

## COORDINATION GAMES · INTELLECTUAL LINEAGE

# Deep *roots.*

*Where the design choices come from, whose shoulders the work stands on, and which open arguments the games are built to contribute evidence to.*

A RESEARCH COMPANION · BOULDER, COLORADO · 2026

A game without rules is chaos. A game without a tradition is a curiosity. The Coordination Games are neither. The rules are written down. The tradition runs from Elinor Ostrom's eight design principles through forty years of behavioral game theory, into the still-warm literature on cooperative AI and digital democracy.

This page is the works cited. It traces each of the games' design choices back to the scholars who first proposed or

tested the underlying claim. It identifies the living researchers whose current work most directly engages the same questions. It names the open arguments where the games could produce evidence rather than commentary.

The voice is invitational, not defensive. The literature is a field to play in, not a moat to defend. Ostrom herself was famously generous with practitioners. The Coordination Games inherit that posture: serious about the work, light about the pretense.

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- 01 Where each design choice comes from
  - 02 A working vocabulary
  - 03 Living scholars
  - 04 Open arguments
  - 05 Works cited
  - 06 A note on voice

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01 · WHERE EACH DESIGN CHOICE COMES FROM

**Each visible mechanic, traced to its source.**

The interesting move in the games is that Ostrom's empirical generalizations about long-enduring commons institutions are instantiated as the operating rules of a recurring game, then layered with intersecting traditions wherever those traditions clarify a particular mechanic. The map below traces that lineage, choice by choice.

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### *Graduated trust*

Ostrom's fifth design principle, **graduated sanctions**, observed that successful commons regimes do not eject first-time offenders. The games invert and complement this: trust graduates upward as evidence accumulates. Inherits from **Ostrom (1990)**, **Cox, Arnold, & Villamayor-Tomás (2010)**, and the conditional-cooperation literature of **Fischbacher, Gächter, & Fehr (2001)**.

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### *Persistent agent identity*

Answers Ostrom's first design principle, **clearly defined boundaries**, and the sixth, **low-cost conflict resolution**. You cannot adjudicate cooperation among strangers whose identities reset between rounds. Connects to the trust-graph tradition of **Marsh (1994)**, **Gambetta (1988)**, the **EigenTrust** reputation algorithm of **Kamvar, Schlosser, & Garcia-Molina (2003)**, and contemporary attestation-based identity in **Weyl, Ohlhaber, & Buterin (2022)**.

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### *Public attestations*

The operational form of Ostrom's fourth principle, **monitoring**. Carries the **REA accounting** lineage from **McCarthy (1982)**: Resources, Events, Agents as a principled ontology for recording who did what with which resources. A substrate that accommodates

non-monetary capitals, connecting to Marjorie Kelly's **generative ownership** and the value-flow accounting tradition.

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### ***Polycentric three-layer governance***

A direct citation of **Vincent and Elinor Ostrom's polycentricity** (V. Ostrom, Tiebout, & Warren 1961) and Elinor Ostrom's IAD framework's three rule levels: **operational, collective-choice, constitutional** (Ostrom 2005). The vertical separation of decision rights is also central to **Schneider's (2024)** argument against implicit feudalism in online governance.

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### ***Seasonal cadence***

Looks ludic, functions institutionally. Corresponds to Ostrom's collective-choice arena: rules are revisable on a cycle, not constantly. Borrows the tournament structure of **Axelrod (1984)**, where iteration lets strategies be tested and evolution occurs, and the rounds-based practice of contemporary mechanism design (**quadratic funding**, retroactive public goods).

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### ***Mixed human–AI populations***

Where the games most clearly enter contemporary research frontiers. Connects to **Dafoe et al.'s (2020)** Open Problems in Cooperative AI agenda, DeepMind's **Melting Pot** evaluation suite (Leibo et al. 2021; Agapiou et al. 2023), and the 2024–2026 literature on LLM agents in iterated social dilemmas (**Willis, Du, Leibo, & Luck 2025; Akata et al. 2023**).

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### ***Restorative sanctions***

Punishment that returns the offender to play, rather than removing them. Picks up the experimental punishment literature (**Fehr & Gächter 2000, 2002; Herrmann, Thöni, & Gächter 2008** on

antisocial punishment) and restorative-justice scholarship (Braithwaite 1989; Zehr 1990). A structural alternative to absorbing-state defection equilibria.

