Cooperation and Adversity: Evolutionary and Cultural Perspectives

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Summary

We are a highly cooperative species

- Potential advantage of shared resources, skills, knowledge
- But why, given the risk of defection on cooperative agreements?

  - How is cooperation maintained?
  - How did it evolve?

- The roles of fairness, trust and reputation

Precarity

- How do adversity – and uncertainty - influence cooperation?

- How are these effects explained?

The evolutionary approach to understanding behaviour

Explaining cooperation

The social scientist asks:

- *What* internal states (e.g. empathy) and environmental factors favour or constrain cooperation?
  - Proximate causation

The evolutionary scientist asks:

- *Why* do people cooperate?
  - Ultimate causation

Different and complementary questions

Evolutionary analysis of behaviour

What it is and what it isn't

An evolutionary explanation

- Implies genetic variation for the trait *between individuals*
- Leaves open the question of how it develops in *each individual*
- Does not assume behaviour is fixed or inevitable:
  - We have evolved biases & predispositions, responsive to environmental contingency; not always adaptive in today's world
  - We are not a blank slate

Ultimate causation

For social behaviour

- An outcome optimal for one individual may not be optimal for others
- Natural selection predicts not optimal, but stable solutions

Predicting stable outcomes

- Game theory predicts the stable outcome for rational (= selfish) decision makers
  - 'Nash equilibrium'
- Natural selection predicted to result in stable outcomes
  - 'Evolutionarily stable strategy' (ESS)

The Prisoner's Dilemma – an exemplar for understanding cooperative behaviour . . .

The Prisoner's Dilemma

Flood & Dresher 1950

		Buyer	
		Cooperate (Bag full)	Defect (Bag empty)
Seller	Cooperate (Bag full)		
	Defect (bag empty)		

The Prisoner's Dilemma

Flood & Dresher 1950

		Buyer	
		Cooperate (Bag full)	Defect (Bag empty)
Seller	Cooperate (Bag full)	3, 3	
	Defect (bag empty)		

The Prisoner's Dilemma

Flood & Dresher 1950

		Buyer	
		Cooperate (Bag full)	Defect (Bag empty)
Seller	Cooperate (Bag full)	3, 3	
	Defect (bag empty)		2, 2

The Prisoner's Dilemma

Flood & Dresher 1950

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Both Defect is stable:

Neither can do better by changing strategy

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Flood & Dresher 1950

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Seller	Cooperate (Bag full)	3, 3	1, 4
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Even though payoff is greater if both cooperate!

The Tragedy of the Commons (Hardin 1968)

The same logic as the Prisoners' Dilemma, in groups, can lead to overgrazing and overfishing

- Because every farmer/fisherman takes a little to much

Hardin, G. (1968). The tragedy of the commons. *Science, 162*, 1243-1248.

If defection is the stable state, how does cooperation emerge?

Repeated interaction allows stable complex strategies of reciprocity, responsive to behaviour of the other player:

- Rewarding cooperation by cooperation
- Punishing defection by defection

Tit-for-Tat (Axelrod & Hamilton 1981) and similar strategies

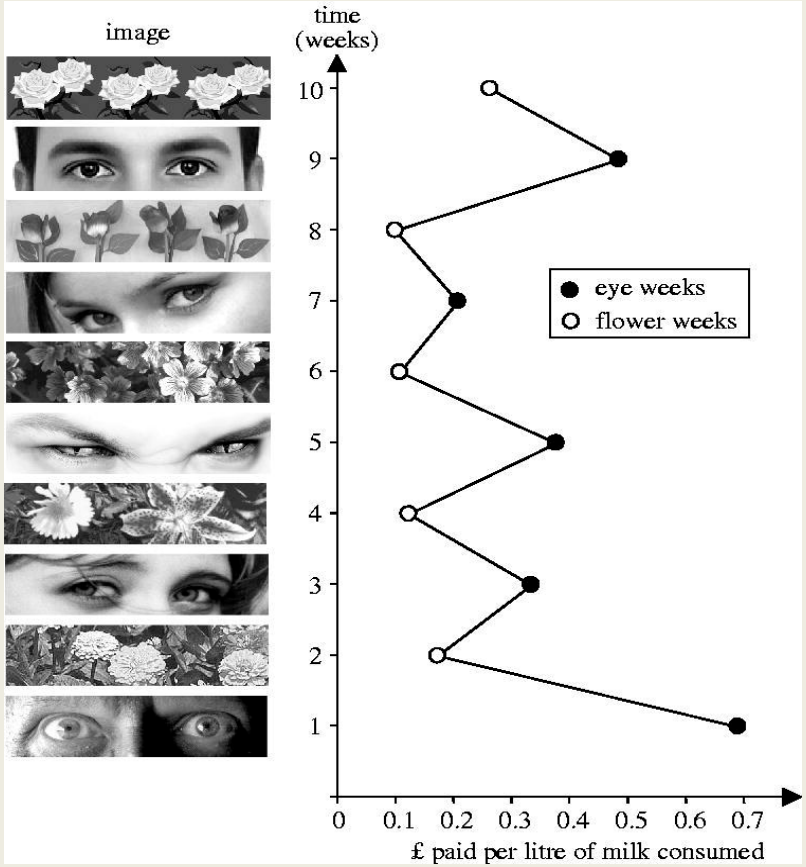
People do cooperate ~ half the time in the *iterated* Prisoners' Dilemma

