

CONTAGION OF NORM BREAKING VS THE NUMBER OF RIGHTEOUS PEOPLE

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in cooperation with

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International Workshop on Coping with Crises in Complex Socio-Economic Systems, ETH Zurich, Switzerland, June 8-12, 2009

outline

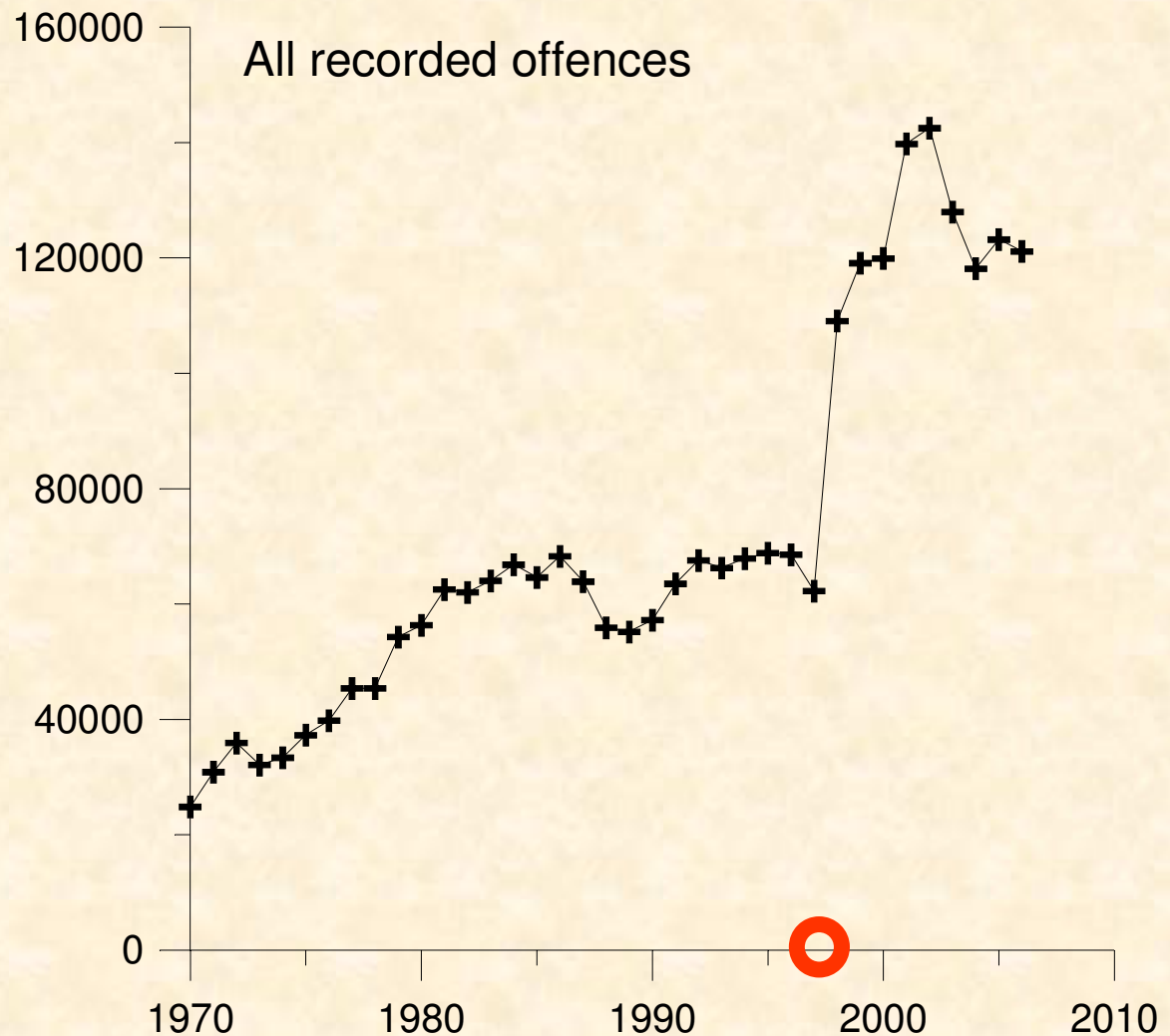
- Some stylized... motivations
- Norms and punishment
- Axelrod's norm game with labeling
- Norm strength
- Threshold probabilities
- How many righteous?
- Unconcluded question

A change: crime in Northern Ireland



Since mid-1997, the main paramilitary group, the Provisional IRA, has observed a ceasefire.

[Wikipedia]



