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Reactive social behaviour models and reality

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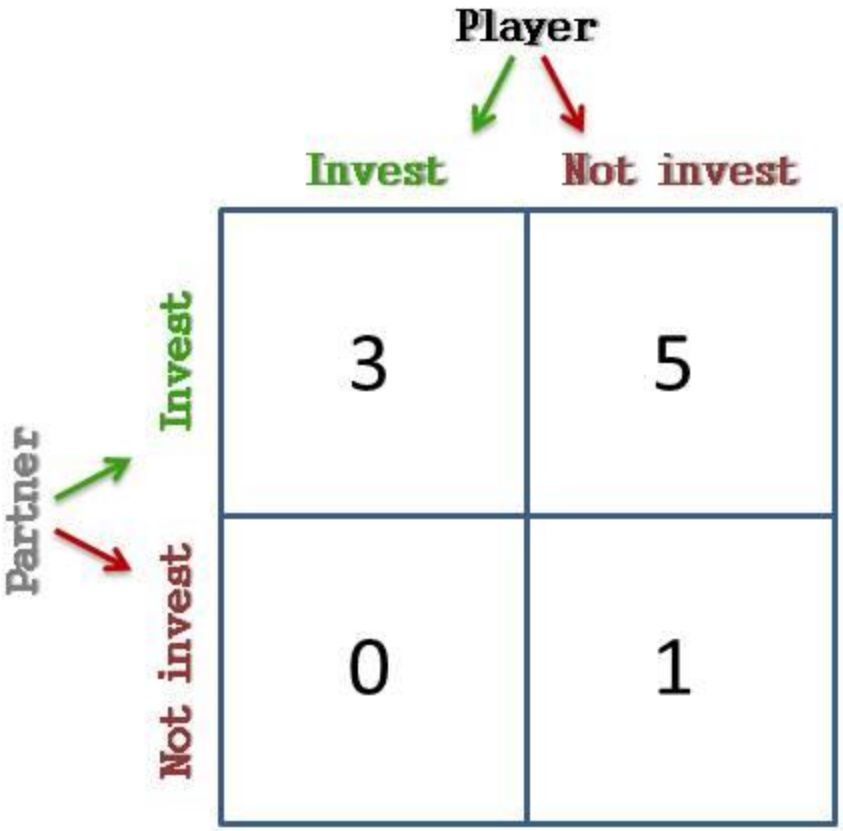
IIASA
Science for Global Insight

Cooperative investments, Economic exchanges

Cooperative investments and social dilemmas. Why study?

Cooperative investments and social dilemmas. Why study?



Cooperative investments and social dilemmas. How to study?

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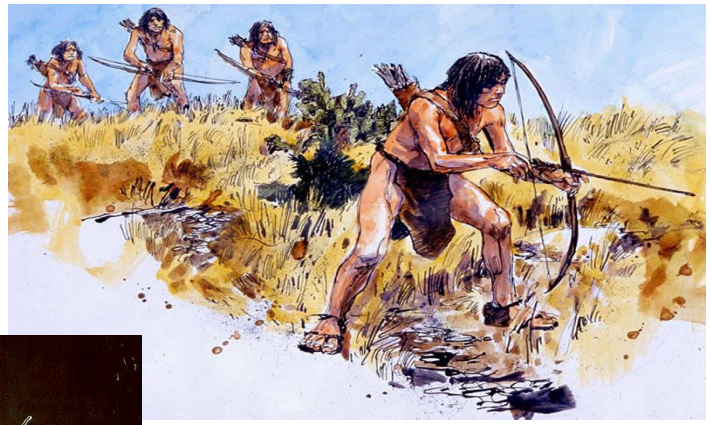
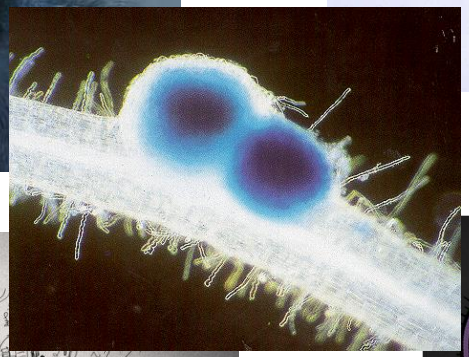
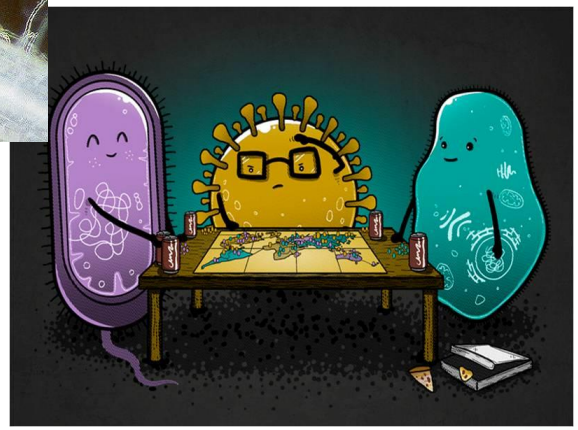
Cooperative investments and social dilemmas. How to study?







Reciprocity in animals: food sharing in vampire bats

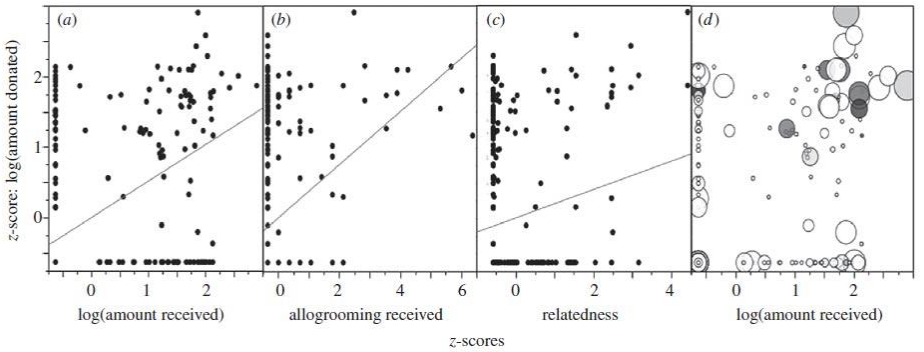


Figure 1. Relationships between food donated and predictor variables. *z*-score for log food donated was predicted by *z*-scores of (*a*) log food received ($R^2 = 0.27$, $p < 0.0002$), (*b*) allogrooming received ($R^2 = 0.14$, $p < 0.0002$) and (*c*) relatedness ($R^2 = 0.04$, $p < 0.0012$). A bubble plot (*d*) shows multivariate relationships by scaling bubble size to relatedness and bubble darkness to allogrooming received.