How did our cooperative nature evolve? . . .

Axelrod, R., & Hamilton, W. D. (1981). The evolution of cooperation. *Science, 211*, 1390-1396.

Indirect reciprocity (Alexander 1987)

- Small early human groups: everyone known
- Reputation for helping built by observation & gossip
- Indirect reciprocity
- Real world evidence . . .



Alexander, R. D. (1987). *The Biology of Moral Systems*. New York: Aldine de Gruyter.
Bateson, M., Nettle, D., & Roberts, G. (2006). Cues of being watched enhance cooperation in a real-world setting. *Biology Letters, 2*(3), 412-414.

. . . Simpler but telling game

Ultimatum game

- Rational offer = lowest positive amount
  - Actual offer 30-45%
- Rational response = always accept
  - Actual response: reject offers <20%

What did you do? . . .

What motivates these decisions?

Ultimatum game offers

- To act fairly
- To gain a reputation for fairness

Ultimatum game responses

- To respect a fair offer
- To punish an unfair offer
- Not to gain a sucker's reputation

Cultural variation: Economy & social life

Ultimatum Game Offers

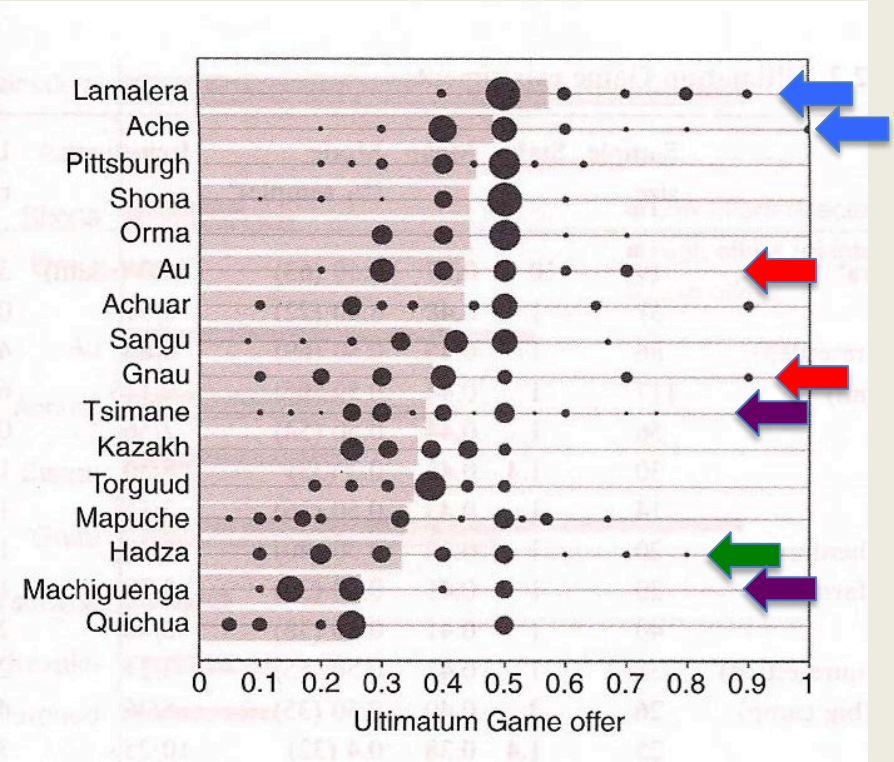
- Students: 42-48%. Mode: 50%
- 15 Small scale societies: 25-55% Mode 15-50%

• Lamalera & Ache – hunters, equitable sharing, interdependent economy

• Hadza – hunters, reluctant sharing, low market exchange

• Tsimane & Machiguenga – horticulture, independent family units

• Au & Gnau reject ~25% offers of >50% Strong obligation to reciprocate gifts



Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., & Gintis, H. (Eds.). (2004). *Foundations of human sociality: Economic experiments and ethnographic evidence from fifteen small-scale societies*. Oxford: Oxford University Press.