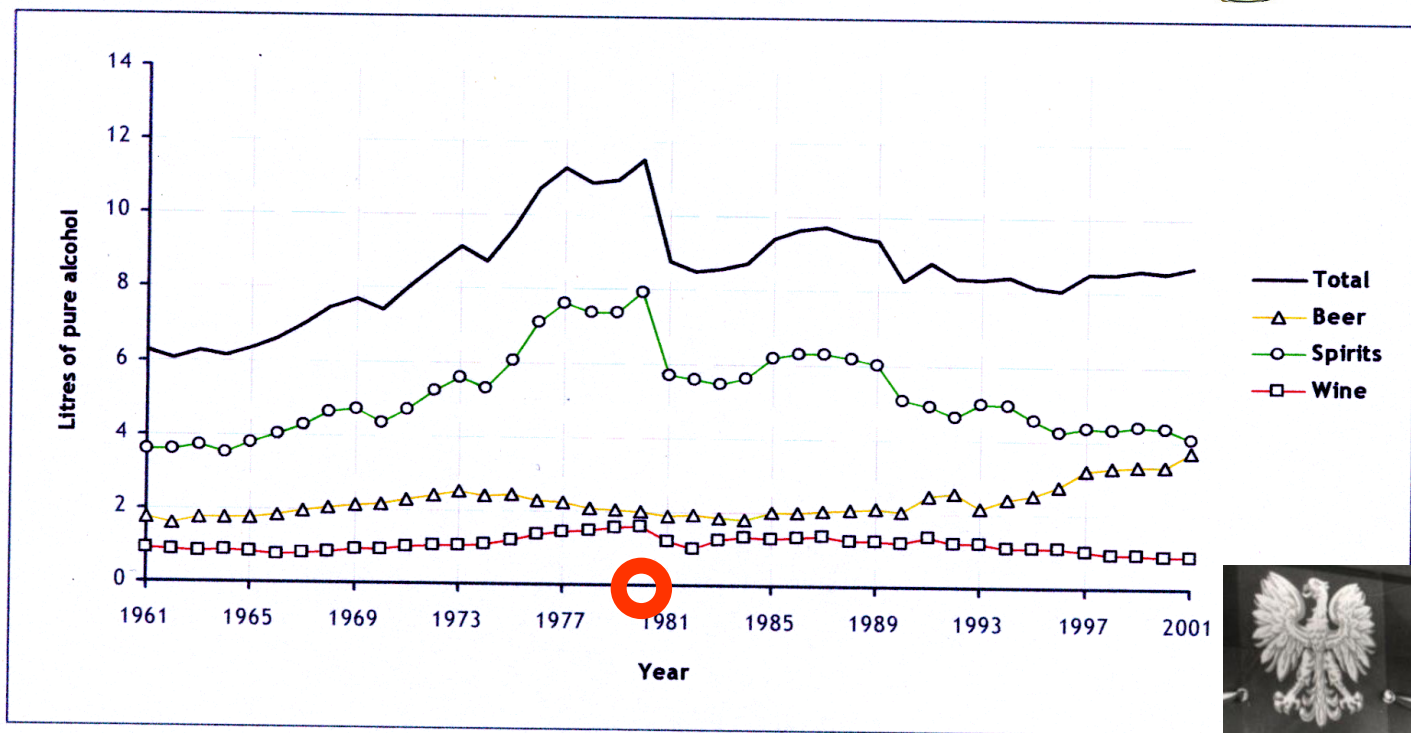
<http://epp.eurostat.ec.europa.eu/>

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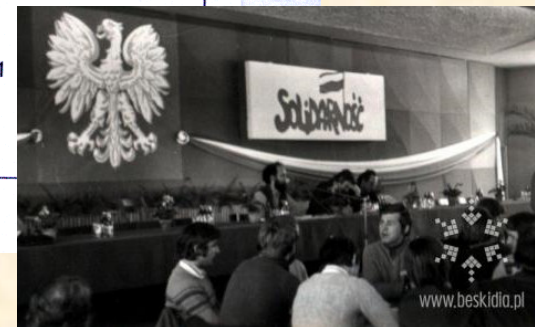
A change: drinking in Poland

POLAND

Recorded adult per capita consumption (age 15+)

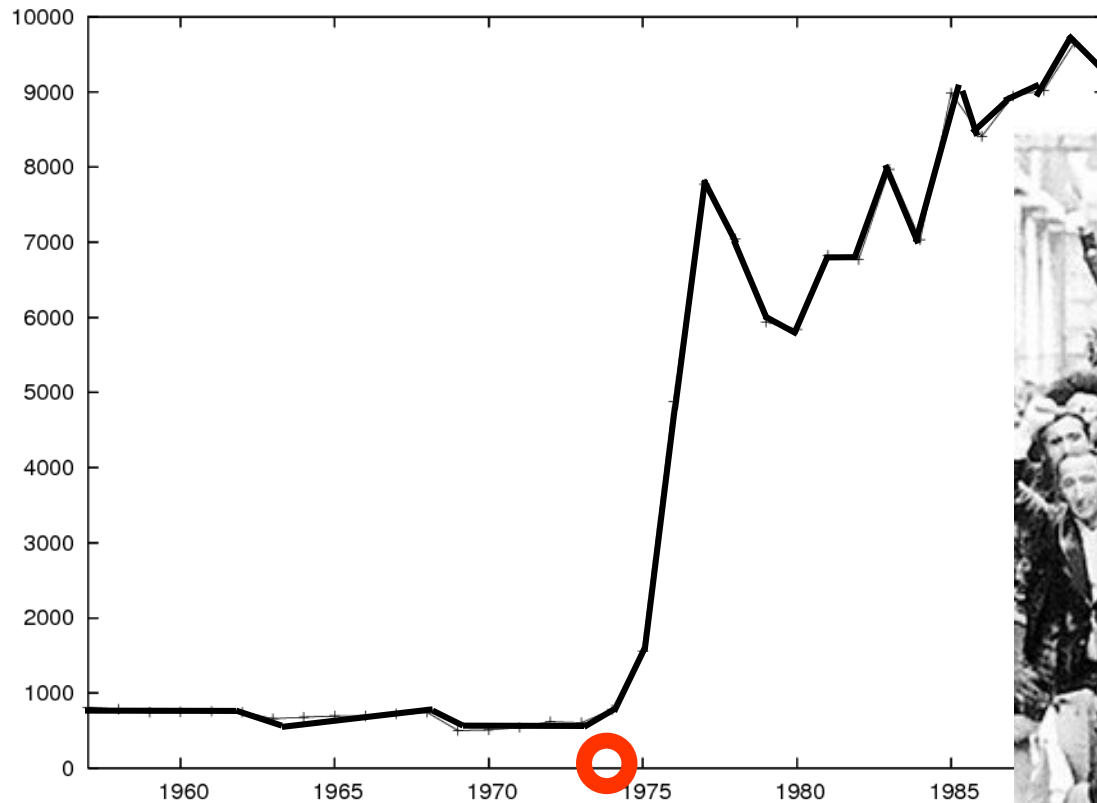


Sources: FAO (Food and Agriculture Organization of the United Nations), World Drink Trends 2003



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A change: divorces in Portugal