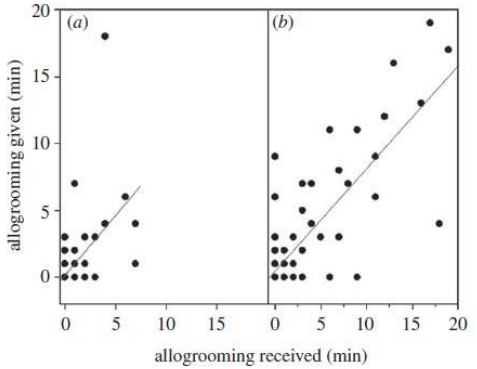


Figure 3. Allogrooming given correlates with allogrooming received. Allogrooming giving is plotted against allogrooming received for dyads that did not share food ((*a*) $n = 214$, $r = 0.62$, $p < 0.0002$) and dyads that did share food ((*b*) $n = 98$, $r = 0.81$, $p < 0.0002$). On non-trial days, dyads that shared food both gave and received more allogrooming than non-sharing dyads ($F_{1,310} = 32.9$ and 41.0, $p < 0.0002$ for both).

Food sharing in vampire bats: reciprocal help predicts donations more than relatedness or harassment

Gerald G. Carter and Gerald S. Wilkinson

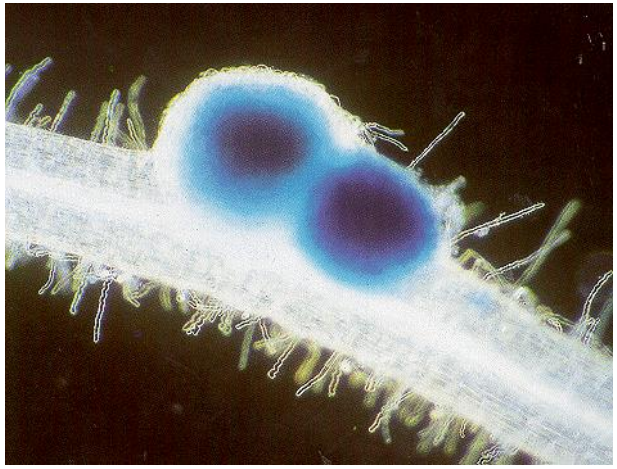
Proc. R. Soc. B 2013 **280**, 20122573, published online 2 January 2013

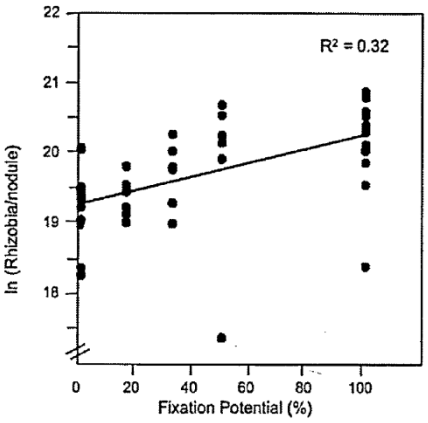
Reciprocity in plants, fungi, bacteria: nutritional mutualisms

Evolutionary Ecology Research, 2006, 8: 1077–1086

Measured sanctions: legume hosts detect quantitative variation in rhizobium cooperation and punish accordingly

E. Toby Kiers,[1,2]* Robert A. Rousseau[1] and R. Ford Denison[1,3]

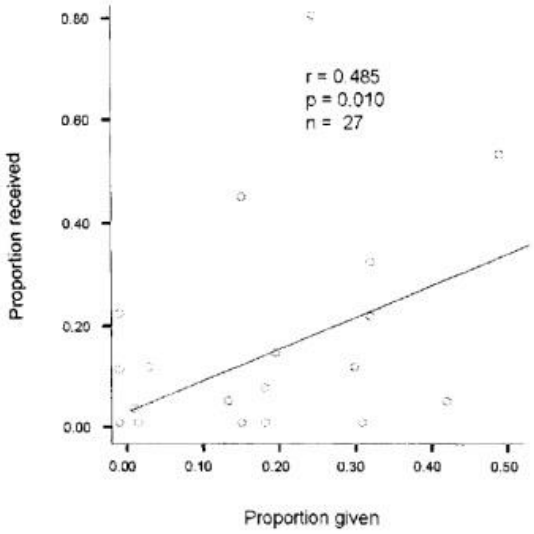




Investment behavior in humans:
Food sharing among hunter-gatherers

Meal Sharing among the Ye'kwana

Figure 2. Proportional giving and receiving.



