Decentralized Lawfulness: A Conceptual Framework for Emergent Agency

Decentralized Lawfulness: A Conceptual Framework for Emergent Agency

Ehsan Roohi

Department of Mechanical and Industrial Engineering
University of Massachusetts Amherst, USA

Manuscript submitted for journal review

March 15, 2026

Declarations

Availability of data and material

Data availability statement: not applicable.

Competing interests

The author has no relevant financial or non-financial interests to disclose.

Funding

The author declares that no funds, grants, or other support were received during the preparation of this manuscript.

Authors' contributions

The author confirms sole responsibility for the conception, design, drafting, and finalization of this manuscript.

Acknowledgements

Not applicable.

Decentralized Lawfulness: A Conceptual Framework for Emergent Agency

March 15, 2026

Abstract

This paper develops *Nomological Foundations of Emergent Agency* as a conceptual framework for relating micro-level lawfulness, macro-level organization, and emergent human agency within a single layered ontological picture. The proposal is a philosophical framework designed to clarify how locally governed interactions can be conceptually linked to large-scale order and, under suitable organizational conditions, to reason-responsive agency. A central aim of the paper is to prevent category confusion in cross-domain discussions that move too quickly between physics, consciousness, and free will. To this end, the paper introduces a restricted notion of particle-level *Computational Description of Dispositional Properties*, defined as locally instantiated lawful state-evolution and interaction responsiveness, and explicitly distinguished from phenomenal consciousness. Through a state-space formalization, the paper argues that human agency is more coherently treated as an emergent higher-order capacity involving representation, evaluation, and self-regulation, rather than as a suspension of physical law. The framework is situated within an emergentist-compatibilist interpretation of free will, offering a disciplined interdisciplinary vocabulary for distinguishing local lawfulness, emergent organization, and agential capacities without collapsing them into one another.

Keywords: Panpsychism, Emergence, Compatibilism, Agency, Metaphysics of Science, Philosophy of Mind, Philosophy of Science.

1 Introduction

Questions about the relation between fundamental physical law, mentality, and human agency remain central to the philosophy of mind, metaphysics, and philosophy of science. In particular, contemporary debates continue to grapple with three interrelated problems: (i) whether mind or mentality is fundamental or emergent, (ii) how higher-level organization relates to lower-level physical dynamics, and (iii) whether any robust notion of free will can be reconciled with lawful physical processes (Seager et al., 2022; Chalmers, 2010; O'Connor and Wong, 2020; O'Connor and Franklin, 2023; McKenna and Pereboom, 2024).

Recent renewed interest in panpsychism has re-opened the possibility that some proto-mental or mind-like aspect may be widely distributed in nature, while still leaving unresolved the so-called combination problem and the precise relation between micro-level and macro-level consciousness (Seager et al., 2022; Goff, 2017). In parallel, emergentist approaches emphasize that higher-level properties may be both dependent on, and yet not straightforwardly reducible to, lower-level constituents, especially in complex systems with large numbers of interacting parts (O'Connor and Wong, 2020; Anderson, 1972; Mitchell, 2009). At the same time, the free will debate continues to distinguish carefully between determinism, indeterminism, predictability, control, and moral responsibility, with compatibilist and incompatibilist positions offering different accounts of how agency may arise within a law-governed world (O'Connor and Franklin, 2023; McKenna and Pereboom, 2024).

Recent debates in philosophy of mind and metaphysics have also sharpened disagreements over non-reductive physicalism, powers/dispositional accounts, mechanistic explanation, and free-will skepticism, especially concerning whether higher-level agential vocabulary has autonomous explanatory force or merely pragmatic usefulness (Siegel and Craver, 2024; Taylor and Law, 2024; McKenna, 2024; Ylikoski, 2024b). The present framework does not attempt to settle these disputes directly. Instead, it aims to improve the inferential discipline with which claims are transferred across these debates, especially when moving from micro-level lawfulness to conclusions about consciousness or agency.

This paper contributes to these discussions by proposing a *conceptual* (not empirical or directly testable) framework that we call *Nomological Foundations of Emergent Agency*. The central idea is to reinterpret cosmological and metaphysical order through the language of decentralized computation and agent-based organization. Rather than modeling cosmic order as if it required continuous top-down micro-management of every particle-level event, we explore a metaphysical picture in which fundamental entities are treated as locally rule-governed units whose lawful interactions collectively generate large-scale structure and, eventually, conditions for higher-order cognition and agency. In this sense, the framework is intended as a form of *computational metaphysical analogy*, informed by ideas from complex systems and agent-based modeling, rather than as a literal claim that the universe is a digital computer in any established physical theory (Bonabeau, 2002; Macal and North, 2010; Mainzer, 2019).

The proposed framework intersects with, but is not identical to, classical panpsychism. We do not assume that particles possess phenomenally conscious experience in the full human sense. Instead, we introduce a weaker and explicitly stipulative notion of particle-level "Computational Description of Dispositional Properties" (or local rule-execution competence) to describe the idea that fundamental entities behave in accordance with intrinsic lawful dispositions. This terminology is intended to provide a computationally inspired vocabulary for discussing local lawful behavior and should not be read as a settled theory of consciousness (Seager et al., 2022; Chalmers, 2010). By making this distinction explicit, we aim to avoid conflating metaphorical, functional, and phenomenological senses of consciousness.