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### *Five canonical games*

A curriculum mapped to distinct **action situations** in the IAD framework. Tragedy of the Commons is **Hardin (1968)** read through **Ostrom (1990)**. Oathbreaker is the trust and promise game of **Bicchieri (2006)** and **Bacharach (2006)**. Shelling Point honors **Schelling (1960)** on focal coordination. Capture the Lobster references the lobster-gang case study (**Acheson 1988**) Ostrom returned to repeatedly.

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### *The cooperative wrapper*

The **Limited Cooperative Association** (Uniform Limited Cooperative Association Act, 2007; adopted in Colorado, 2011) is one of the few U.S. corporate forms that contemplates two member classes (patron and investor) with built-in patron primacy. That structurally embodies **Hansmann's (1996)** theory of ownership. The form makes the games a real institution, not a thought experiment.

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## The terms the games use, and what they mean.

Twelve concepts that recur across the literature. They are precise

enough to satisfy a serious reader and supple enough to stay playful. The games are built to give each of them a place to live.

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### ***Action situation***

The setting in which players, positions, actions, information, and outcomes interact. From Ostrom's IAD framework. A canonical game is an action situation made teachable.

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### ***Design principles***

The eight features of long-enduring commons institutions, identified by Ostrom in 1990 and reformulated by Cox, Arnold, and Villamayor-Tomás in 2010 after analyzing ninety-one cases.

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### ***Polycentricity***

Multiple, overlapping centers of decision-making, none fully sovereign. The architectural answer to coordination at scale without collapsing into central command.

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### ***Graduated sanctions, graduated trust***

Proportionality and memory in how the institution responds. Small failures are recoverable. The institution remembers but does not banish.

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### ***Conditional cooperation***

Most people cooperate if they expect others to. Collapse begins with perceived defection, not actual defection. Why monitoring is foundational.

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### ***Focal point***

The convergence solution that needs no enforcement once recognized. Schelling's contribution: coordination without communication is possible when shared salience exists.

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### ***Common-pool resource***

Subtractive in use, costly to exclude from. Distinct from public goods, club goods, and private goods. The four-cell typology that disciplines loose talk about the commons.

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### ***Attestation***

A witnessed claim about an event, agent, or resource. The digital descendant of Ostrom's monitoring principle.

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### ***Substrate and scenario***

From the Melting Pot evaluation framework: the physical-rules environment, separated from the social composition that plays in it. Useful precisely because the games hold both variable.

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### ***Constitutional, collective-choice, operational rules***

The three layers of rule-making in Ostrom's IAD framework. Operational rules govern play. Collective-choice rules govern how operational rules change. Constitutional rules govern the rest.

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### ***Generative ownership***

Marjorie Kelly's distinction: ownership designed to generate value over time, contrasted with extractive ownership designed to maximize a payout. The moral grammar behind choosing the LCA form.

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## ***Restorative***

Sanctions that return a player to the field. Borrowed from restorative-justice scholarship. The opposite of absorbing exclusion.

03 · LIVING SCHOLARS

## **Whose current work most directly engages the same questions.**

A shortlist. These are people whose ongoing research most plausibly intersects with what the games are testing, and who would be plausible residency, advisory, or collaboration candidates.

### **Joel Z. Leibo**

GOOGLE DEEPMIND

Lead architect of Melting Pot. Principal author of the cooperative AI agenda. Working at the intersection of multi-agent reinforcement learning and institutional economics. The closest match to the mixed human–AI populations question.

### **Marco A. Janssen**

ARIZONA STATE UNIVERSITY

One of Ostrom's most active living collaborators. Runs

computational and experimental commons studies at the Center for Behavior, Institutions and the Environment. The natural bridge between Ostrom's empirical tradition and computational modeling.

## **Michael Cox**

DARTMOUTH

Co-author of the 2010 design-principles update that revalidated Ostrom's framework against ninety-one cases. Continues empirical commons-governance work and is unusually generous with practitioner projects.

## **Nathan Schneider**

CU BOULDER · MEDIA ECONOMIES DESIGN LAB

Author of *Governable Spaces*. Geographically local. Works directly on cooperatives, online governance, and the institutional question the LCA form embodies.

## **Brett Frischmann, Michael Madison, Katherine Strandburg**

VILLANOVA · PITTSBURGH · NYU

The Governing Knowledge Commons trio. The games are themselves a knowledge commons, which makes the GKC framework directly applicable as both lens and benchmark.

## **Jessica Gordon Nembhard**

CUNY · JOHN JAY COLLEGE

Cooperative economics with a strong commitment to

community and equity dimensions Ostrom's tradition has sometimes underweighted. Author of *Collective Courage*.