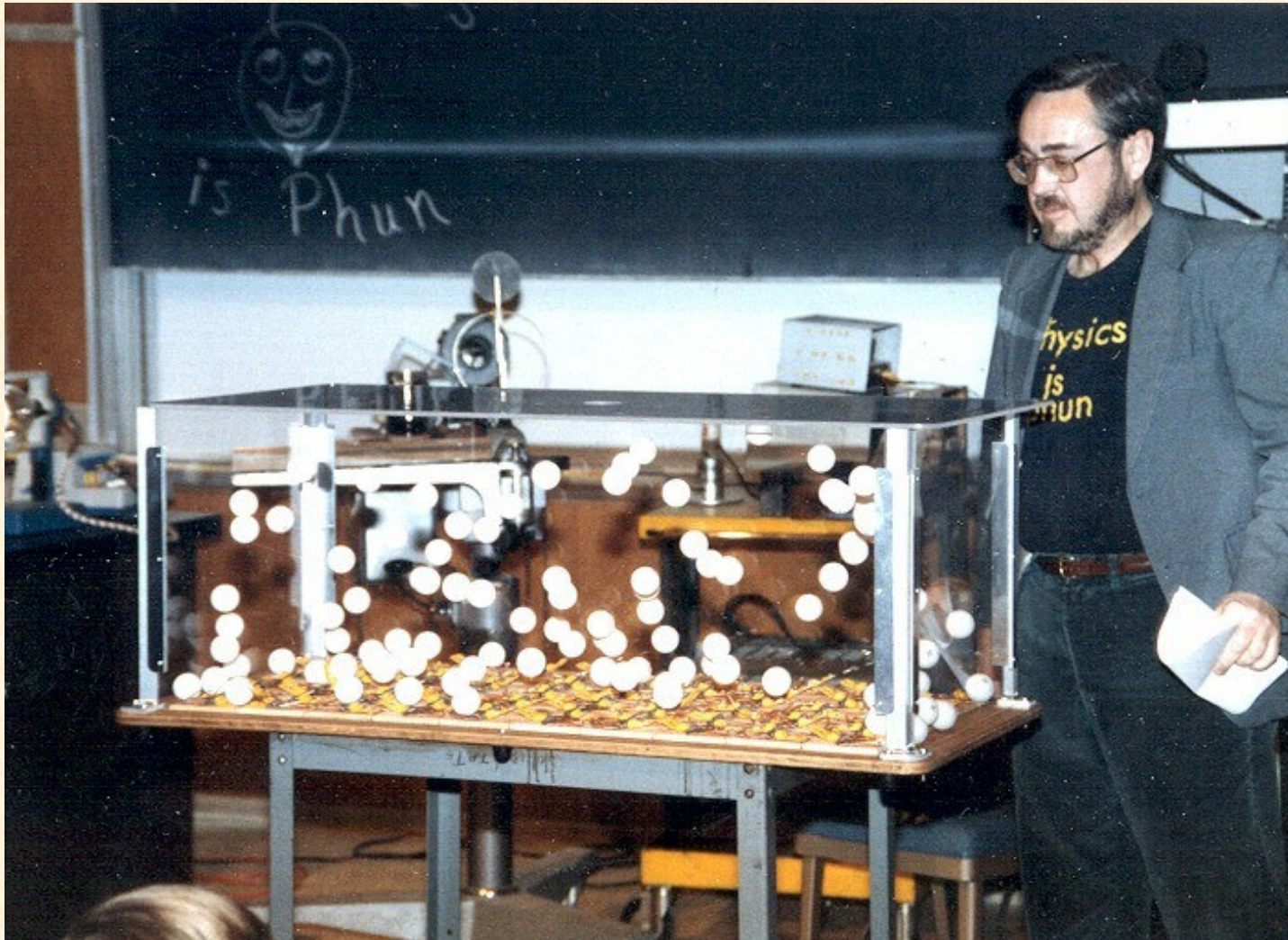


<http://epp.eurostat.ec.europa.eu/>



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Some positive feedback?

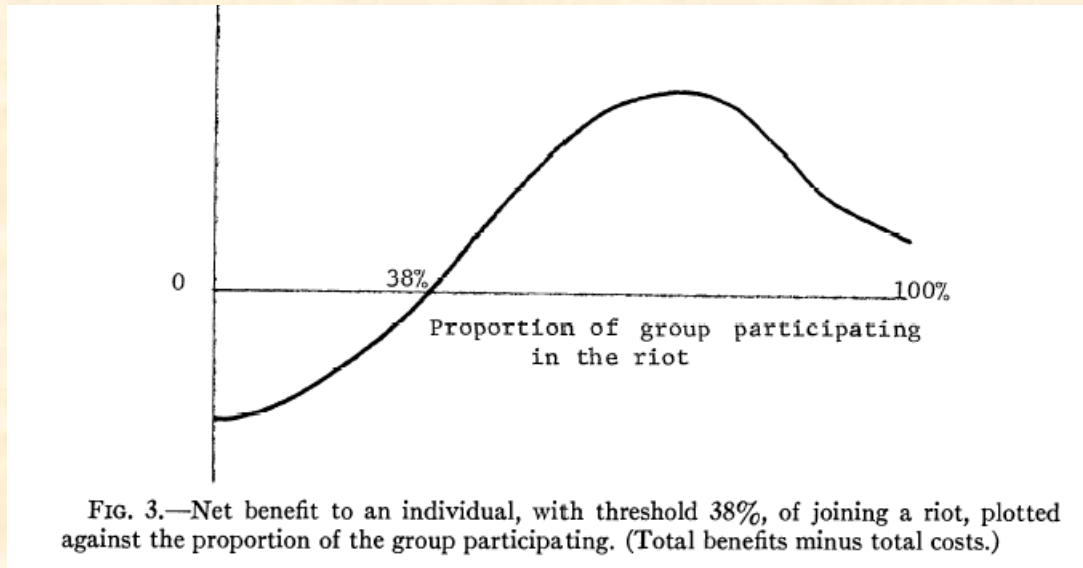


(Thanks to www.physics.umd.edu)

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Catastrophic events (such as crashes, or sudden opinion shifts) can occur at the macro level, induced by imitation, whereas the behaviour of independent agents would be perfectly smooth.

Quentin Michard and Jean-Philippe Bouchaud, Eur. Phys. J. B **47**, 151–159 (2005)
Theory of collective opinion shifts: from smooth trends to abrupt swings