Hames & McCabe (2007) *Human Nature*

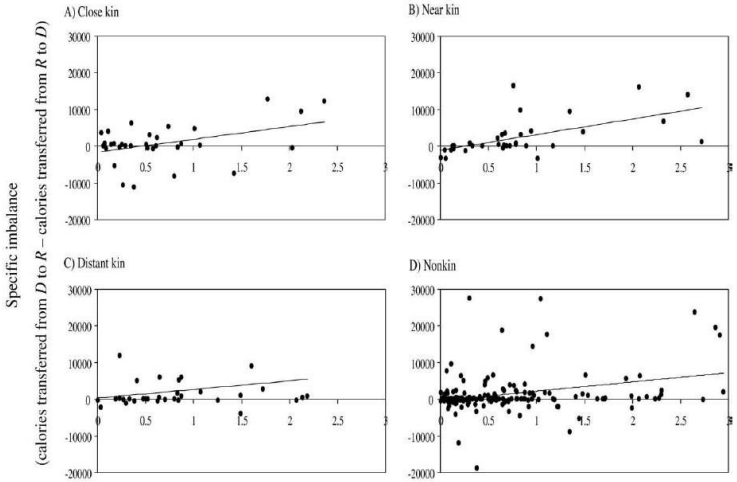
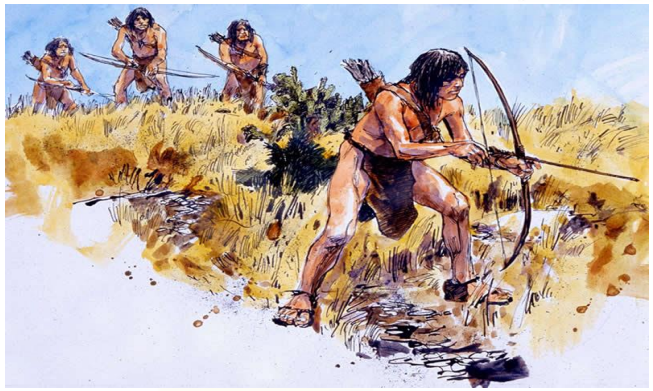


Fig. 1. Linear regression of the relationship between the difference in net caloric production between dyads of households and specific imbalance in their food transfers (arrayed so that positive specific imbalance values are attained when an imbalance favors the household with the lower net caloric value). Plots for (a) close kin (r>.05), (b) near kin (.018<r<.047), (c) distant kin (0<r<.018), and (d) unrelated dyads (r=0).

Evolution and Human Behavior 29 (2008) 305–318

Reciprocal altruism, rather than kin selection, maintains nepotistic food transfers on an Ache reservation☆

Wesley Allen-Arave[a,*], Michael Gurven[b], Kim Hill[c]



Investment behavior in humans: Public Good game experiments

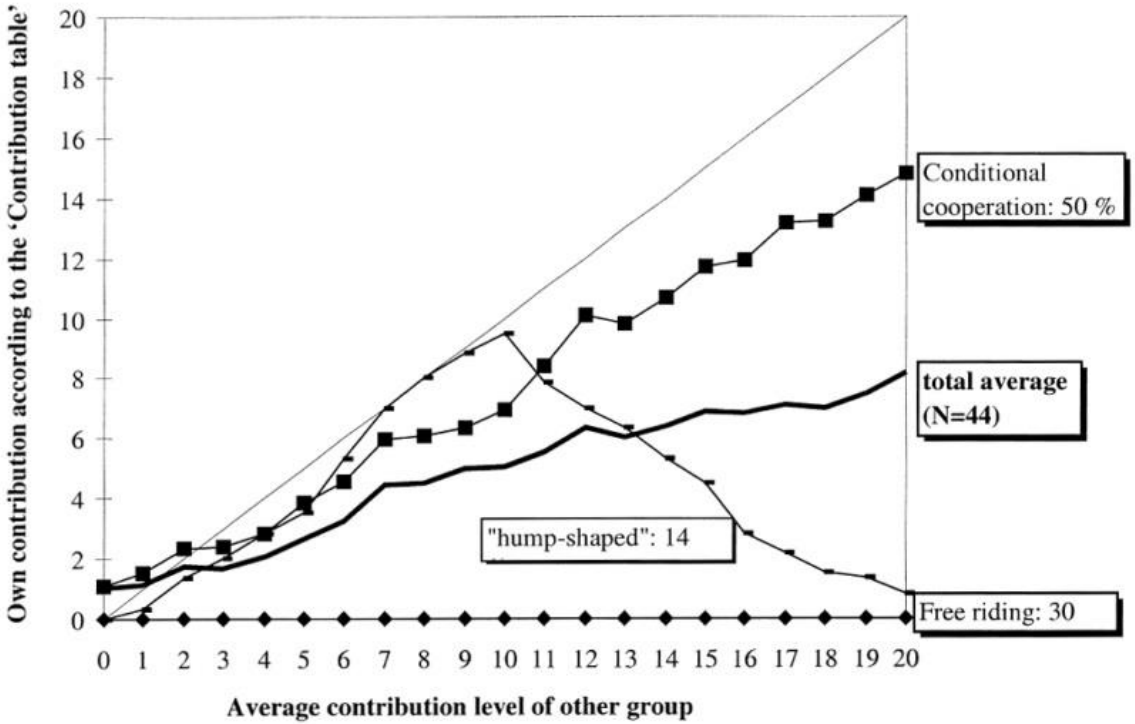


Fig. 1. Average own contribution level for each average contribution level of other members (diagonal = perfect conditional).

Economics Letters 71 (2001) 397–404

Are people conditionally cooperative? Evidence from a public goods experiment

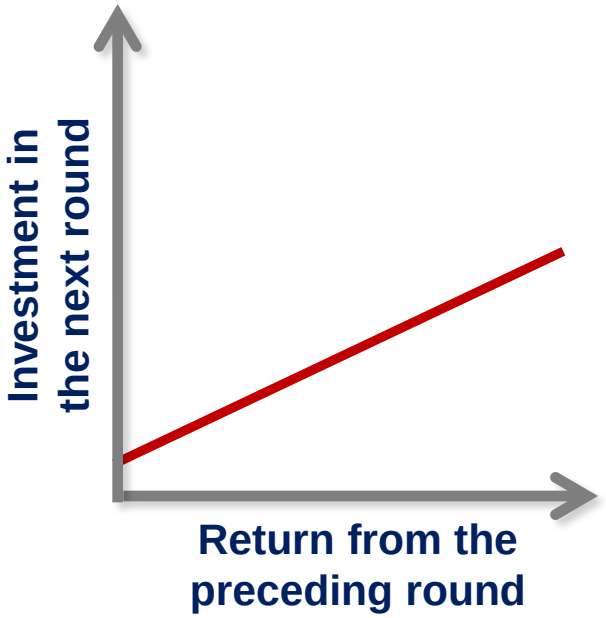
Urs Fischbacher[a,*], Simon Gächter[b], Ernst Fehr[a]