Increasing Cooperation

- Enhance subjective value of others
- Increase social contact
  - Glance, touch, converse
- Reputation
  - Anonymity reduces cooperation
- Punishment of free riders
  - Cooperators will pay to punish

Ashington Event

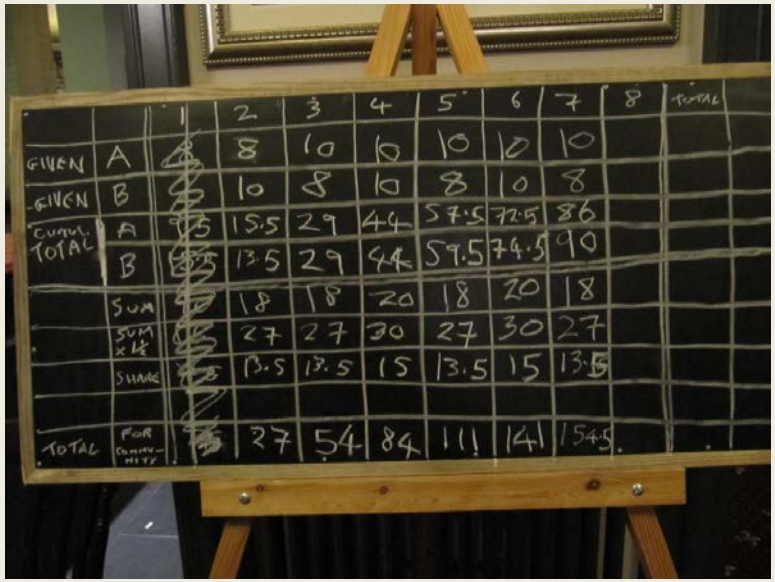
The Elephant

Ultimatum game

- All 4 (anonymous) donors offered a half of their £1 pot: generous
- All donations accepted
- No one took their money home, but left it for me!

The games generated discussion about sharing in communities.

Ashington Event
The Elephant



Public Goods Game

Measures

- Ashington & Brisbane donations
- Ashington & Brisbane cumulative gains
- Total donations to community
- Community fund after interest added
- Share of community fund for each household
- Cumulative value of community fund

Results

- 80-100% (notional) donation each round
- No typical decline over rounds
- Brisbane group took longer to decide than Ashington group

The game generated discussion about conflict between individual and community good.
More on project website.

Summary so far

- Social life brings opportunity for mutual benefits but is vulnerable to free-riding
- These benefits have selected for high levels of cooperation, by repeated interaction in small groups of early humans - **enlightened self-interest**
- Cooperation relies on **trust**, **fairness** and concern for **reputation**
- Concern for fairness and reputation seem to be universal
  - Origin of the Golden Rule: '**Do as you would be done by**'?

How do Precarity (Adversity) and Uncertainty influence Cooperation?

Andras, P. & Lazarus, J. (2005) Cooperation, Risk and the Evolution of Teamwork. In: *Teamwork: Multi-Disciplinary Perspectives*, edited by N Gold. Basingstoke: Palgrave, Macmillan. Pp. 56-77.

