

Coalition Formation under Free-rider Challenges

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Retreat of the UN EU Heads of Mission

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Cooperation



Maxim Malevich

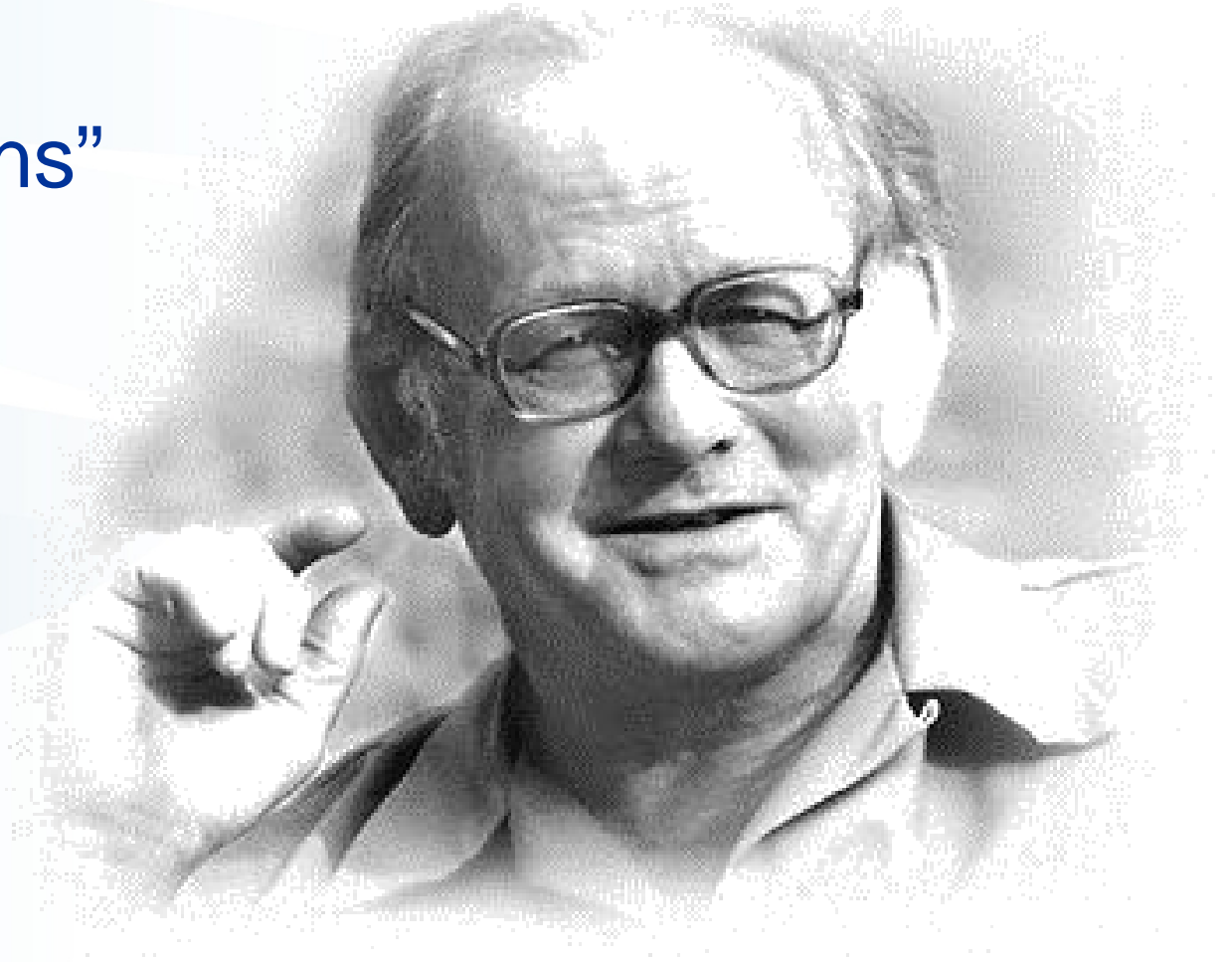
Free Riding



Maxim Malevich

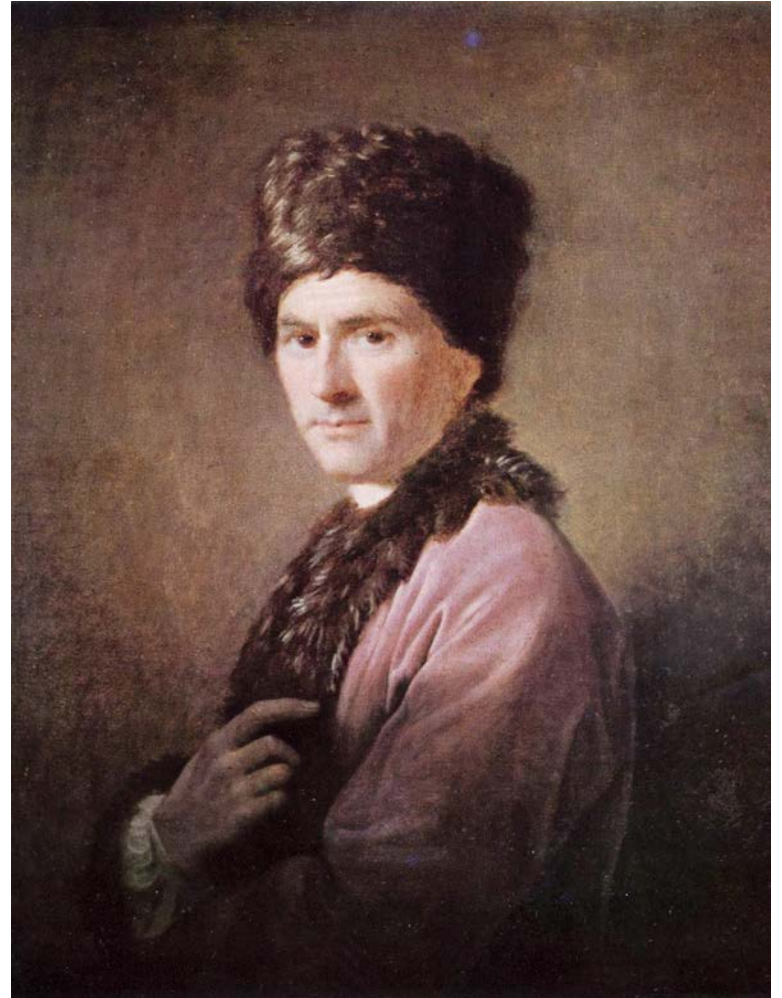
Garrett Hardin

“Tragedy of
the Commons”



Jean-Jacques Rousseau

Social contract:
“Man is born free,
and everywhere
he is in chains”



Elinor Ostrom

Governing the commons: “Institutions are tools that offer incentives to enable humans to overcome social dilemmas”



Promoting Cooperation

- Game-theoretical studies, traditionally focused on pairwise interactions, increasingly address the design of institutions and socio-economic settings
- Three lines of research:
 - ⇒ Designing incentives
 - ⇒ Using uncertainty
 - ⇒ Ameliorating payoffs

Study



Incentives

The take-it-or-leave-it option allows small penalties to overcome social dilemmas