[a] *University of Zurich, Institute for Empirical Economic Research, Blümlisalpstrasse 10, CH-8006 Zürich, Switzerland*
[b] *University of St. Gallen, FEW-HSG, Dufourstrasse 50b, CH-9000 St. Gallen, Switzerland*

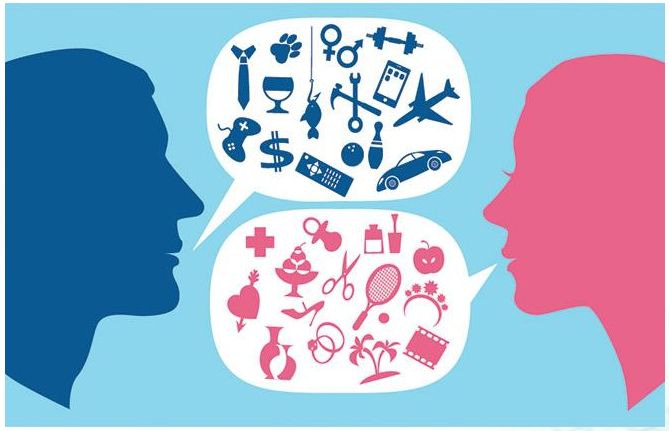
Received 19 July 2000; accepted 21 December 2000