Adversity

Poor environmental quality

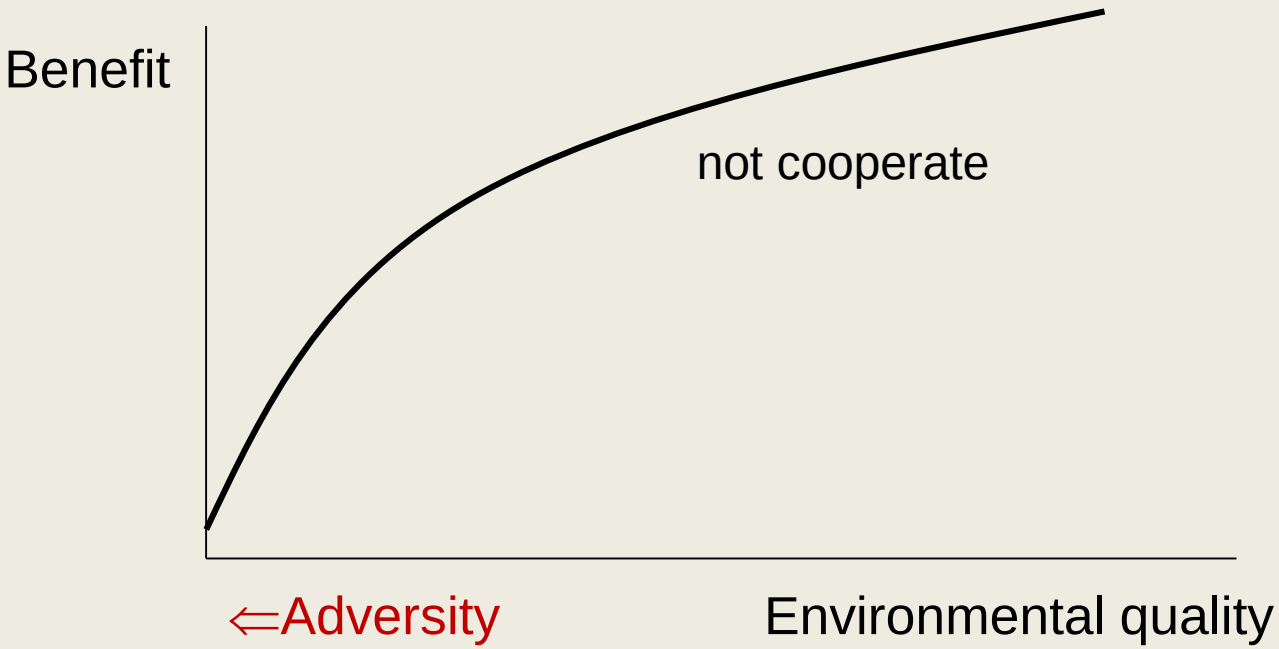
- Resources
- Predators, parasites, competitors
- Abiotic factors
  - Temperature, humidity, altitude
- For humans: Absolute adversity
  - Poverty, pollution, social exclusion
  - Gibson: “Economic deprivation, reduction in life chances”
- For humans: Relative adversity
  - Comparison with others: inequality

Uncertainty

Variance in environmental quality

- Uncertainty in all aspects of adversity
- Gibson: “unpredictability” of life without work