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Self-interest frequently causes individuals engaged in joint enterprises to choose actions that are counterproductive. Free-riders can invade a society of cooperators, causing a tragedy of the commons. Such social dilemmas can be overcome by positive or negative incentives. Even though an incentive-providing institution may protect a cooperative society from invasion by free-riders, it cannot always convert a society of free-riders to cooperation. In the latter case, both norms, cooperation and defection, are stable: To avoid a collapse to full defection, cooperators must be sufficiently numerous initially. A society of free-riders is then caught in a social trap, and the institution is unable to provide an escape, except at a high, possibly prohibitive cost. Here, we analyze the interplay of (a) incentives provided by institutions and (b) the effects of voluntary participation. We show that this combination fundamentally improves the efficiency of incentives. In particular, optional participation allows institutions punishing free-riders to overcome the social dilemma at a much lower cost, and to promote a globally stable regime of cooperation. This removes the social trap and implies that whenever a society of cooperators cannot be invaded by free-riders, it will necessarily become established in the long run, through social learning, irrespective of the initial number of cooperators. We also demonstrate that punishing provides a “lighter touch” than rewarding, guaranteeing full cooperation at considerably lower cost.

punishment | rewards | public goods | social contract | evolutionary games

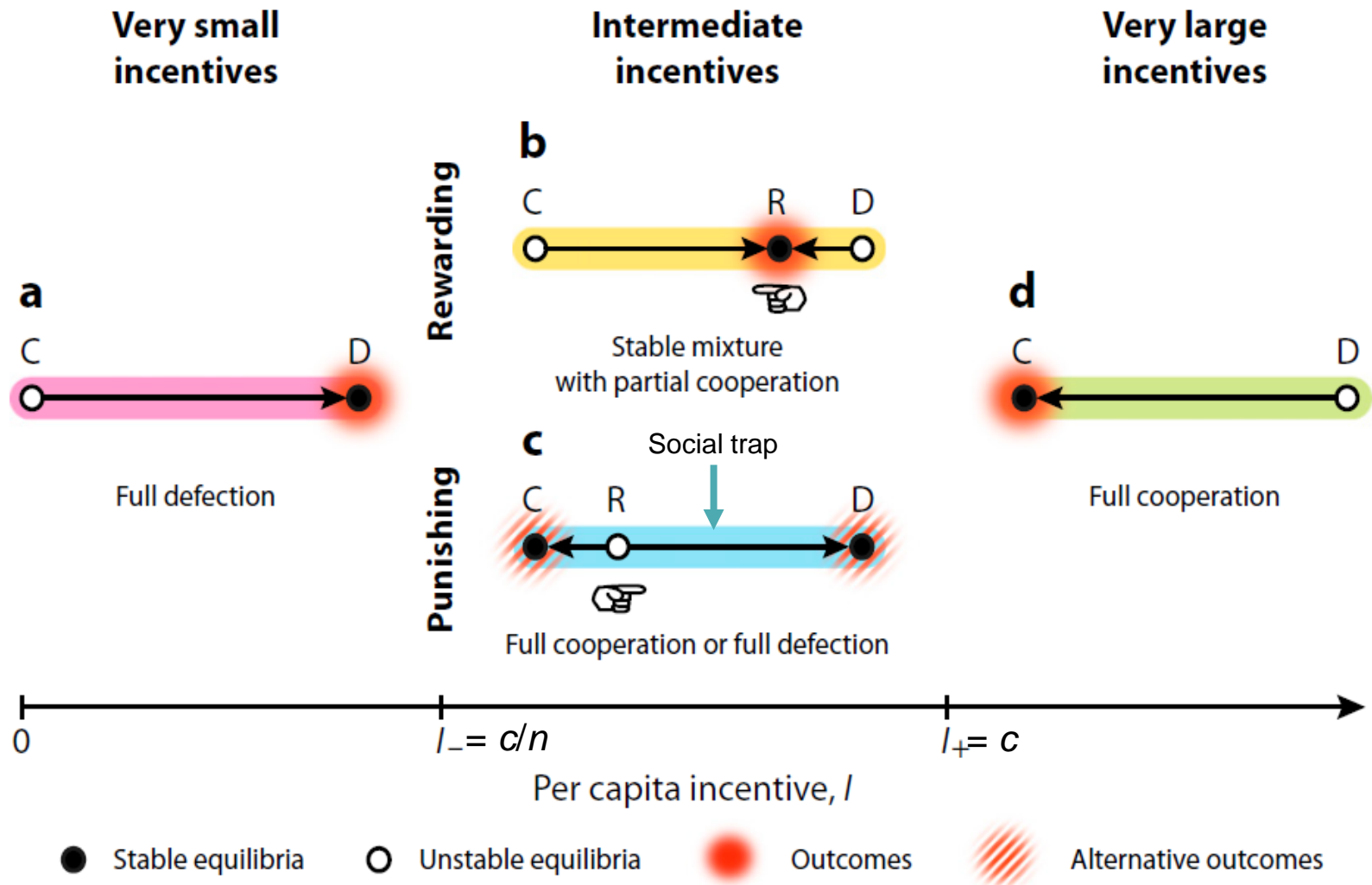


Methods

Specifically, we apply evolutionary game theory (20) to cultural evolution, based on (a) social learning (i.e., the preferential imitation of more successful strategies) and (b) occasional exploratory steps (modeled as small and rare random perturbations). Because the diversity of public good interactions and sanctioning mechanisms is huge, we first present a fully analytical investigation of a prototypical case (*SI Text*). We posit a large, well-mixed population of players. From time to time, a random sample of $n \geq 2$ players is faced with an opportunity to participate in a public good game, at a cost $g > 0$. We denote by m the number of players willing to participate ($0 \leq m \leq n$) and assume that $m \geq 2$ players are required for the game to take place. If it does, each of the m players decides whether or not to contribute a fixed amount $c > 0$, knowing that it will be multiplied by r (with $1 < r < n$) and distributed equally among all $m - 1$ other members of the group. If all group members invest into the common pool, each obtains a payoff