Modelling reactive investments

Investments based on preceding returns



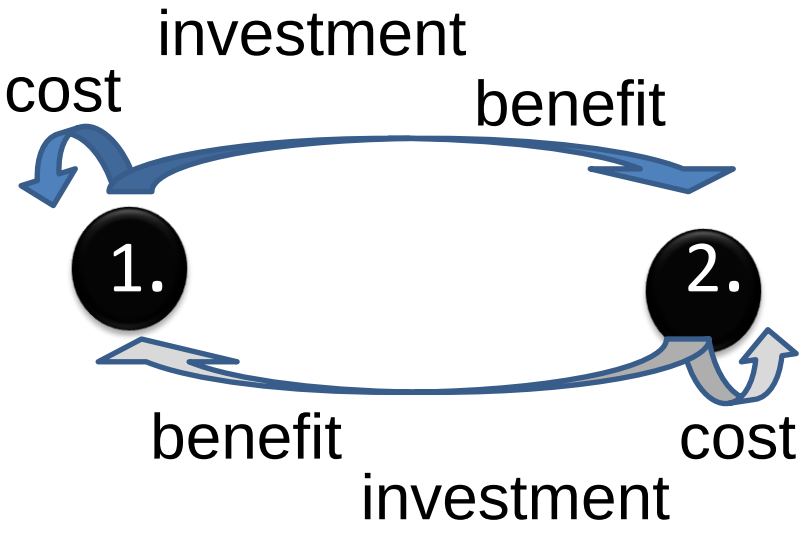
Reciprocal investments in humans

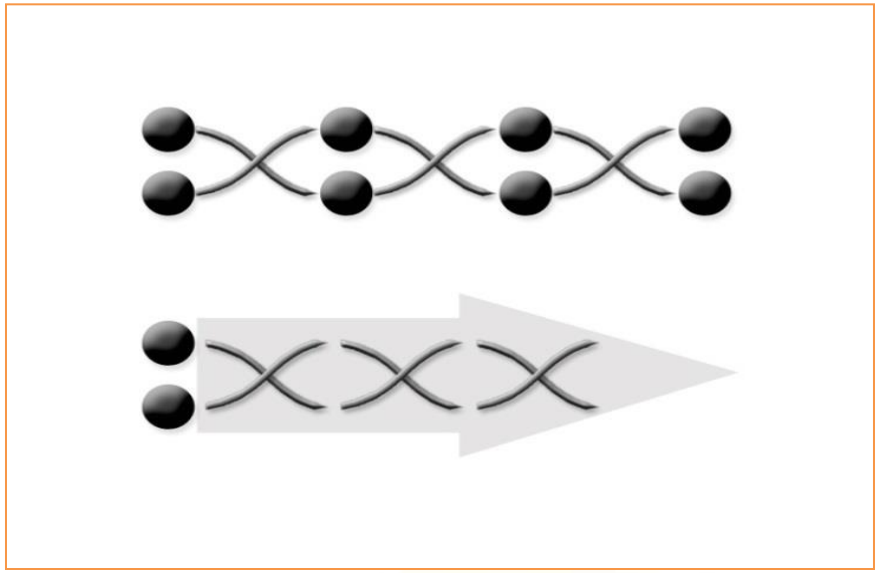


Reciprocal investments in humans

Modelling investment behavior in social dilemmas

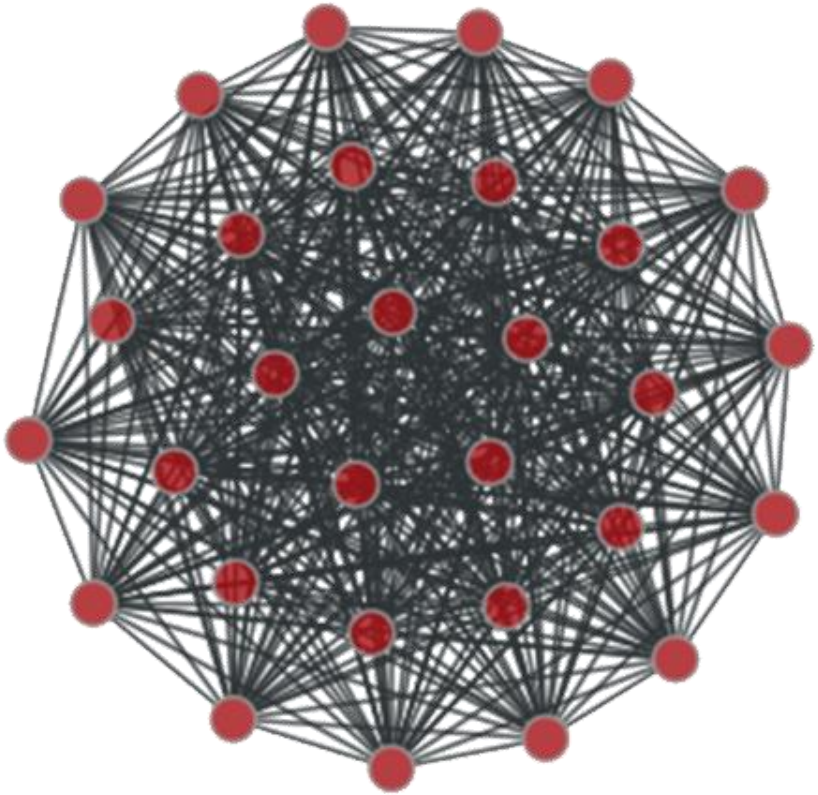
Interacting individuals