## **E. Glen Weyl**

MICROSOFT RESEARCH · PLURALITY INSTITUTE

Plurality, quadratic funding, attestation-based identity. The practitioner-scholar whose mechanism-design work is most easily ported into the games.

## **Audrey Tang**

PLURALITY INSTITUTE

Living embodiment of broad listening and digital-democracy infrastructure in production, drawing on years of work in Taiwan. Connects the games to a working real-world referent.

## **Cristina Bicchieri**

UNIVERSITY OF PENNSYLVANIA

Norms, conventions, trust games. The bridge between the philosophy of coordination and experimental economics. Author of *The Grammar of Society*.

## **Vincent Conitzer & Caspar Oesterheld**

CARNEGIE MELLON · FOUNDATIONS OF COOPERATIVE AI LAB

The most theoretically rigorous current home of cooperative-AI research. Concerned with the formal foundations the games would extend empirically.

## David Sloan Wilson

BINGHAMTON · PROSOCIAL WORLD

Has explicitly generalized Ostrom's principles to any cooperative group and runs a practitioner network. Direct fit with the games' ambition to operationalize the principles in a live setting.

## Allan Dafoe

GOOGLE DEEPMIND

Co-author of Open Problems in Cooperative AI. Concerned with multi-agent governance at civilizational scale. The strategic frame within which games for AI cooperation become legible as serious research.

04 · OPEN ARGUMENTS

# Where the games could produce evidence, not commentary.

Live debates in the literature where a standing experiment with persistent identity, public attestations, and a long enough time horizon could meaningfully contribute. Each is a real disagreement, not a strawman.

*Do Ostrom's design principles generalize beyond face-to-face natural-resource communities?*

Cox, Arnold, and Villamayor-Tomás argued yes, empirically, in

2010. Critics maintain the principles elide power, culture, and ecology when transposed to other domains. A standing experiment with mixed populations is a useful evidence-generator.

*Does altruistic punishment universally sustain cooperation, or does it sometimes corrode it?*

Fehr and Gächter (2002) on altruistic punishment, set against Herrmann, Thöni, and Gächter (2008) on antisocial punishment in cross-cultural settings. Graduated and restorative sanctions are a third path that has been more theorized than tested.

*Can LLM agents sustain cooperation in iterated social dilemmas, or do they converge to defection?*

Recent results from Willis et al. (2025), Akata et al. (2023), and Phelps and Russell (2023) are mixed and model-dependent. Mixed human–AI populations under graduated trust are an open frontier.

*Are reputation systems Sybil-resistant in practice, or only in theory?*

EigenTrust's pre-trusted-peer assumption has been debated for two decades. Persistent identity tied to cooperative membership is an interesting institutional answer to what has usually been treated as a technical problem.

*Is implicit feudalism in online platforms avoidable, or does scale always re-introduce it?*

Schneider's (2024) argument is that nearly all online communities default to a single-administrator pattern. A polycentric three-layer governance running in production for multiple seasons would be informative either way.

*Is there a fourth quadrant beyond private, public, and club goods?*

Frischmann, Madison, and Strandburg's Governing Knowledge

Commons framework is rich on case studies but thin on living experiments. The games are arguably one such experiment, in a domain where scholarship has been ahead of practice.

05 · WORKS CITED

## The reading the games are built on.

Organized by theme, each section anchored in commons governance and pulling outward where the intersections illuminate the work. Recent extensions and the canonical foundations sit side by side.

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## Why the citations read as invitation, not defense.

The literature wants to be read as an invitation, not a moat. Ostrom herself was famously generous with practitioners. She ran field trips, experiments, and a workshop, not a citadel. The Coordination Games inherit that posture.

The bibliography here is meant to signal: *we have read carefully, we know whose shoulders we are standing on, and we are inviting you to play in a field you helped define.* The page cites freely without apologizing, names living scholars by name as if they might actually show up (because some of them might), and treats the eight design principles, the Schelling point, the iterated prisoner's dilemma, and the Limited Cooperative Association statute as part of a shared toolkit. They are not authorities to be deferred to.

*A game without rules is chaos. A game without a tradition is a curiosity. **The Coordination Games are neither.***

That is the spirit of games guided by common rules. Fun, inspiring, and serious all at once. The works cited above are the

rules of the larger game the Coordination Games are playing in.  
The next move belongs to whoever shows up.

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*A standing experiment in cooperation. Cultivating scenius.*