A second aim of the paper is to clarify how human free will might be framed in relation to a micro-level lawful ontology. Here, our proposal is closest in spirit to an emergentist-compatibilist research program: human agency is treated not as a violation of physical law, but as a higher-level capacity arising in sufficiently complex neural and social systems that can represent alternatives, evaluate reasons, and regulate action across time (McKenna and Pereboom, 2024; O'Connor and Franklin, 2023; Dennett, 2003). This does not by itself resolve the traditional metaphysical disputes over free will, but it offers a structured way of articulating how macro-level agency and micro-level lawfulness may be jointly described within a single ontological picture.

The contribution of this paper is best understood as a clarificatory and integrative one. More specifically, the framework is designed to resolve a recurrent cross-domain ambiguity in discussions of order, mind, and agency: the tendency to move too quickly from micro-level lawfulness to claims about consciousness, or from lawful regularity to claims that agency must be illusory. The proposed framework addresses this by introducing a layered conceptual architecture that explicitly distinguishes (a) local lawful state-evolution, (b) emergent macro-level organization, and (c) reason-responsive agential capacities. Its novelty lies in providing a disciplined philosophical vocabulary and a state-space formalization that reduces category confusion and enables more precise comparison between emergentist, compatibilist, and panpsychism-adjacent ways of framing the same broad problem-space.

To make the contribution more explicit, the paper advances three specific claims. First, it identifies and corrects a recurrent category-slippage in cross-domain debates. Second, it proposes a layered conceptual architecture that separates local lawfulness, emergent organization, and agential capacities. Third, it demonstrates through formal reasoning that this layered architecture makes room for a robust account of reason-responsive agency in a law-governed ontology without violating physical closure.

The remainder of the paper is organized as follows. Section 2 introduces the decentralized ontological framing and addresses the epistemic limits of agent-based analogies. Section 3 defines the restricted notion of particle-level "Computational Description of Dispositional Properties". Section 4 formalizes the emergence of human agency in complex macro-networks, situates the proposal relative to compatibilist debates, and addresses the causal exclusion problem. Section 5 addresses potential objections, and Section 6

concludes with a discussion of future directions.

2 Decentralized Ontological Framing and Local Rule-Governed Processing

This section introduces the core architectural metaphor of the proposed framework. The aim is not to present a new physical theory or a computational simulation of the universe, but to provide a disciplined metaphysical vocabulary for describing how large-scale order may arise from locally governed interactions among fundamental entities. In this sense, the framework is best understood as a *decentralized ontological framing* informed by agent-based and complex-systems reasoning (Bonabeau, 2002; Macal and North, 2010; Mitchell, 2009).

2.1 From Centralized Governance to Local Lawful Interaction

Many traditional theological and philosophical descriptions of cosmic order are often interpreted (explicitly or implicitly) through a centralized-control image: a single supreme intelligence continuously determines, monitors, or updates every event at every scale. While such an image may function symbolically or theologically, it becomes conceptually strained when translated into modern descriptions of highly distributed, multi-scale, law-governed systems. Contemporary scientific modeling often explains global order without requiring continuous top-down micro-management, instead relying on local interaction rules and collective dynamics (Anderson, 1972; Mitchell, 2009).

The present framework adopts this latter style of description as a metaphysical analogy. It proposes that cosmic order may be interpreted as arising through *local lawful interaction* among fundamental entities, where stable regularities emerge from the repeated execution of intrinsic behavioral constraints (i.e., physical laws) rather than from continuous centralized intervention. This claim should be read as a philosophical reframing of lawful order, not as a denial of theological interpretations of divine sovereignty. This pressure toward distributed, multi-level description is not merely a modeling convenience; it also bears on how one should understand explanatory organization in a law-governed world (Ylikoski, 2024b).

2.2 Fundamental Entities as Locally Structured Units

To articulate this decentralized picture, we describe fundamental entities (e.g., elementary particles) as *locally structured units* endowed with intrinsic properties and lawful behavioral dispositions. The object-oriented language used here is heuristic: More specifically, this vocabulary is introduced only to illuminate conceptual features such as locality, modular constraint, and interaction-bounded state evolution; it is not intended to import a literal software ontology into physics or to suggest that physical entities are software

objects in an engineering sense. Terms such as "state," "encapsulation," and "interaction protocol" are borrowed from computational discourse to help describe the idea that each entity participates in physical evolution according to a constrained set of admissible behaviors.

Under this framing, a fundamental entity is not imagined as independently "choosing" among arbitrary possibilities. Rather, its evolution is restricted by:

1. intrinsic parameters (e.g., invariant properties and conserved quantities relevant to its physical identity),

2. context-sensitive interaction conditions (e.g., local fields, neighboring entities, boundary conditions), and

3. lawful update constraints (deterministic, probabilistic, or quantum-statistical, depending on the level of description).

The key philosophical point is that lawful behavior can be understood as *locally enacted* rather than externally recalculated at each instant by a centralized controller. The framework therefore emphasizes distributed regularity, not metaphysical independence from an originating source.