Adversity



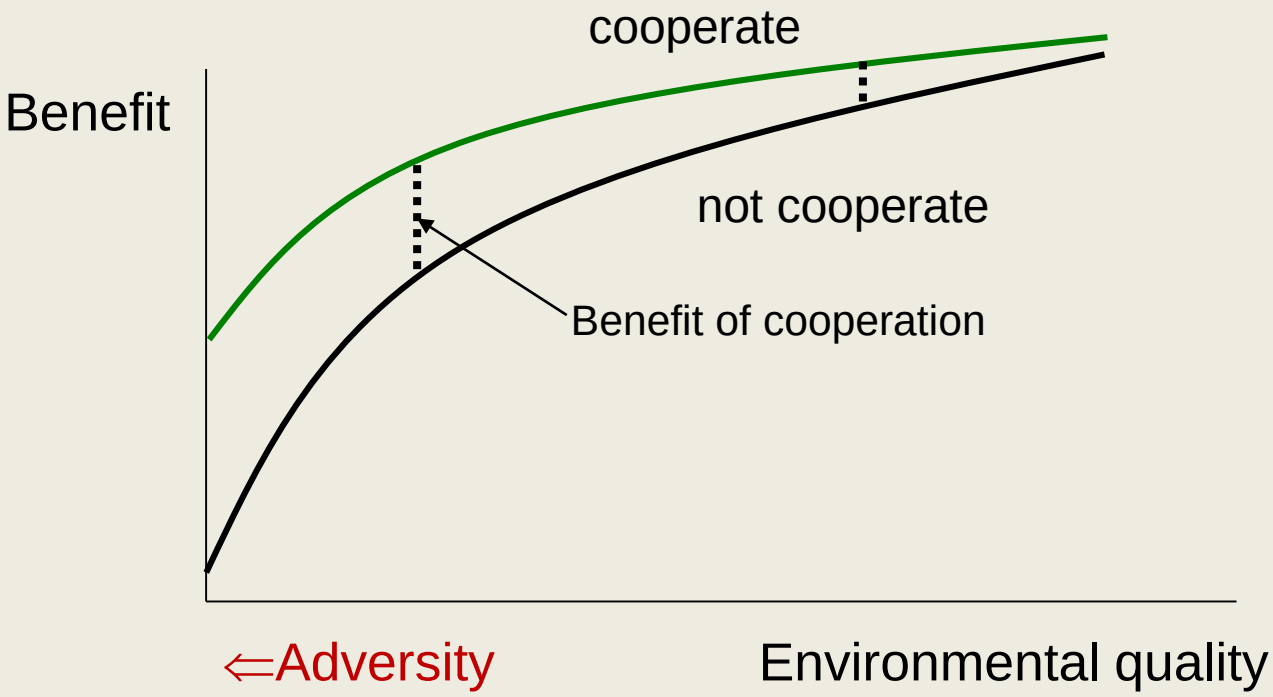
Assumptions

Diminishing returns

- Satiation □ benefit
- Motivational switching
- Handling time
- Abiotic factors

Benefit = fitness, or whatever individuals value

Adversity



Assumptions

Diminishing returns

- Satiation □ benefit
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Cooperation benefits

