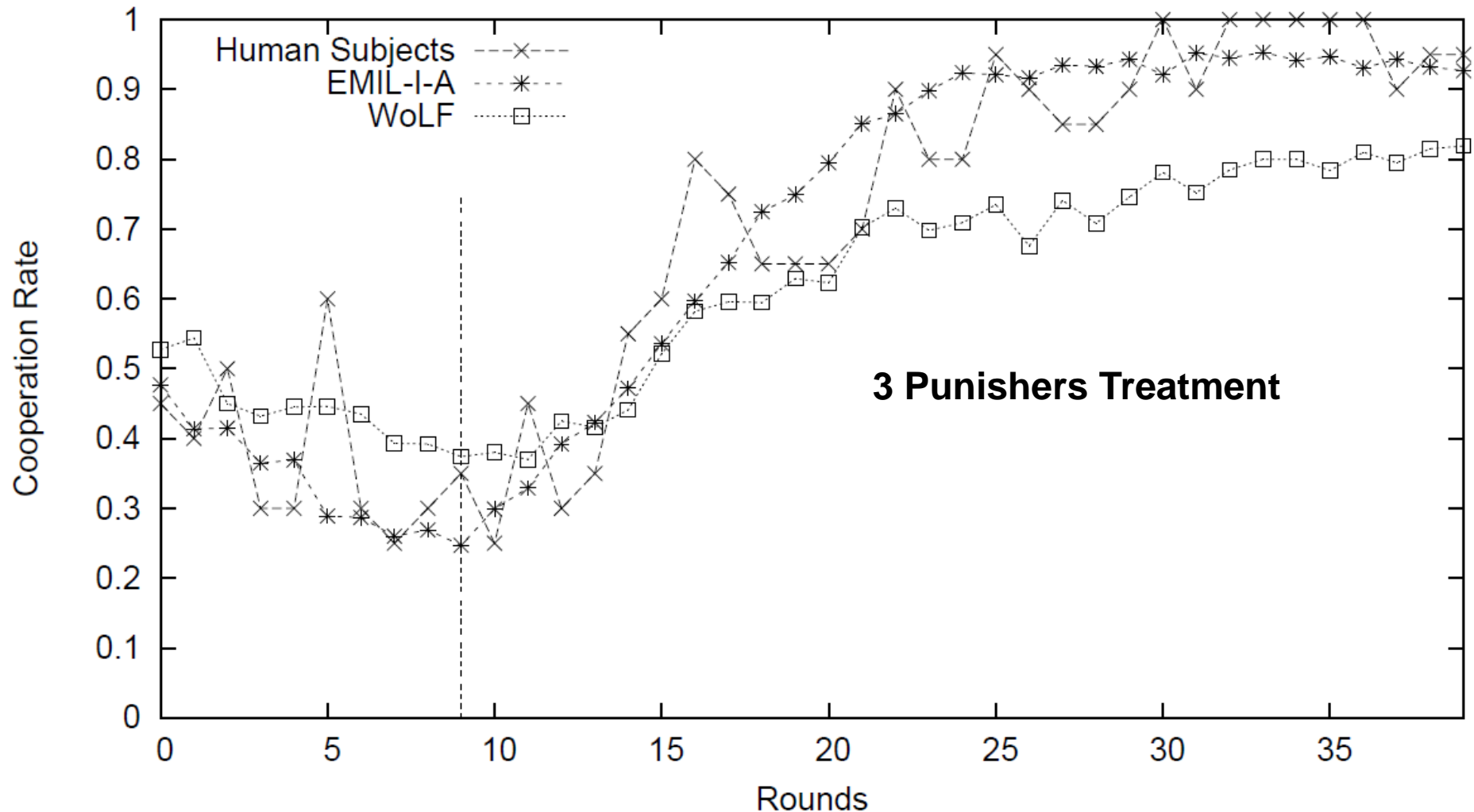


# How does EMIL-I-A perform?

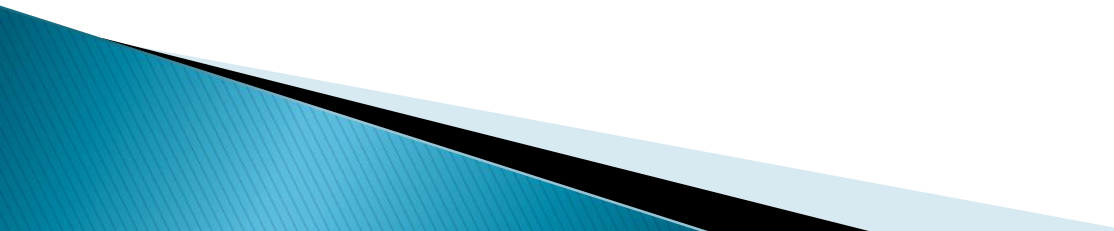




# And with respect to classical RL?



# What have we used EMIL-I-A for?

- ▶ Scale up problems:
    - Bigger populations.
    - Different distributions.
    - On different social networks.
  - ▶ Different dynamics of the systems:
    - When new free-riders are introduced.
    - Unstable resources.
    - Unstable environments.
- 

# For further info



- ▶ *Dynamic Sanctioning for Robust and Cost-Efficient Norm Compliance.* Villatoro, Andrighetto, Sabater and Conte.

**Thanks!**

**Questions?**

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