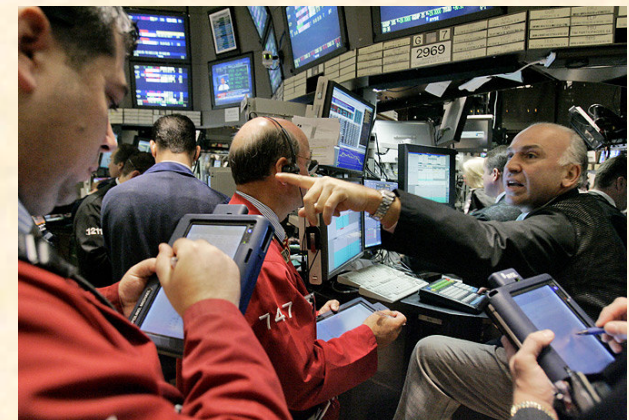
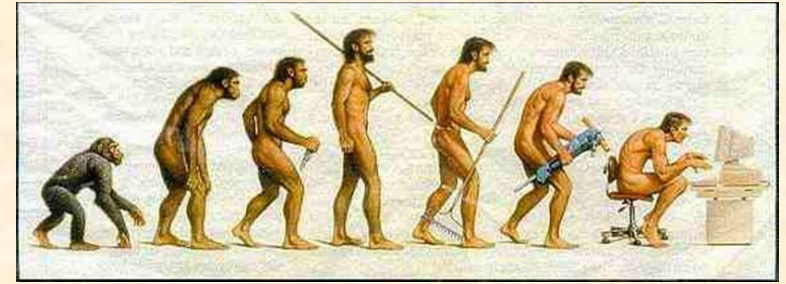
Foam party – a threshold game

Mark Granovetter, Amer. J. Soc. **83** (1978) 1420
Threshold models of collective behaviour

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Robert Axelrod: *Three mechanisms of an evolutionary change:*

1. More effective individuals are more likely to survive and reproduce.
2. **The players learn by trial and error, keeping effective strategies and altering ones that turn out poorly.**
3. The players observe each other, and those with poor performance tend to imitate the strategies of those they see doing better.



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„The first need of any social system is to create incentives to make people do more work than that required by their immediate wants.”

[Elias J. Bickerman]



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A norm exists in
a given social
setting

to the extent that

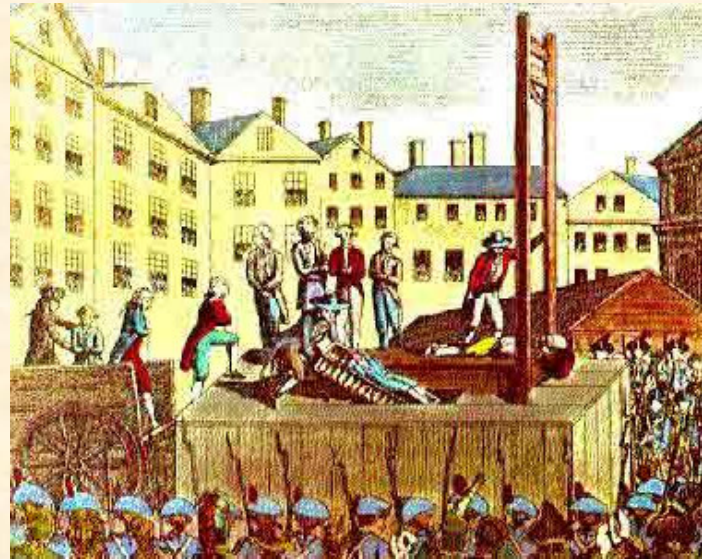
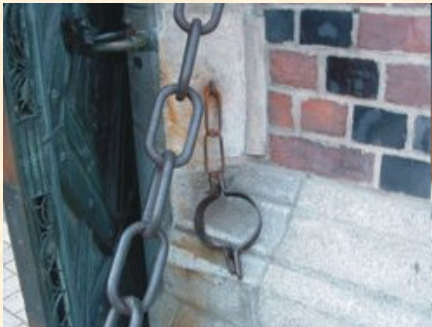
individuals
usually act in a
certain way ...



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...and are often
punished when
seen not to be
acting in this way.