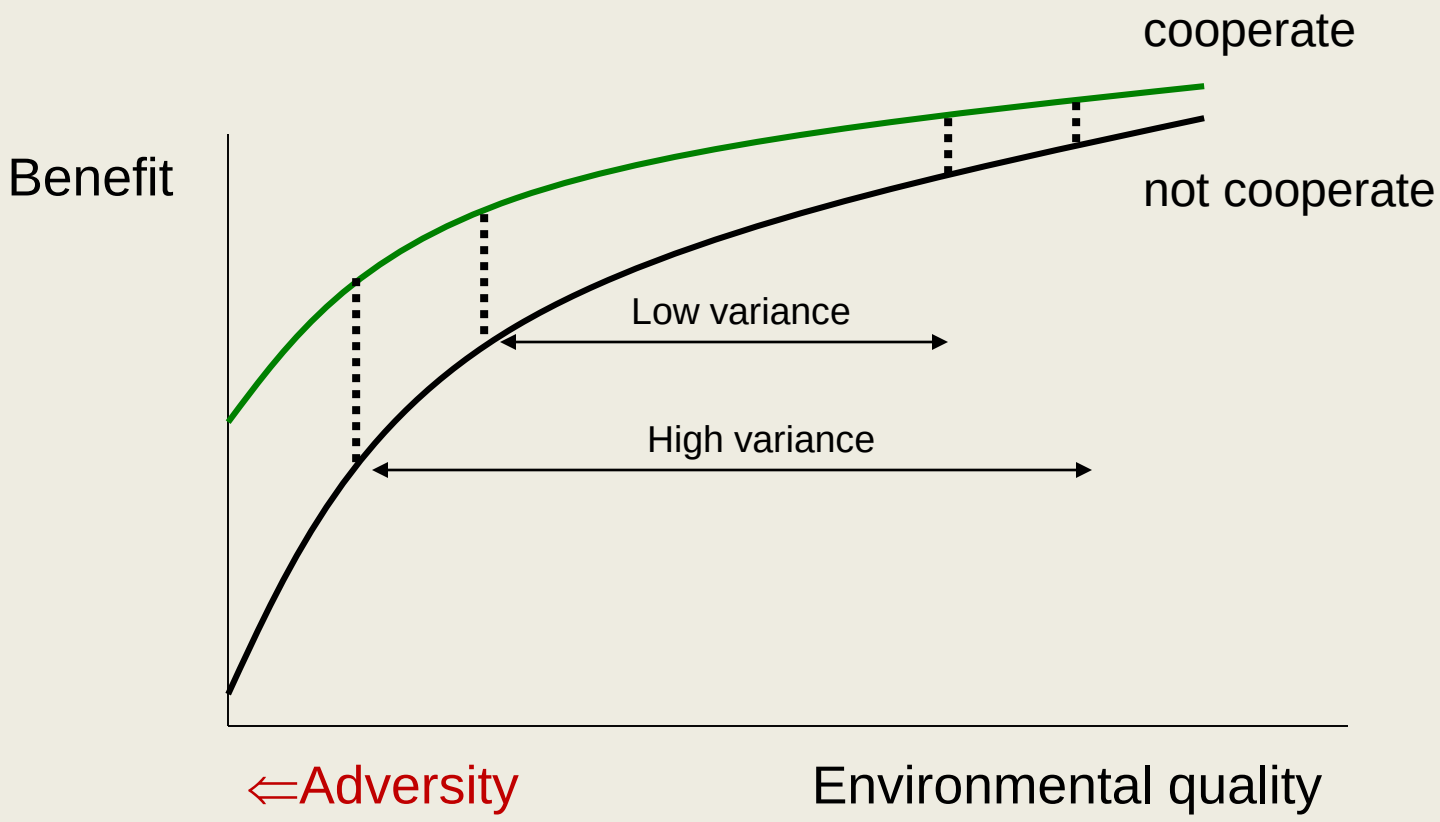
***Asymptotes converge**

Conclude: benefit of cooperation increases with adversity

- Sharing resources, skills, knowledge
- Social support

So, cooperation more likely under adversity

Uncertainty



Conclude: Benefit of cooperation increases with uncertainty

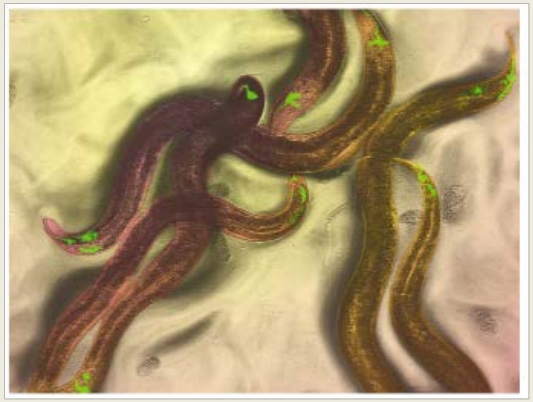
What does the evidence show? . . .

Adversity Enhances Cooperation

Alpine plants more cooperative than Sub-alpine

Callaway et al. 2002

Nematodes feed socially in response to aversive stimuli



De Bono el al. 2002

Animal groups larger under predation risk

Seghers 1974, Farr 1975, Dunbar 1988

Precarity: Human in-group solidarity increases under threat or stress

Levine & Campbell 1972, Goody 1991, Hewstone et al. 2002, Hogg 1992

Uncertainty Enhances Cooperation

Human foragers, chimpanzees, lions share unpredictable foods

Kaplan & Hill 1985,
Gurven 2004

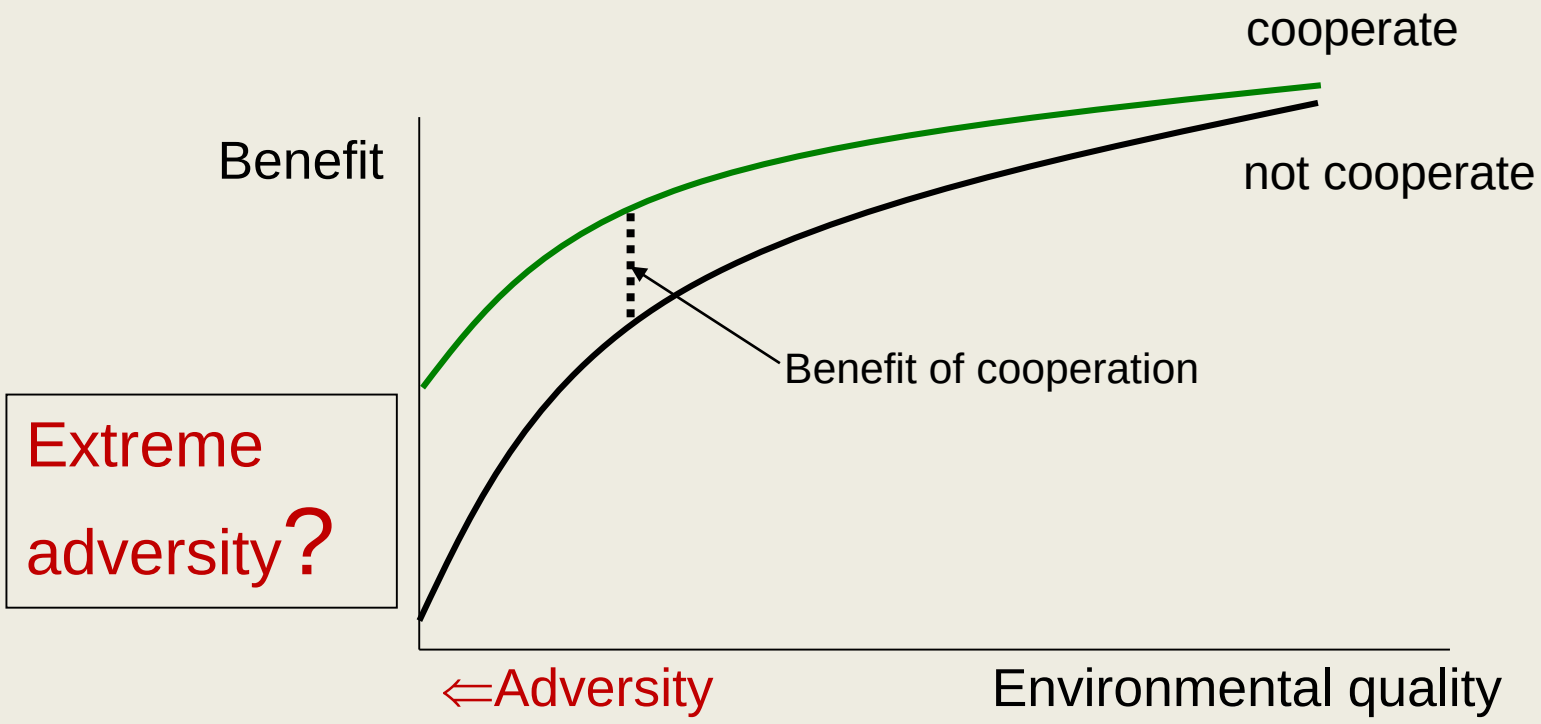
Money acquired as windfall more generously shared