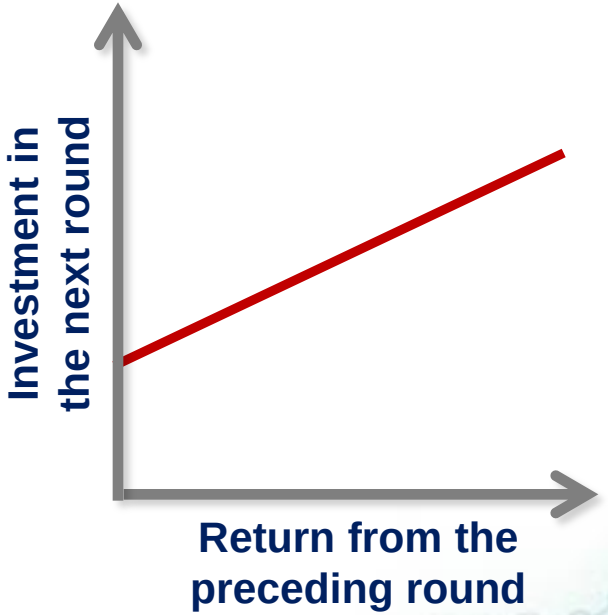


Modelling investment behavior in social dilemmas

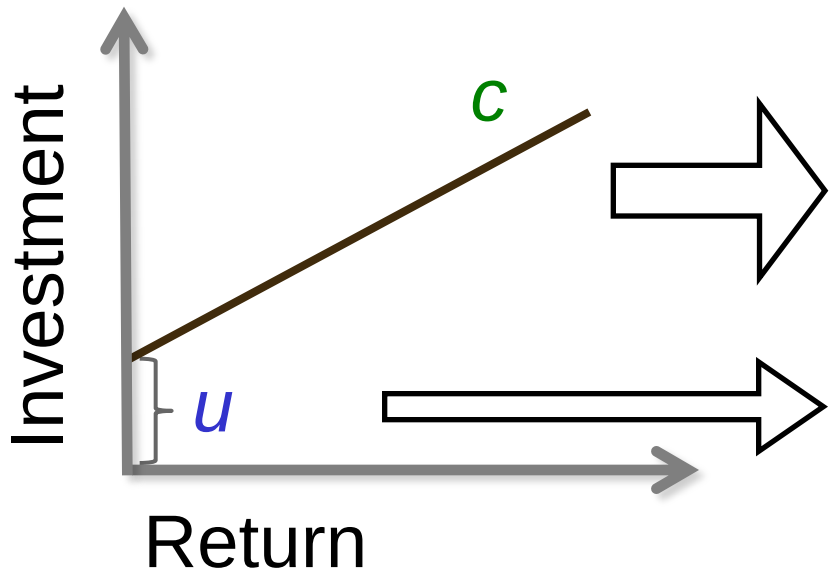
- Agent-based model
- Repeated pairwise interactions



- Investments based on preceding returns
- Strategy imitation and innovation



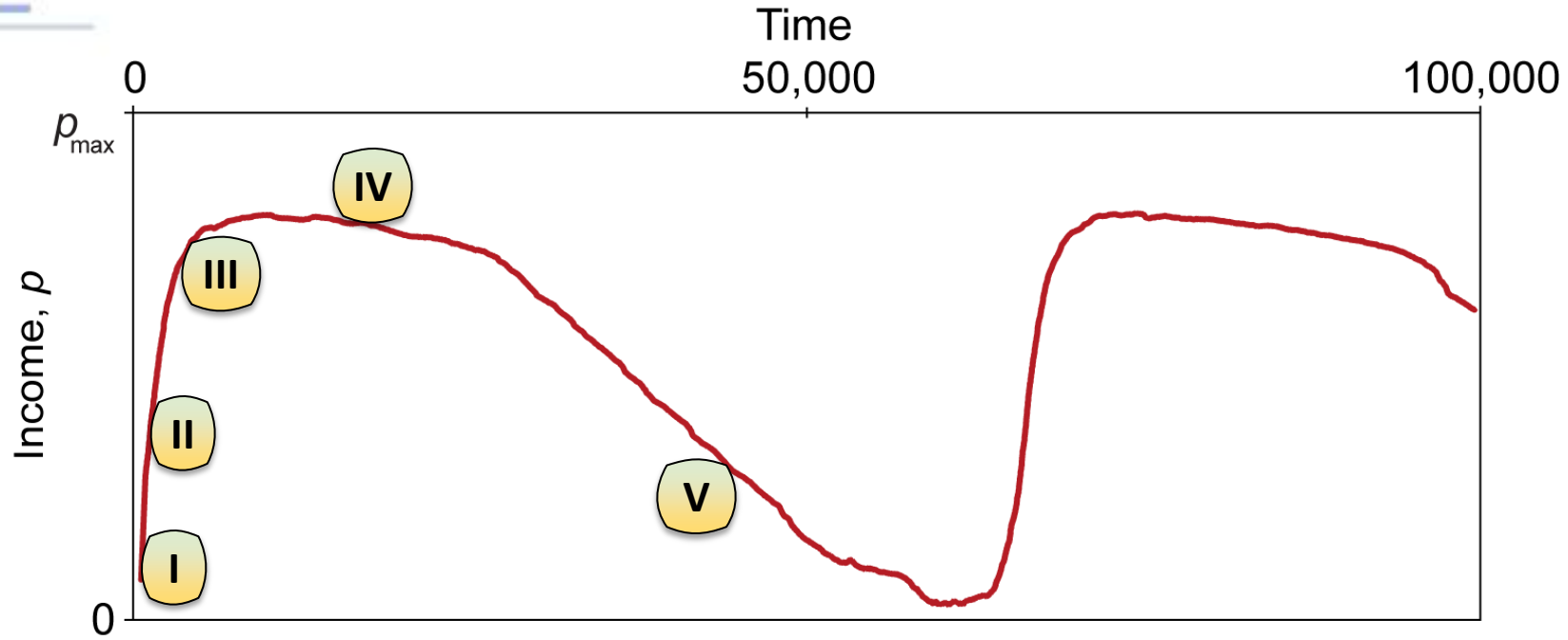
Modelling reactive investments in social dilemmas