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**ONE
STEP:**

select randomly
an agent i

$S \in (0,1)$

$b(i) < S$; end



$b(i) > S$; i defects



$S \in (0,1)$

$\forall k \in \{n.n. (i)\}$

$v(i)=0$, $b(i)=1$



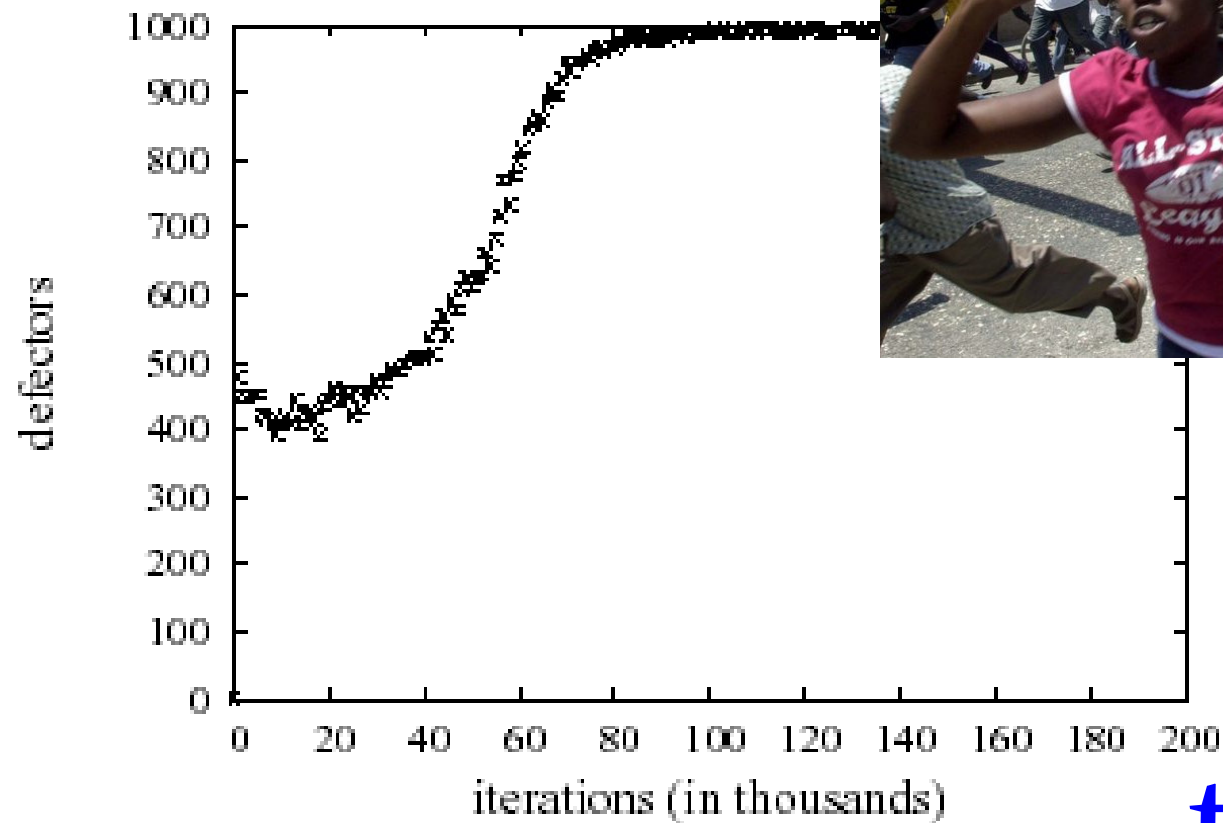
$S < v(k)$; k punishes

$v(k) < S$; k is an accomplice

$v(k)=0$, $b(k)=1$; end

$b(i)=b(i)(1-\beta)$; punishment
 $v(k)=v(k)(1-\gamma)$; cost
end

defectors

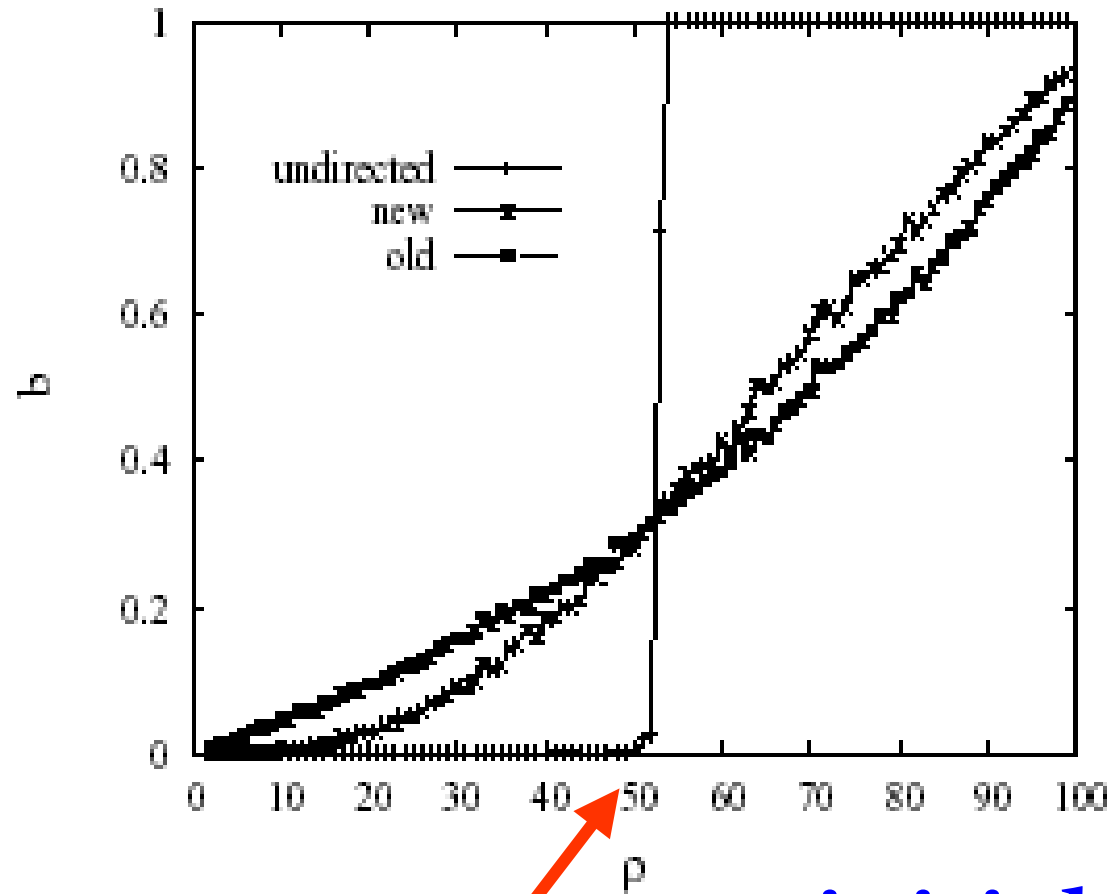


time

Figure 2: Time evolution of the number of defectors - an example.