2.3 Why the Agent-Based Analogy is Useful

Agent-based modeling and complex-systems research provide a useful conceptual analogy because they show how systems composed of many locally interacting units can generate robust macro-scale order, pattern formation, and adaptive behavior without a globally supervising process explicitly computing every trajectory (Bonabeau, 2002; Macal and North, 2010). The analogy is not exact: physical particles are not agents in the cognitive or intentional sense. This analogy is also methodologically motivated. Across many areas of scientific modeling, large-scale regularities are frequently described through local interactions together with higher-level or effective descriptions, rather than through a single exhaustive micro-level narrative at every explanatory step. The present paper does not extend those scientific models, but draws on this general explanatory style as a philosophical resource for reframing metaphysical order. However, the analogy is philosophically productive because it clarifies a key distinction between:

- **global order as centralized computation**, and

- **global order as emergent consequence of local lawful dynamics**.

This distinction is central to the overall thesis of the paper. It allows us to reinterpret "design" in decentralized terms: order is not taken as evidence of ongoing micro-level intervention, but as compatible with a universe whose foundational entities are constituted so as to interact lawfully from the outset.

The argumentative force of the analogy is not that physical systems are literally agent-based models, but that explanatory success in many domains supports a general

conceptual distinction between (a) centralized micro-management pictures and (b) distributed order generated by local constraints. The present framework imports only this distinction, not the ontological assumptions of agent-based simulation practice (Siegel and Craver, 2024; Ylikoski, 2024b).

However, when importing these concepts into metaphysics, we must be highly sensitive to the epistemic limits of agent-based models. As recent discussions in the philosophy of science have highlighted, computational models typically provide "how-possibly" explanations rather than direct empirical proofs of causal mechanisms. The analogy here is not meant to suggest that the universe operates exactly like a digital simulation, but rather to use the structural features of these models—specifically the generation of macro-level complexity from micro-level local constraints—as a formal heuristic to bridge the explanatory gap between fundamental physics and complex systems.

2.4 Scope and Limits of the Object-Oriented Metaphor

The object-oriented terminology used in this paper should be treated as an *explanatory metaphor with ontological intent*, not as a literal software claim. In particular, we do not claim that the universe is a digital machine in any straightforward engineering sense, nor that physical entities instantiate software objects in a literal programming language. Rather, the metaphor is intended to make three conceptual features explicit:

1. the locality of interaction,
2. the stability of lawful behavior, and
3. the possibility of macro-level emergence from micro-level rule-governed dynamics.

These clarifications are essential because the subsequent sections depend on a careful distinction between metaphorical vocabulary and stronger metaphysical claims. In Section 3, this distinction is used to define the restricted notion of particle-level "Computational Description of Dispositional Properties" without collapsing it into full phenomenological consciousness. In Section 4, the same framework supports an emergent account of human agency that remains consistent with micro-level lawfulness. Figure 1 summarizes the layered conceptual structure of the framework and the distinction between its ontological, agential, and optional theological readings.

3 A Restricted Notion of Particle-Level "Computational Description of Dispositional Properties"

A central source of ambiguity in discussions that combine physics, computation, and philosophy of mind is the use of the term "consciousness" across multiple, non-equivalent senses. In ordinary philosophical usage, consciousness often refers to phenomenal experience (what-it-is-like-ness), subjective awareness, or reflective cognition. None of these

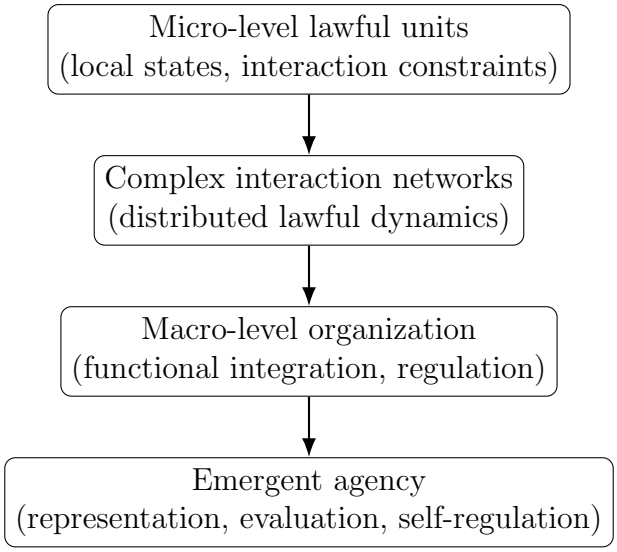

Figure 1: Layered conceptual architecture of the proposed framework. Solid arrows indicate conceptual layering from local lawfulness to emergent agency.

stronger meanings is assumed at the particle level in the present framework (Chalmers, 2010; Seager et al., 2022). To avoid category confusion, this section introduces a more restricted term: *Computational Description of Dispositional Properties*.

By *Computational Description of Dispositional Properties*, we mean the minimal notion that a fundamental entity can be described, at a given level of abstraction, as occupying a lawful state and evolving according to intrinsic constraints and interaction-dependent update rules. This notion is not intended to imply introspection, intentionality, phenomenology, or deliberative choice. Rather, it serves as a conceptual descriptor for *locally enacted lawful behavior* within the decentralized ontological framing proposed in Section 2.