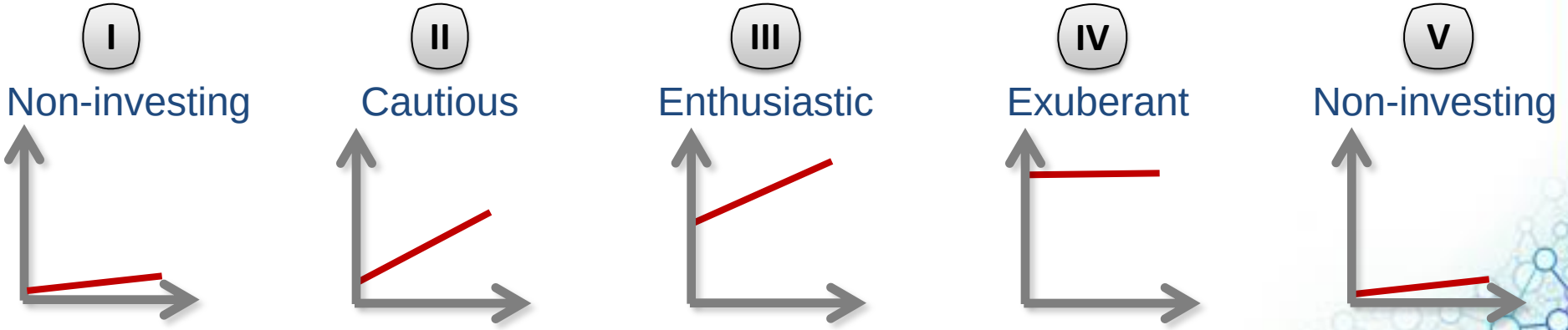


Conditional investment

Unconditional investment

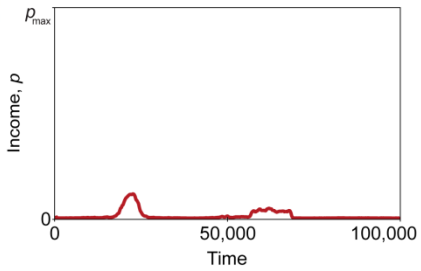
Boom-bust cycles of investments

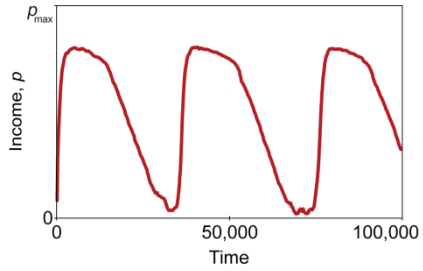


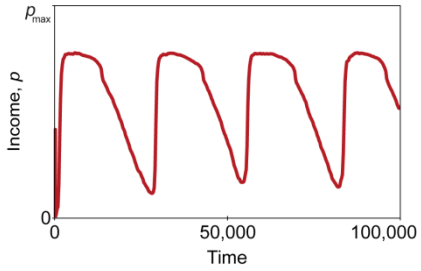


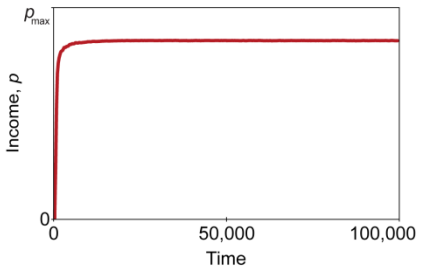
Diversity

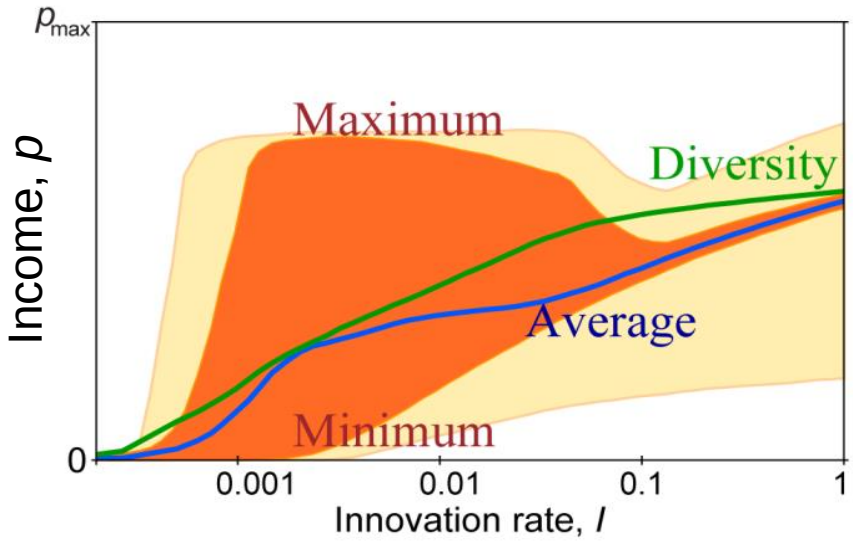
Mitigating investment cycles: Diversity







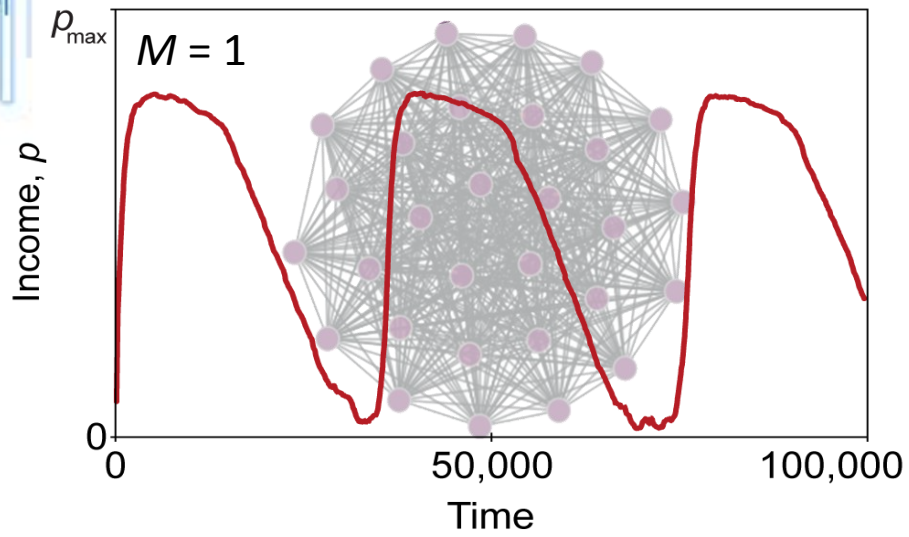


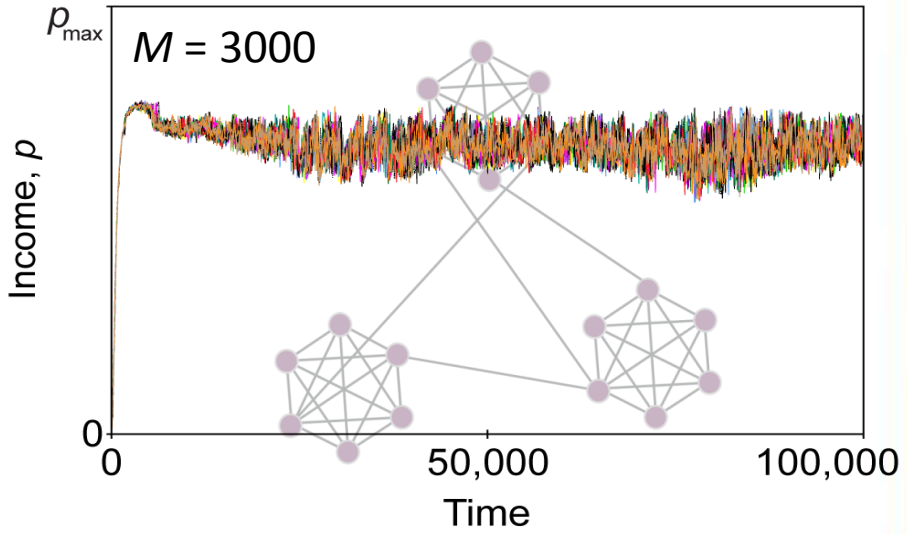


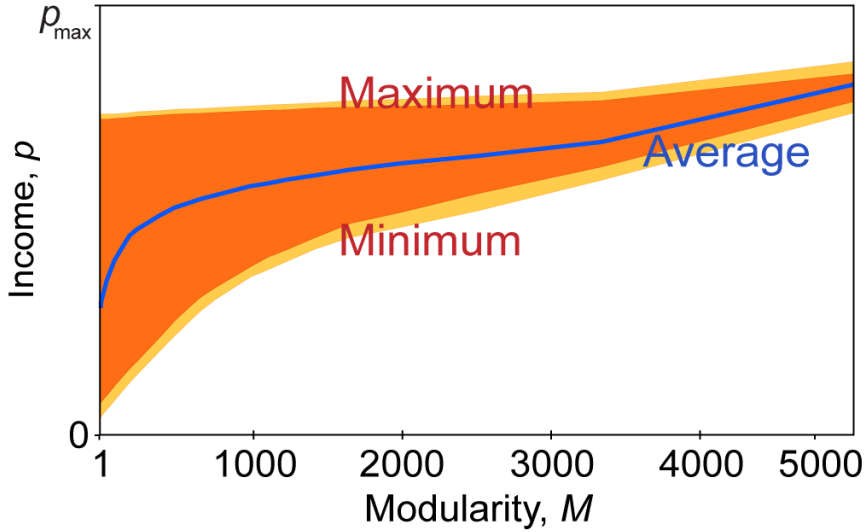
Modularity

Mitigating investment cycles: Modularity

Globalized interactions ⟹ Modularized interactions

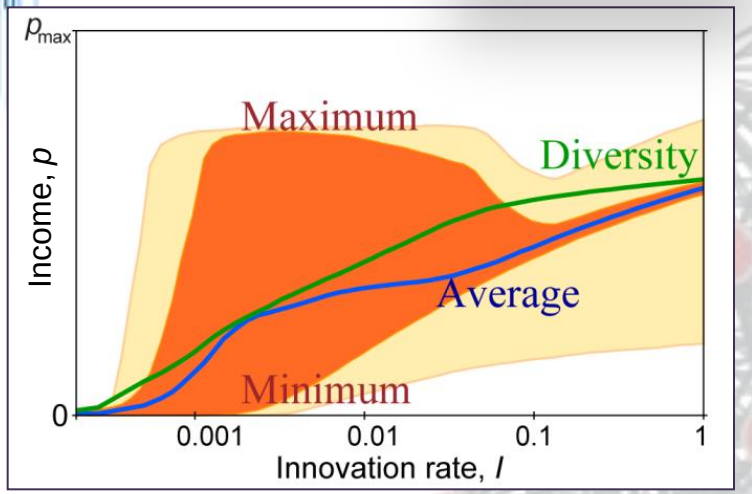




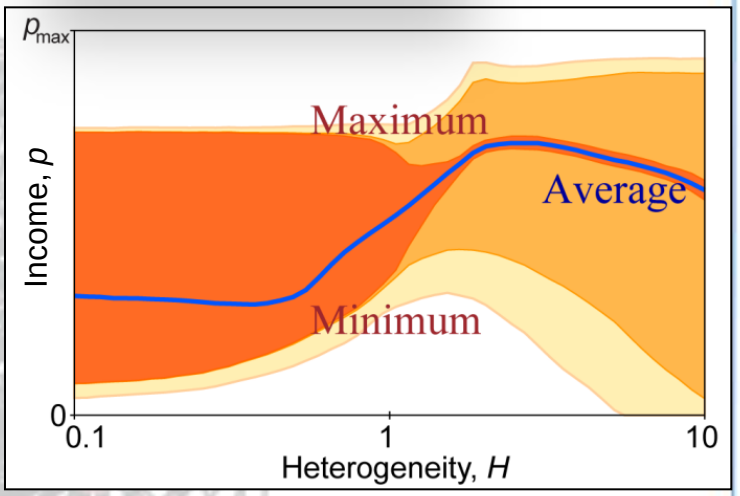


Mitigating investment cycles

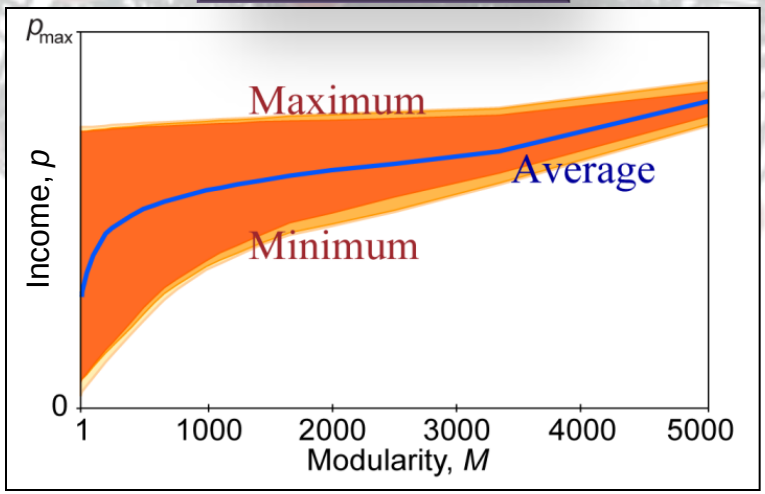
Diversity



Heterogeneity



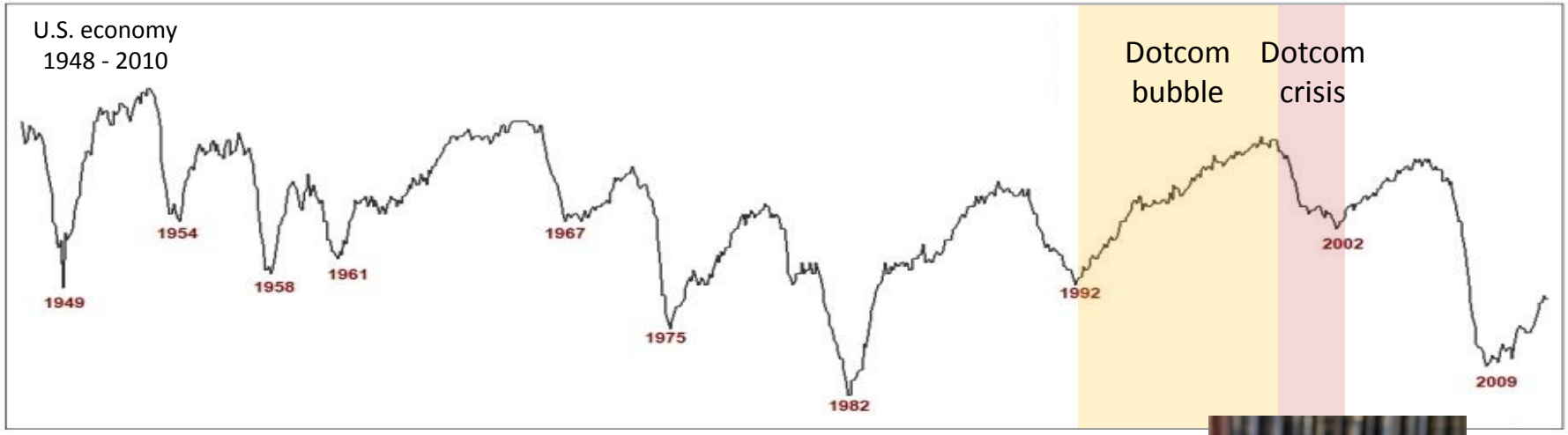
Modularity



Reactive investment behavior and systemic risk

- While **reactivity** safeguards against exploitation at the individual level, it creates **instability** at the system level.
- A rational succession of profit-maximizing reactive investment strategies can lead to irrational exuberance, and **boom-bust cycles**.

Systemic risk and human investment behavior



"How do we know when irrational exuberance has unduly escalated asset values, which then become subject to unexpected and prolonged contractions?"

Alan Greenspan in 1996

Reactive investment behavior and systemic risk

- While **reactivity** safeguards against exploitation at the individual level, it creates **instability** at the system level.
- A rational succession of profit-maximizing reactive investment strategies can lead to irrational exuberance, and **boom-bust cycles**.
- These cycles can be mitigated by decoupling investment decisions through the **modularity** and **heterogeneity** of investor groups or the **diversity** of investment behaviors.
- Globalization, equity, and uniformity may thus exacerbate boom-bust cycles.

Thank you for your attention!

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