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final boldness

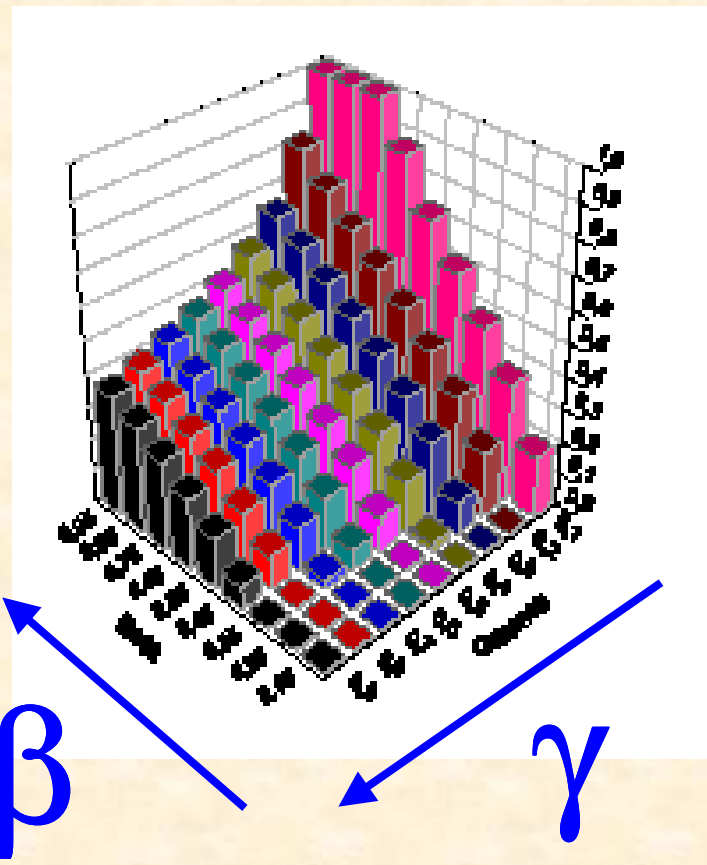
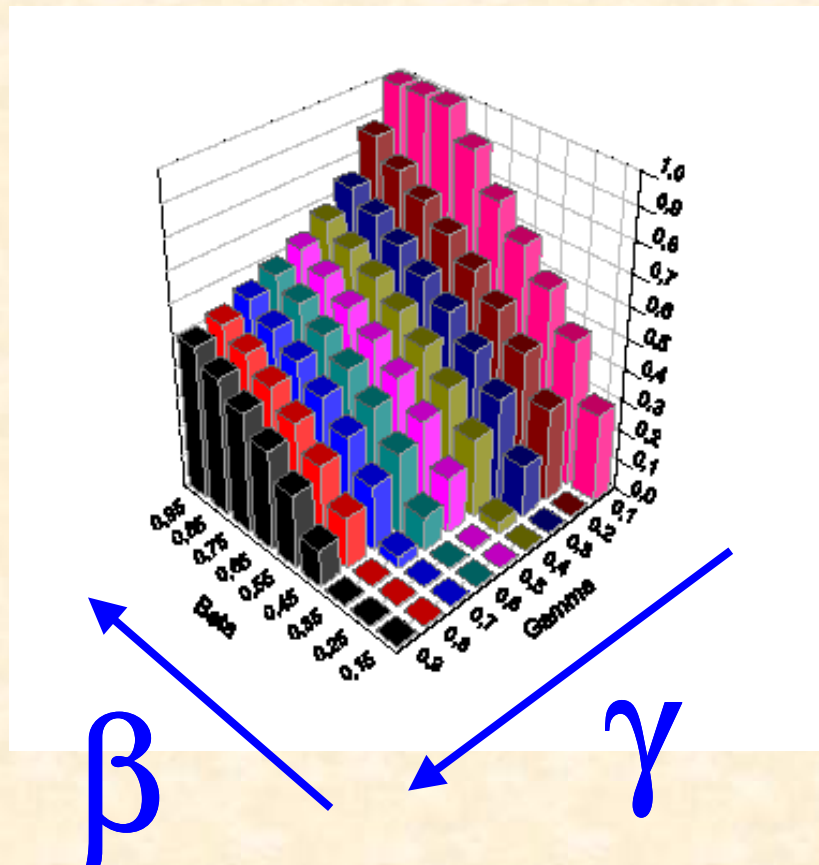


norm strength

initial boldness

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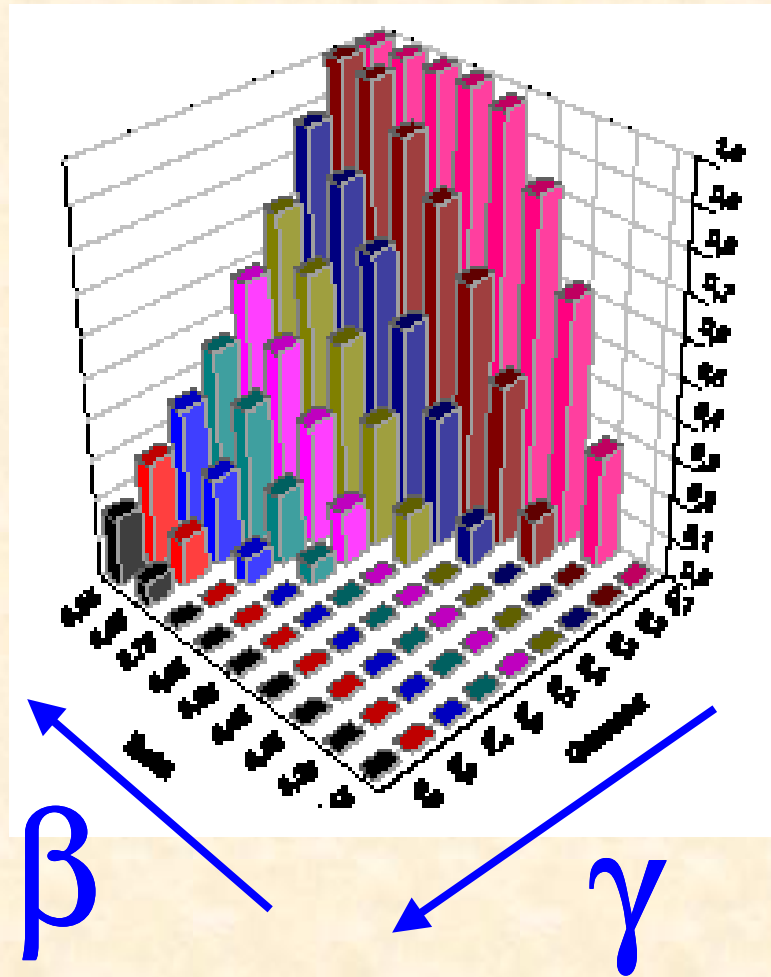
norm strength