Working definition (restricted use). In this paper, "Computational Description of Dispositional Properties" refers only to the following conjunction of features at a chosen level of description: (i) locally instantiated state-specification, (ii) law-constrained transition profile, and (iii) interaction-dependent responsiveness. The term explicitly excludes phenomenal consciousness, intentionality, deliberation, and personal selfhood (Siegel and Craver, 2024; Ylikoski, 2024b).

3.1 Why a New Term is Needed

The motivation for introducing "Computational Description of Dispositional Properties" is primarily terminological and philosophical. If one speaks directly of "conscious particles," many readers will reasonably interpret this as a strong panpsychist claim about micro-phenomenology. However, the present framework does not require such a commitment. What it requires is only that fundamental entities be describable as:

- possessing a determinate (or probabilistically characterizable) local state,

- interacting under stable lawful constraints, and
- contributing, through repeated interactions, to the formation of larger-scale organization.

This restricted vocabulary allows the framework to preserve its decentralized explanatory structure without overcommitting to controversial claims about phenomenal consciousness at the micro-level. In this respect, the proposal is compatible with multiple interpretations, including weak panpsychist, neutral-monist, and purely structural-functional readings, provided the distinction between phenomenology and lawful state-evolution is maintained (Seager et al., 2022; Goff, 2017). It should also be emphasized that "Computational Description of Dispositional Properties" is not introduced here as a new metaphysical primitive competing with established dispositional or powers-based vocabularies. In many respects, it overlaps with dispositional ways of describing lawful behavioral profiles. Its role in this paper is primarily translational: it provides a computationally inflected bridge-language for relating local lawful dispositions to a layered account of organization and emergence without presupposing a strong thesis about micro-phenomenology.

3.2 Why not use existing dispositional vocabulary alone?

A natural objection is that the proposed term "Computational Description of Dispositional Properties" may be unnecessary, since philosophy already possesses dispositional, powers-based, and state-space vocabularies for describing lawful behavior. This objection is important, and the present framework does not deny the adequacy of those vocabularies in their proper contexts. Indeed, the notion introduced here substantially overlaps with dispositional descriptions of what entities can do under lawful conditions.

The reason for introducing the present term is therefore not to replace dispositional metaphysics, but to serve a *bridging and disambiguating* function within an interdisciplinary argument. In cross-domain discussions that move between physics, computation, and philosophy of mind, the paper needs a term that simultaneously emphasizes: (i) local state-instantiation, (ii) rule-constrained transition structure, and (iii) interaction-dependent responsiveness, while explicitly excluding phenomenal consciousness and deliberative agency. The expression "Computational Description of Dispositional Properties" is intended to mark that restricted combination of features.

The adjective "algorithmic" should thus be read in a minimal and non-committal sense: it refers to structured, constraint-governed state-transition profiles, not to a commitment to digital physics, computationalism about consciousness, or literal software ontology. It is best understood here as a constraint-structural marker within the paper's comparative vocabulary, not as a commitment to computational metaphysics in the strong sense. This is consistent with a levels-sensitive view of explanation in which inferential roles and explanatory granularity may differ across descriptive frameworks without implying ontological duplication (Ylikoski, 2024b). Likewise, "self" is used only to in-

dicate local state-bearing participation in lawful dynamics, not psychological selfhood. The term is retained because it helps stabilize the paper's layered distinctions across sections, especially the distinction between micro-level lawful participation and macro-level agential capacities.

In this respect, the proposed term is not offered as a replacement for powers-based or mechanistic vocabularies, but as a cross-domain coordination device for arguments that otherwise risk shifting between descriptive registers without explicit notice (Siegel and Craver, 2024).

The justificatory structure for retaining the term can be stated briefly: (1) cross-domain debates in this area routinely shift between physical, computational, and mental vocabularies; (2) such shifts often generate ambiguity about what is being attributed at the micro-level; (3) a restricted bridge-term can reduce that ambiguity if its exclusions are made explicit. Therefore, retaining "Computational Description of Dispositional Properties" is warranted here as a local disambiguation device, even if alternative vocabularies remain fully legitimate in other contexts.

3.3 Computational Description of Dispositional Properties as a Descriptive, Not Psychological, Category

The "Computational Description of Dispositional Properties" should not be interpreted psychologically. It is used in a strictly limited sense to indicate that each entity's current state is locally instantiated (i.e., not externally re-specified at every instant in the conceptual picture) and enters into lawful interactions as a bounded participant in the overall dynamics. The term therefore functions analogously to state descriptions in physics and dynamical systems, not to selfhood in personal identity theory. If preferred, readers may interpret "self" here as shorthand for *locally indexed state-bearing unity* rather than any psychologically loaded notion of selfhood.

More precisely, the framework attributes to each fundamental entity only the following minimal features:

1. **State specification**: the entity has properties or variables relevant to lawful evolution at the chosen level of description;

2. **Lawful transition profile**: state changes occur in accordance with physical constraints (which may be deterministic, stochastic, or quantum-statistical, depending on the theory, (Chen, 2025; Chua and Chen, 2025; Ismael, 2023));

3. **Interaction responsiveness**: transitions depend, at least in part, on local interaction context.