Kameda et al. 2002

Common pool resources more successful under environmental uncertainty

Ostrom 1990
Governing the Commons

Very adverse environments?



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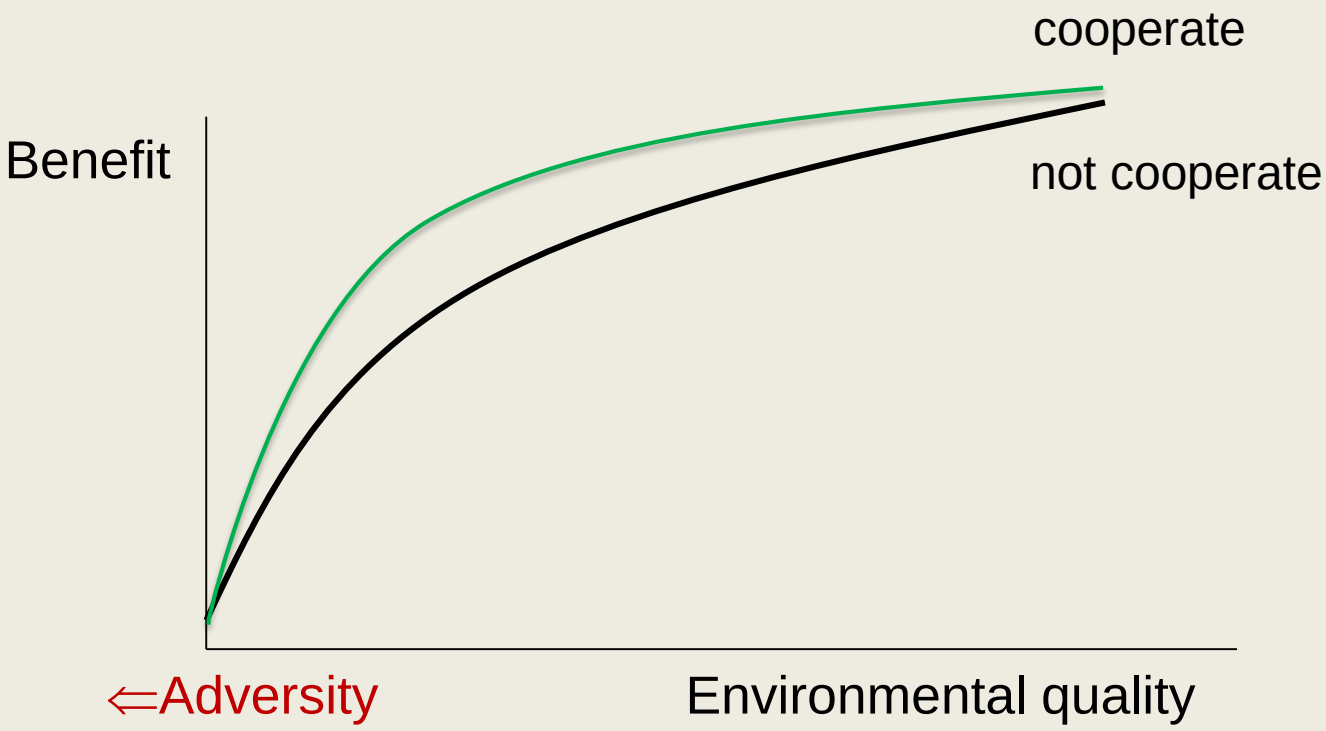

