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December 26, 2025

Editorial Office
Biology & Philosophy

Dear Editors,

I am submitting “Costly Signaling and Coalition Formation Across Biological Scales” for consideration as an original article in *Biology & Philosophy*.

This manuscript is a conceptual sequel to my paper “Power as Control of Controllers: A Cross-Scale Theory of Agency,” currently under review at *Biology & Philosophy*. That paper developed a cross-scale account of agency and power in biological systems. It established continuity from microbes to humans but left open a prior question: how do coalitions capable of exercising power form in the first place?

The present paper addresses this gap. I argue that costly signaling provides a general solution to coalition formation across biological scales. When coordination stakes are high, agents face a commitment verification problem: how can potential cooperators distinguish genuine allies from defectors before undertaking costly collective action? Signals that are expensive to produce—and differentially costly for defectors—create a separating equilibrium.

The paper offers a **design-space explanation**, not a genealogical one. I do not claim that human religions descended from bacterial quorum sensing. The claim is convergence: under shared stability constraints (high-stakes coordination, partial observability, defection incentives), viable solutions cluster in the same region of design space. The structural features often labeled “religious”—ritual, sacred markers, deviation punishment, identity fusion—are attractors in the space of coalition-stabilizing architectures.

The paper engages with the existing literature on costly signaling in religion (Irons, Iannaccone, Berman, Sosis) and extends it in two directions: (1) generalizing beyond religion to coalition formation as a cross-scale design constraint, and (2) providing a unified treatment across biological scales from microbial quorum sensing through multicellular coordination to ideological movements.

Key contributions include:

- A formal account of why defectors pay higher signaling costs than loyalists
- Cross-scale analysis from microbes through primates to human ideological movements
- Testable predictions: evidence against beliefs can strengthen commitment; internal deviation is punished more than external opposition; threatened coalitions escalate signal demands
- Agent-based simulations demonstrating the separating equilibrium, cost ratchet dynamics, and cellular coalition maintenance

I believe this paper is well suited to *Biology & Philosophy* because it engages directly with debates on functional explanation, levels of selection, and cross-scale continuity in biology—questions central to the journal’s scope. The manuscript advances a constraint-based account of coalition individuality and norm-governed commitment verification.

The manuscript is approximately 7,500 words and has not been submitted elsewhere. I have no conflicts of interest to declare.

Thank you for considering this submission.

Sincerely,

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