These features are sufficient for the purposes of the present metaphysical analogy. They support a decentralized account of order while avoiding anthropomorphic or psychologically inflated descriptions of matter.

3.4 Relation to Panpsychism and the Combination Problem

The proposed terminology intersects with panpsychist discussions but does not collapse into a standard panpsychist thesis. Classical and contemporary panpsychism often ask whether mentality is fundamental and, if so, how micro-level experiential units combine into unified macro-consciousness (the combination problem) (Seager et al., 2022; Goff, 2017). The present framework does not claim to solve the combination problem in its full form. Instead, it brackets the strong phenomenal question and focuses on a weaker ontological point: local lawful state-structured entities can form increasingly complex organizations whose macro-level properties are not trivially reducible to isolated component descriptions.

Accordingly, the framework should be read as offering a *graded conceptual bridge*:

$$\text{micro-level lawful state-structure} \rightarrow \text{complex interaction networks} \rightarrow \text{emergent macro-level organization} \rightarrow \text{conditions for agency and cognition.}$$

This schematic progression should be read as indicating conceptual layering and organizational dependence, not as a proof that cognition or agency necessarily emerges in every law-governed system, nor as a demonstration of a unique developmental pathway from micro-structure to person-level capacities. This bridge is intentionally weaker than a full theory of consciousness, but stronger than a purely rhetorical metaphor, because it specifies what is and is not being claimed at each level.

3.5 Philosophical Payoff for the Overall Framework

The introduction of "Computational Description of Dispositional Properties" performs two important functions in the paper. First, it prevents an equivocation between particle-level lawful behavior and human-level conscious experience. Second, it prepares the conceptual ground for Section 4, where human free will is discussed as an emergent, higher-order capacity involving representation, evaluation, and self-regulation across time.

In this way, the framework preserves a layered ontology: micro-level entities are treated as lawful participants in decentralized dynamics, while macro-level persons may exhibit forms of agency that require additional organizational and cognitive conditions. The conceptual distinction between these levels is essential to the coherence of the proposed nomological foundations of the emergent agency framework.

Positioning within the dialectical landscape. The framework developed so far should be located between several stronger and weaker positions. It is stronger than a merely rhetorical appeal to complexity, because it introduces explicit level distinctions and claim-boundaries regarding lawfulness, organization, and agency. It is weaker than a full panpsychist theory of consciousness, because it does not attribute phenomenal experience to micro-entities or solve the combination problem. It is also not a reductionist physicalism that treats agential vocabulary as dispensable, since it preserves the explanatory relevance of macro-level organization and reason-responsive capacities. In this sense,

the proposal is best read as a clarificatory framework for comparing positions, rather than as a comprehensive competitor that eliminates them.

4 Emergent Agency in Complex Macro-Networks

A central challenge for any framework that affirms micro-level lawfulness is to explain how human agency can be meaningfully described without positing a violation of physical law. In the present framework, this challenge is addressed through an emergentist-compatibilist interpretation: human free will is not treated as a break in lawful dynamics, but as a higher-order capacity that arises in sufficiently complex biological and social systems (McKenna and Pereboom, 2024; O'Connor and Franklin, 2023; Dennett, 2003).

4.1 From Micro-Level Lawfulness to Macro-Level Organization

The decentralized ontological framing developed in Sections 2 and 3 describes fundamental entities as locally rule-governed participants in lawful interaction. On its own, this account does not yet yield agency. The relevant claim of this paper is instead that, through hierarchical organization and increasing system complexity, new explanatory levels become necessary. Molecules, cells, neural assemblies, and whole organisms can be described in ways that are not reducible, in practice or explanatory usefulness, to isolated particle-level descriptions (Anderson, 1972; O'Connor and Wong, 2020; Mitchell, 2009; Ylikoski, 2024b,a).

This point should not be interpreted as a rejection of physical dependence. Rather, it reflects a layered ontology: macro-level capacities depend on micro-level processes, yet they may require distinct conceptual vocabularies because they involve organization, function, information integration, temporal modeling, and regulatory feedback. Human agency is introduced at this macro-level, not at the level of fundamental particles.

4.2 Agency Is Not Mere Unpredictability

A common source of confusion in discussions of free will is the conflation of unpredictability with agency. Complex systems may be difficult to predict, and stochastic processes may introduce indeterminacy, but neither unpredictability nor randomness by itself constitutes free will (O'Connor and Franklin, 2023; McKenna and Pereboom, 2024). For this reason, the present framework does not define free will as "non-deterministic output" or as mere computational opacity.

Instead, the framework adopts a more structured account of agency. At the human level, free will is understood as involving capacities such as:

- representation of alternatives,
- evaluation of reasons and consequences,
- temporally extended deliberation,

- self-regulation of action, and
- responsiveness to normative and social constraints.

On this view, agency is an organizational and functional achievement of complex macro-networks, especially neural and embodied cognitive systems embedded in social environments. The relevant contrast is therefore not between "law" and "freedom," but between lower-level lawful transition and higher-level reason-responsive control.