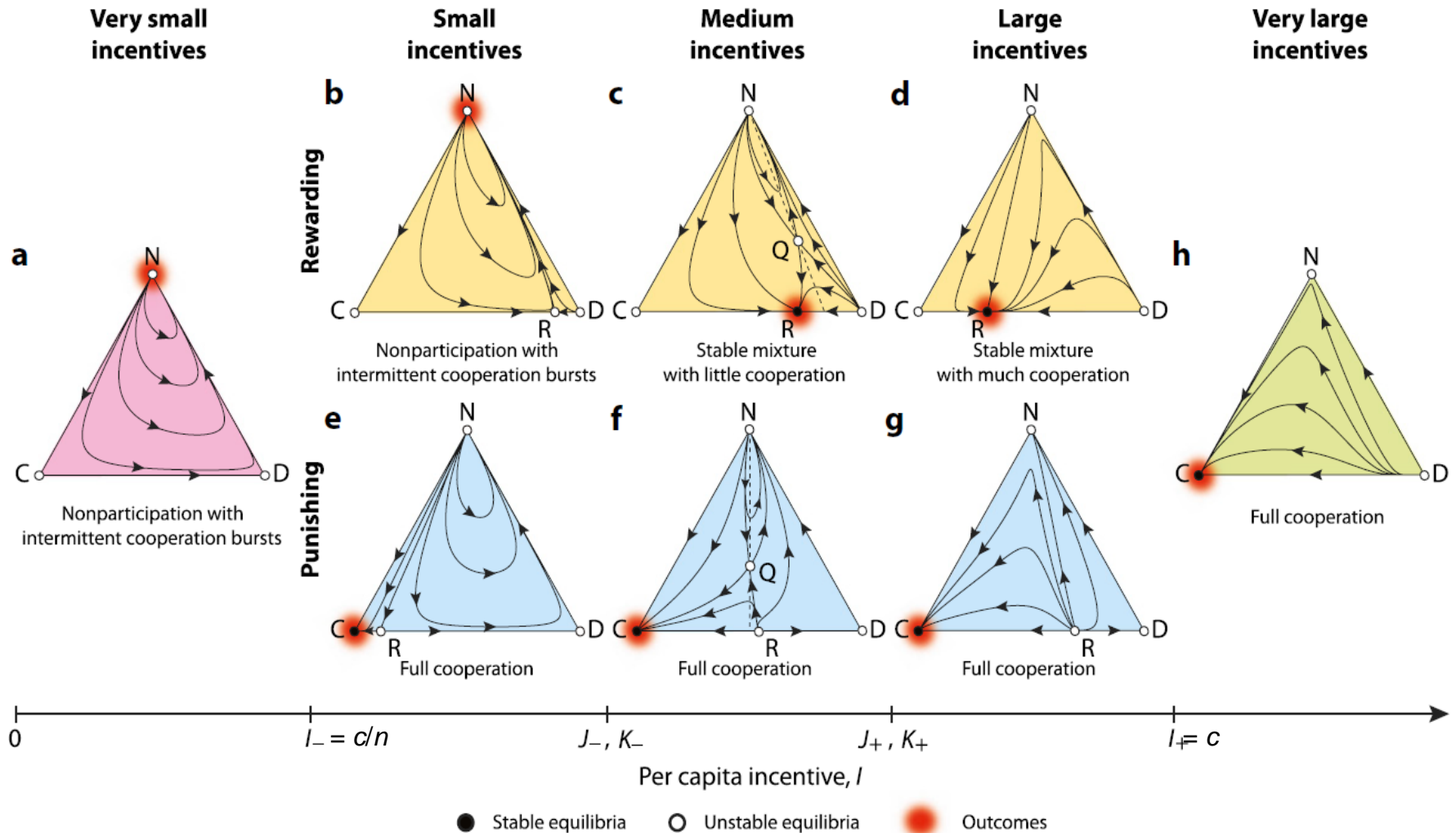
Designing Incentives

Compulsory Participation



Designing Incentives

Voluntary Participation



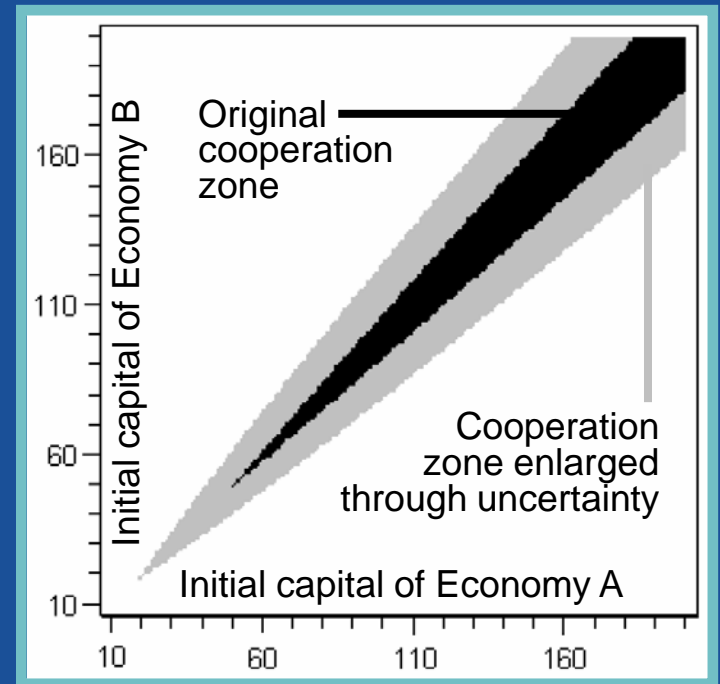
Study

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Uncertainty

Using Uncertainty

- Policy goal: Building a global earth-observation system
- Policy approach: Increased uncertainty in environmental risks encourages free-riders to cooperate



Proceedings “*Sustaining the Millennium Development Goals*”,
4-8 May 2009, Stresa, Italy

Study

3

Payoffs

Ameliorating Payoffs

- Policy goal: Development of a European–North African electricity supergrid
- Policy approaches: Reducing perceived risks, investing into technological leadership