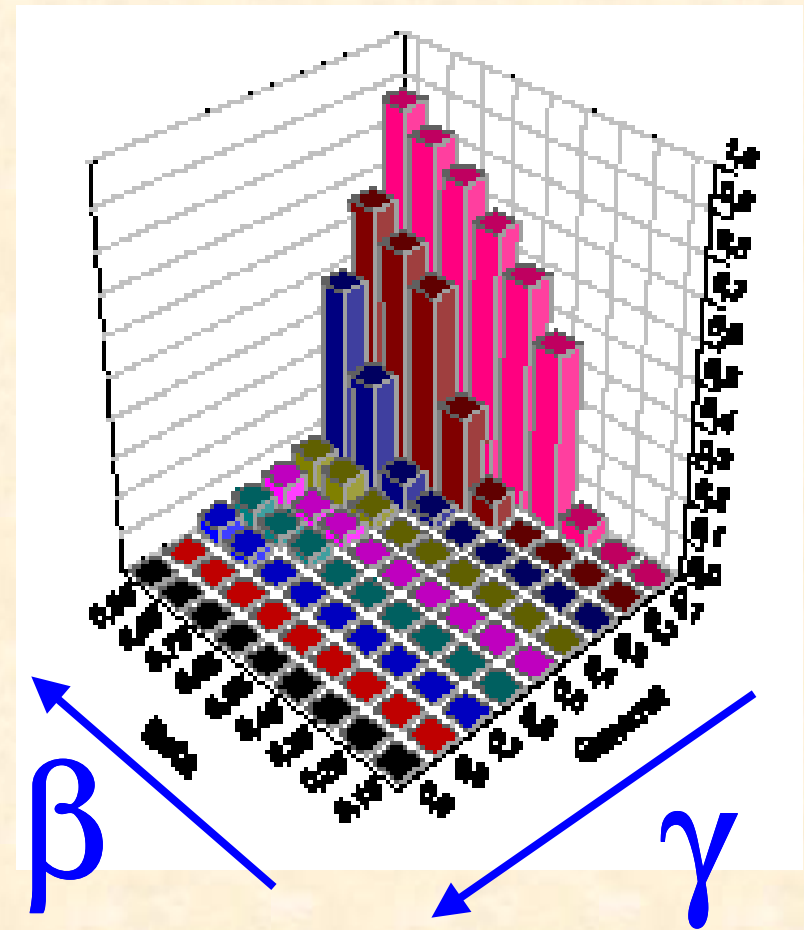
E-R network, various initial vengeances

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norm strength

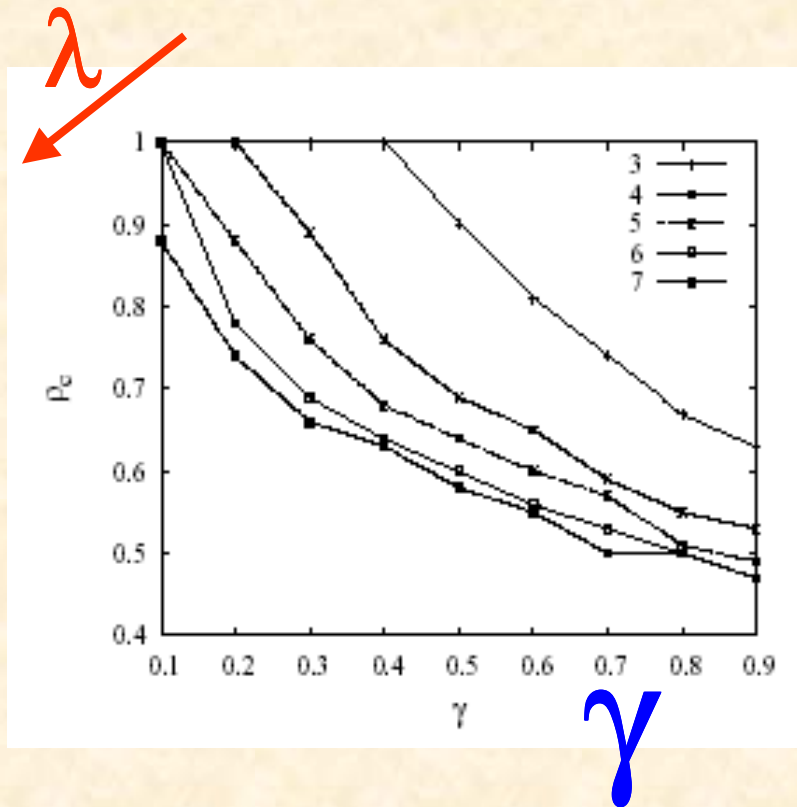


B-A networks: $M=2$

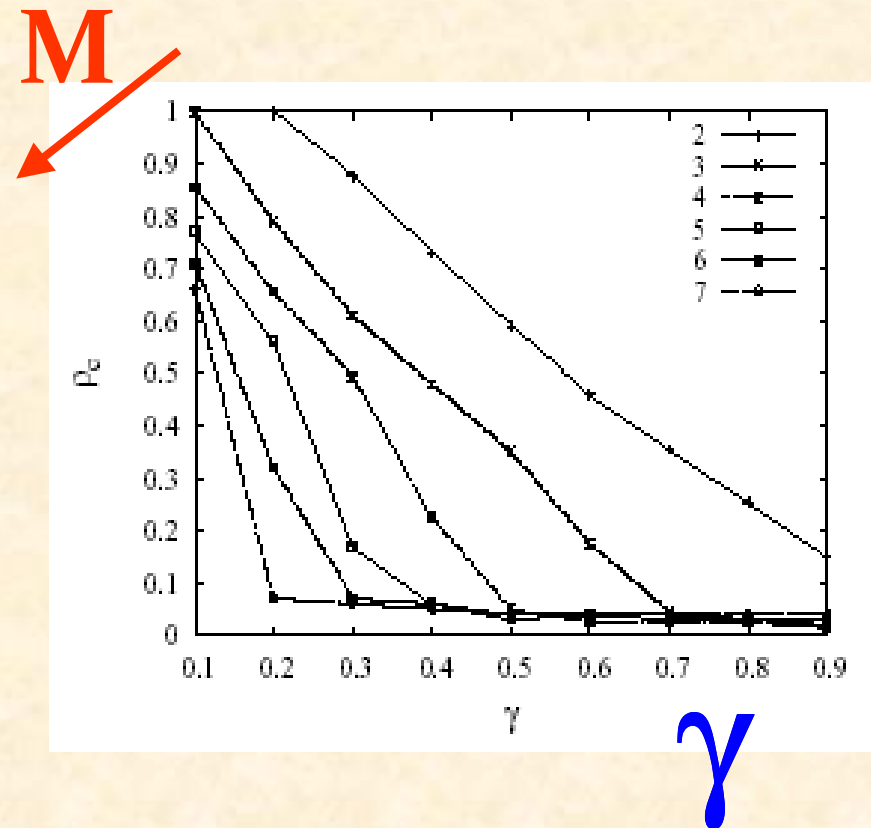


$M=4$

norm strength



E-R networks



B-A networks



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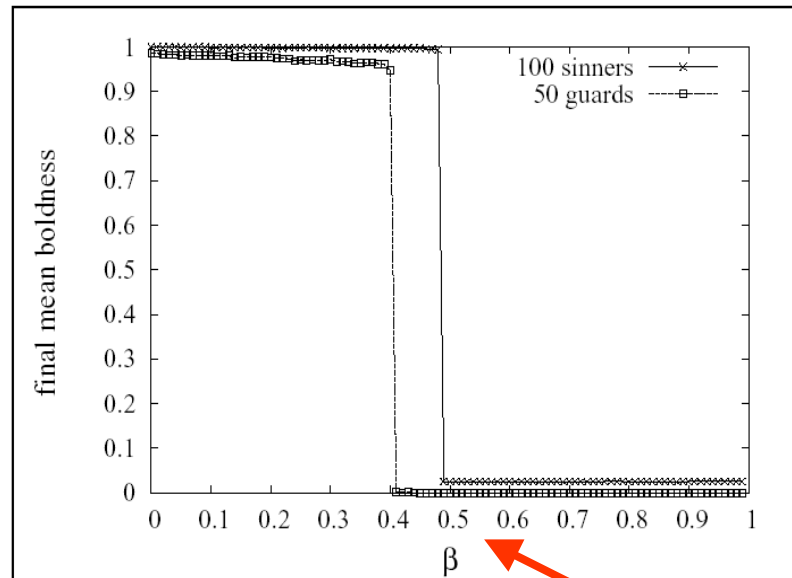


„For the
sake of ten,
I will not
destroy it.”