4.3 Compatibility Argument: A State-Space Formalization

To move beyond a merely descriptive compatibility, we formalize this relationship using a state-space framework, drawing on recent multi-level approaches to determinism and agency (List, 2014). Let S_μ denote the micro-level state space of the system (e.g., the exact physical configuration of a neural network), governed by a strictly deterministic transition function $f_\mu : S_\mu \times T \to S_\mu$.

The macro-level agential capacities operate within a macro-state space S_M (e.g., intentional states, representations, and reasons). The relationship between the micro and macro levels is defined by a supervenience mapping $\pi : S_\mu \to S_M$. Because multiple micro-configurations can realize the same macro-state, the mapping π is inherently many-to-one (coarse-grained).

Crucially, the macro-level transition dynamics, defined as $f_M : S_M \times T \to \mathcal{P}(S_M)$, do not simply mirror the deterministic nature of f_μ. Because π is many-to-one, a single macro-state $M_1 \in S_M$ can lead to multiple possible future macro-states, depending on which specific micro-state $\mu \in S_\mu$ (where $\pi(\mu) = M_1$) is actually instantiated. This structural decoupling demonstrates that macro-level alternative possibilities—the foundational requirement for agential freedom—are mathematically and logically consistent with strict micro-level determinism. Thus, the existence of micro-level lawfulness does not render human agency illusory; rather, reason-responsiveness and deliberation are irreducible features of the macro-dynamics f_M.

4.4 An Emergentist-Compatibilist Reading

The present proposal is closest to an emergentist-compatibilist reading of free will. Compatibilist traditions generally maintain that agency and responsibility can be meaningful even in a law-governed world, provided that action flows from the agent's own capacities (e.g., deliberation, self-control, reasons-responsiveness) rather than from external coercion or pathological impairment (McKenna and Pereboom, 2024; Dennett, 2003). Emergentist perspectives add that these capacities become intelligible only at higher levels of organization, where new forms of structure and regulation appear (O'Connor and Wong, 2020; Anderson, 1972).

A further clarification concerns the relation between agency and responsibility. The present paper does not develop a full moral theory, but the compatibilist background

relevant here typically connects agency to social practices of appraisal, accountability, and reason-giving. For this reason, the framework distinguishes between mere behavioral complexity and normatively assessable agency. The emphasis on deliberation, self-regulation, and reasons-responsiveness is intended to align the proposed account with those dimensions of agency that are most relevant to responsibility, even though a full treatment of moral responsibility lies beyond the scope of this paper. The contribution of the present framework is not to resolve longstanding disputes among compatibilist and incompatibilist theories. Rather, it offers a coherent conceptual vocabulary for describing how macro-level agency may be situated within a universe understood in decentralized, locally lawful terms. In this sense, the framework supports coexistence between:

1. micro-level lawful dynamics,
2. macro-level cognitive organization, and
3. human-level agency as an emergent, reason-responsive capacity.

This positioning is also intended to mark distance from some reductionist or deflationary readings of agency, including views that treat agential explanation as explanatorily secondary or merely pragmatic (Siegel and Craver, 2024; Ylikoski, 2024b).

This emergentist account also provides a naturalistic grounding for the notion of agent-causation. As Martinez (Martinez, 2024) has recently analyzed, reducing agent-causation entirely to event-causation often obscures the unique structure of basic actions and self-determination. By locating agency strictly at the macro-organizational level where capacities for evaluation and self-regulation reside, our framework preserves the indispensable explanatory role of agent-causation without requiring a return to mysterious, unembodied agents or violating naturalistic constraints.

4.5 Causal Exclusion and Downward Causation

A persistent challenge for any non-reductive framework is the Causal Exclusion Problem (Kim, 2005). If every physical event has a sufficient physical cause at the micro-level (the principle of Physical Closure), macro-level mental or agential properties appear causally redundant, threatening systematic overdetermination.

To resolve this within our decentralized framework, we adopt an interventionist approach to causation (Woodward, 2003; Gebharter and Sekatskaya, 2024). Under interventionism, a macro-state M (e.g., a deliberative decision) is a genuine cause of an action A if intervening on M, while appropriately controlling background variables, systematically changes A. Because macro-states track organizational patterns that are multiply realized, interventions on the macro-level provide specific, proportional control over the behavioral outcome that cannot be captured by intervening on a single micro-variable in S_μ. Therefore, macro-level agential properties exert genuine downward causal efficacy without violating the physical closure of the micro-level, successfully avoiding the overdetermination dilemma.

4.6 Scope of the Claim

The claim advanced here is philosophical and interpretive, not experimental. The paper does not present a neuroscientific theory of consciousness or a formal computational model that proves the emergence of free will from particle dynamics. Incompatibilist readers may regard such an account as insufficient for securing the strongest notions of "ultimate" freedom, and the present framework does not seek to settle that disagreement. Its aim is more modest: to show that, once particle-level lawful state-evolution is not conflated with human-level consciousness, a layered account of meaningful agency becomes conceptually available within an ontology that preserves micro-level lawfulness while recognizing macro-level reason-responsive capacities. This is sufficient for the broader purpose of the paper, namely, to articulate how decentralized lawful order and meaningful human agency may be discussed within a single metaphysical framework.