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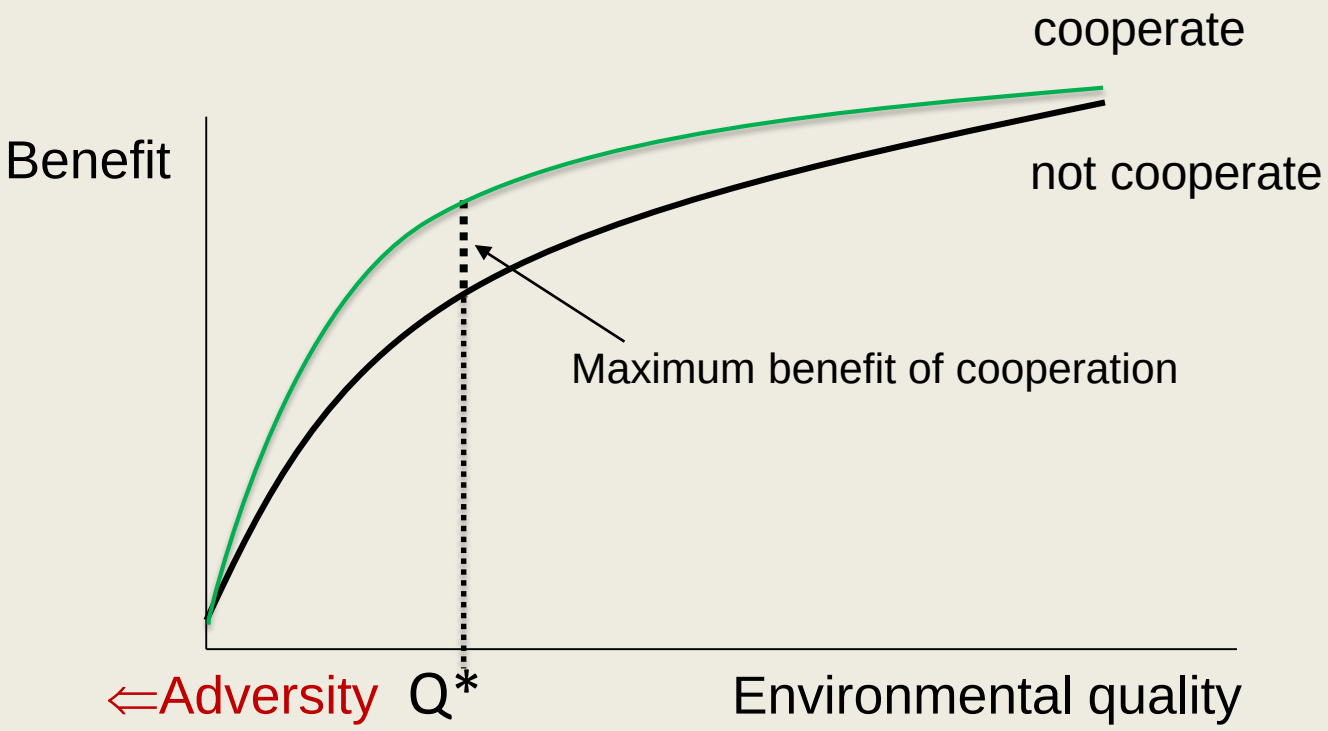

Now: 1. In the most adverse environments, cooperation cannot help (e.g. the Ik of Uganda?)

2. Adversity effect is reversed below Q*

3. This reverse effect seems to be rare; do such populations & communities die out?

Precarity and Cooperation: Conclusion

Two perspectives

Despairing

- ***Things*** have to get bad before ***we*** get good

Positive

- ***We*** get better when ***things*** get worse
- Cooperation is scaled to adversity & uncertainty
- It responds adaptively to need