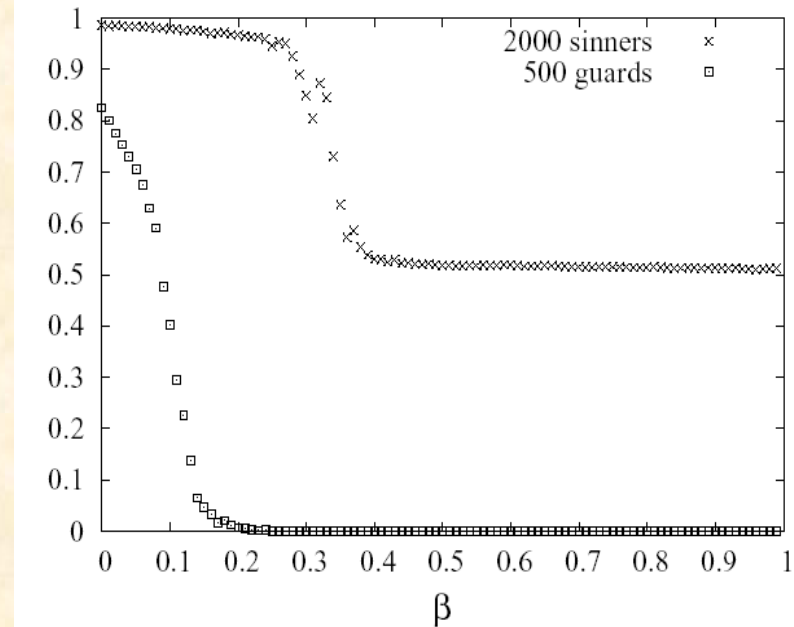


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final boldness, $\#=4000$



β

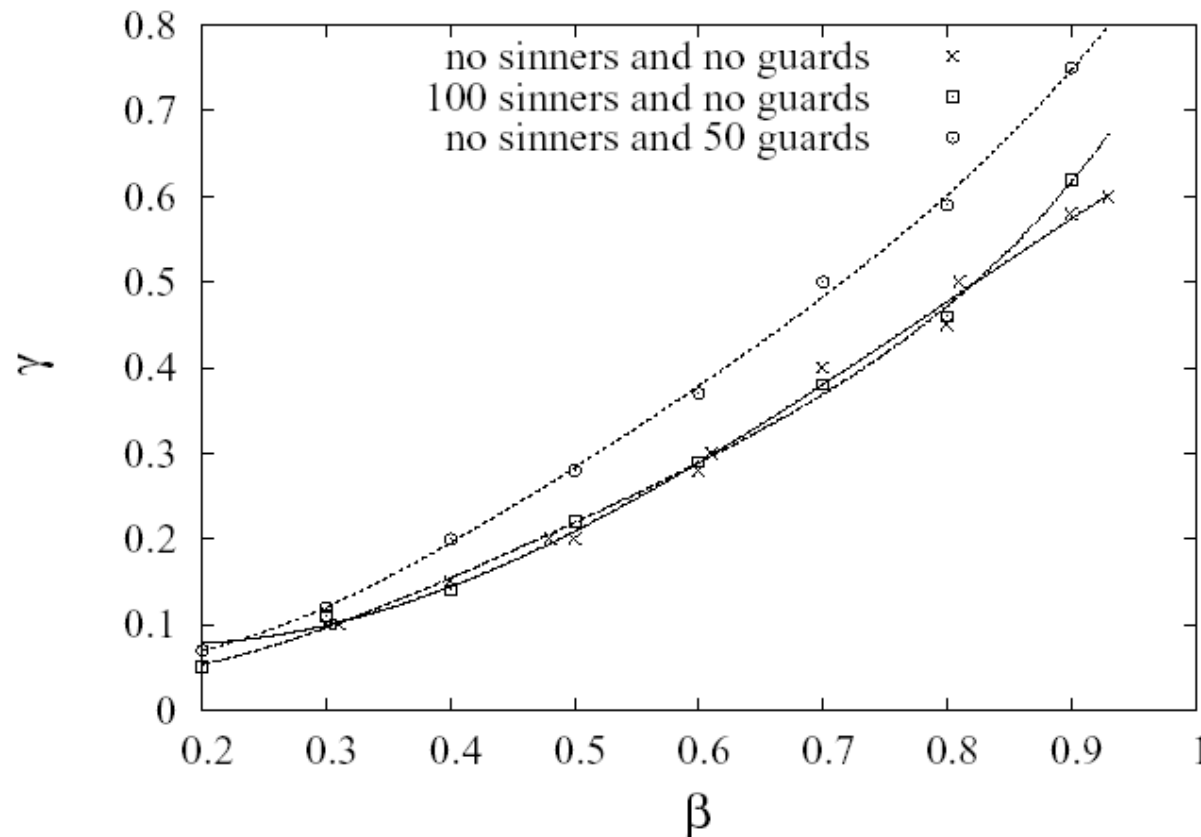


β

threshold probability β_c

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The critical line



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discussion

- Some directed networks do not show the discontinuity
- The results are more sensitive to the punishment cost than to the punishment
- **Question:** how to imagine the social labeling in the case of divorces?

Perhaps it is an open promoting of opinions what plays the role of the labeling.



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references

- **A. Dydejczyk, K. Kułakowski, M. Rybak**
The norm game - how a norm fails
LNCS **5545** (2009) 835
- **M. Rybak, A. Dydejczyk, K. Kułakowski**, The
norm game on a model network: a critical line
(accepted in LNCS; arXiv:0904.0081)

Thank you

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