5 Objections and Clarifications

Because the proposed framework is interdisciplinary and explicitly relies on a computationally inspired metaphysical vocabulary, several objections are foreseeable. This section addresses the most important of them in order to clarify the scope, strength, and intended contribution of the paper.

5.1 Is the framework merely metaphorical?

A natural objection is that the framework is only a rhetorical metaphor that redescribes familiar ideas without adding philosophical substance. This concern is understandable, especially because the paper uses computational language (e.g., local state, interaction constraints, rule-governed processing, and architectural framing) in a domain that is not itself a software engineering model.

The response is that the framework is indeed metaphorical in vocabulary, but not merely rhetorical in function. Its purpose is to impose disciplined distinctions that are often blurred in cross-domain discussions: the distinction between local lawfulness and centralized control, between particle-level state-evolution and human-level consciousness, and between ontological framing and mere heuristic analogy. In this sense, the metaphor does not operate as decorative language; it serves as a constraint on what may and may not be inferred at each explanatory level.

Accordingly, the framework should be judged less as a competing physical theory and more as a structured conceptual instrument. Its philosophical contribution lies in clarifying how claims about order, emergence, agency, and metaphysical grounding can be articulated together without collapsing into category mistakes.

The relevant standard of success for the present framework is not novel prediction or empirical confirmation, but improved inferential discipline across domains. Concretely, the framework succeeds to the extent that it (a) blocks illegitimate transitions between

lawfulness, consciousness, and agency, (b) preserves level-sensitive explanatory distinctions, and (c) clarifies which claims depend on theological interpretation and which do not.

5.2 Is this just panpsychism under a new label?

A second objection is that the proposed framework may appear to be a rebranding of panpsychism, especially given its engagement with debates about mentality at the fundamental level. This objection has force if the term "Computational Description of Dispositional Properties" is read as a disguised claim about micro-level phenomenal consciousness.

However, the paper explicitly introduces "Computational Description of Dispositional Properties" as a restricted descriptive category and not as a claim about particle-level phenomenology. The framework does not assert that fundamental entities possess experience in the full sense relevant to philosophy of mind. Instead, it uses a weaker, stipulative vocabulary to describe locally instantiated lawful state-evolution and interaction responsiveness. This is precisely why the framework remains compatible with multiple interpretations, including weak panpsychist, neutral-monist, and structural-functional readings.

The proposed view is therefore better understood as *panpsychism-adjacent* in dialectical context, rather than as a direct defense of classical panpsychism. Its aim is not to solve the combination problem, but to provide a layered conceptual bridge that is stronger than a purely rhetorical analogy while remaining weaker than a full theory of consciousness.

5.3 Does the free-will account collapse into standard compatibilism?

A third objection is that the account of agency presented in Section 4 ultimately reduces to a familiar compatibilist position expressed in new terminology. In one sense, this objection is correct: the paper explicitly states that its closest affinity is with an emergentist-compatibilist reading.

This is not a defect in the present context, but part of the intended scope. The contribution of the framework is not to replace compatibilist theories or to resolve long-standing disputes between compatibilists and incompatibilists. Rather, it is to show how a compatibilist-style account of reason-responsive agency can be situated within a broader layered ontology that begins with micro-level lawfulness and proceeds through organizational emergence. The novelty, therefore, lies in conceptual integration and framing, not in claiming an entirely new theory of free will.

At the same time, the framework adds a useful clarification: it emphasizes that the relevant contrast is not between "law" and "freedom," but between lower-level lawful transition and higher-level reason-responsive regulation. This helps prevent the recurrent

confusion between unpredictability, indeterminacy, and agency.

A stronger version of this objection would come from views that regard all higher-level agential explanation as either reducible in principle or normatively dispensable; the present framework resists that move by treating level-distinctions as explanatorily substantive rather than merely heuristic (Siegel and Craver, 2024; Taylor and Law, 2024; McKenna, 2024).

5.4 Clarification of the paper's contribution

Taken together, these replies clarify the kind of contribution this paper makes. It does not offer a new physical theory or a formal proof of emergent agency. Its contribution is a disciplined interdisciplinary framework for cross-domain conceptual translation: one that connects local lawfulness, emergent organization, and meaningful agency.

5.5 What the framework changes in adjacent debates

Although the framework does not resolve the major debates it engages, it does alter their dialectical organization in two ways. First, in relation to panpsychism, it separates questions about micro-level lawful participation from stronger claims about micro-phenomenology, thereby reducing pressure to treat every appeal to distributed order as an implicit consciousness thesis. Second, in relation to free will, it blocks a common inference from micro-level lawfulness to agential eliminativism by making explanatory level-distinctions explicit.

6 Conclusion

This paper has proposed *Nomological Foundations of Emergent Agency* as a conceptual framework for reinterpreting the relation between micro-level lawfulness, macro-level complexity, and human agency. The framework does not claim to be a new physical theory, a computational simulation of the universe, or an empirical proof of metaphysical or theological doctrines. Its contribution is primarily philosophical: it offers a structured interdisciplinary vocabulary for discussing how lawful order and emergent agency may coexist within a single ontological picture.

The central clarification of the paper is the distinction between particle-level lawful state-evolution and human-level conscious agency. By introducing the restricted notion of *Computational Description of Dispositional Properties*, the framework avoids conflating phenomenological consciousness with local rule-governed behavior. This distinction makes it possible to preserve a layered account of reality in which fundamental entities are described in terms of lawful participation, while human beings are described at a higher explanatory level in terms of representation, evaluation, self-regulation, and agency.

In relation to free will, the paper has argued for the conceptual plausibility of an emergentist-compatibilist reading: human agency need not be framed as a violation of

physical law, but may instead be understood as a higher-order, reason-responsive capacity arising in sufficiently complex macro-networks. This claim does not settle the broader philosophical debates on free will, but it demonstrates that the proposed decentralized framework can accommodate agency without collapsing into either reductive mechanism or purely rhetorical appeals to mystery.

Several limitations of the present framework should be made explicit. First, the proposal is conceptual and interpretive rather than empirical; it does not offer a formal model that derives agency from micro-level dynamics, nor does it provide a testable physical theory. Second, the notion of "Computational Description of Dispositional Properties" is introduced as a constrained philosophical vocabulary, and its value depends on whether readers find it clarifying rather than merely terminological.

These limitations, however, also indicate productive directions for future work. One direction is comparative philosophical refinement, especially with respect to neutral monism, structural realism, and non-reductive physicalist accounts of emergence. A second direction is conceptual formalization: the framework could be sharpened by developing more explicit criteria for level distinction, explanatory dependence, and reason-responsive agency. A third direction is interdisciplinary dialogue, particularly with philosophy of science and complex-systems theory, to clarify how far computationally inspired metaphysical vocabularies can illuminate lawful order without overextending scientific models.

Despite these limitations, the framework may be useful as a philosophical synthesis. Its main value lies in offering a disciplined way to discuss how decentralized lawful dynamics, emergent complexity, and meaningful agency can be jointly articulated in a law-governed universe.

References

Anderson, P. W. (1972). More is different. *Science*, 177(4047):393–396.

Bonabeau, E. (2002). Agent-based modeling: Methods and techniques for simulating human systems. *Proceedings of the National Academy of Sciences*, 99(suppl_3):7280–7287.

Chalmers, D. J. (2010). *The Character of Consciousness*. Oxford University Press.

Chen, E. K. (2025). The simplicity of physical laws. *Noûs*.

Chua, E. Y. S. and Chen, E. K. (2025). Decoherence, branching, and the born rule in a mixed-state everettian multiverse. *Synthese*, 205(160).

Dennett, D. C. (2003). *Freedom Evolves*. Viking.

Gebharter, A. and Sekatskaya, M. (2024). Interventionism and causal exclusion. *Synthese*, 203(6):1–22.

Goff, P. (2017). *Consciousness and Fundamental Reality*. Oxford University Press.

Ismael, J. (2023). Reflections on the asymmetry of causation. *Interface Focus*, 13(3):20220081.

Kim, J. (2005). *Physicalism, or something near enough*. Princeton University Press.

List, C. (2014). Free will, determinism, and the possibility of doing otherwise. *Noûs*, 48(1):156–178.

Macal, C. M. and North, M. J. (2010). Tutorial on agent-based modelling and simulation. *Journal of Simulation*, 4(3):151–162.

Mainzer, K. (2019). The digital and the real universe: Foundations of natural philosophy and computational physics. *Philosophies*, 4(1):3.

Martinez, J. (2024). Agent causation and motivating reasons. *Philosophy Compass*, 19(8):e13012.

McKenna, M. (2024). Facing the luck problem for compatibilists. *Midwest Studies in Philosophy*. Wiley Online Library.

McKenna, M. and Pereboom, D. (2024). Compatibilism. In Zalta, E. N. and Nodelman, U., editors, *The Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University, spring 2024 edition.

Mitchell, M. (2009). *Complexity: A Guided Tour*. Oxford University Press.

O'Connor, T. and Franklin, C. E. (2023). Free will. In Zalta, E. N. and Nodelman, U., editors, *The Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University, winter 2023 edition.

O'Connor, T. and Wong, H. Y. (2020). Emergent properties. In Zalta, E. N., editor, *The Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University, summer 2020 edition.

Seager, W., Goff, P., and Allen-Hermanson, S. (2022). Panpsychism. In Zalta, E. N. and Nodelman, U., editors, *The Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University, winter 2022 edition.

Siegel, G. and Craver, C. F. (2024). Phenomenological laws and mechanistic explanations. *Philosophy of Science*, 91(1).

Taylor, W. C. and Law, A. (2024). Reasons-responsiveness and the demarcation problem. *Midwest Studies in Philosophy*, 48:71–89.

Woodward, J. (2003). *Making things happen: A theory of causal explanation*. Oxford University Press.

Ylikoski, P. (2024a). Getting lost with levels: the sociological micro-macro problem. *Synthese*, 204(175).

Ylikoski, P. (2024b). Levels, perspectives, and inferential richness. *Synthese*.