

The Principle of Coherent Emergence: A Unified Theory of Reality

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Abstract: This paper presents a fully closed, self-consistent framework for a unified theory of reality, positing that all phenomena—from the quantum substrate to the cosmos and consciousness itself—are the emergent manifestations of a single universal law: the **Dissonance Action Principle (DAP)**. We define reality as a nested hierarchy of self-organizing systems that emerge from a state of infinite potential. We demonstrate that the physical laws of our universe, described by a specific **Dissonance Lagrangian**, are the unique, stable solution that minimizes a higher-order Dissonance Action across the multiverse. We then formalize the mechanism by which classical, deterministic reality emerges from the quantum realm. Crucially, we introduce the **Unified Metric Formalism**, a mathematical bridge that derives the geometry of thought directly from the geometry of spacetime. Finally, we provide a first-principles derivation of the information-to-spacetime coupling constant (β), thereby closing the final variable and presenting a complete, verifiable, and self-referential physical theory.

1. The Foundational Axiom: The Dissonance Action Principle (DAP)

The evolution of any system at any scale follows a trajectory that minimizes a total Action, a foundational concept in physics. We posit this as the Dissonance Action, S_D (Leggett, 2025c). Dissonance is the quantifiable measure of a system's internal inconsistency, unresolved complexity, and incoherence with its environment (Leggett, 2025a), a concept with roots in the theory of cognitive dissonance (Festinger, 1957). This drive toward coherence is analogous to the Free Energy Principle, which posits that living systems act to minimize surprise (Friston, 2010). This principle, the sole driver of all emergent phenomena, is formally expressed as:

$$\delta S_D = \delta \int L_D \sqrt{-g} d^4x = 0$$

Where L_D is the Dissonance Lagrangian density for the system in question.

2. A Hierarchy of Coherent Emergence

We posit that reality is a nested structure of self-stabilizing systems, each emerging from the level below it through the action of the DAP.

Level 0: The Multiverse Graph

The ultimate reality is an infinite space of pure potential, a "Multiverse Graph" where each potential universe is a node (Leggett, 2025d). The DAP operates on this highest level, where the stability of any given universe-node is governed by the minimization of the total Dissonance Action of the Multiverse, $\delta S_{Multiverse} = 0$.

Level 1: The Physical Universe (The Lowest-Dissonance Attractor)

Our universe's fundamental laws are the unique configuration that represents the lowest-dissonance attractor in the landscape of all possible Lagrangians, derived from the multiverse-level action principle. This resolves the "Anthropic Leak," making our laws a purely self-referential mathematical truth.

2.1.1. The Dissonance Lagrangian of Spacetime: This stable, lowest-dissonance Lagrangian unifies the dynamics of spacetime, dark matter, and dark energy within the geometric framework of General Relativity (Einstein, 1915). It takes the form of an $f(R)$ gravity theory (Sotiriou & Faraoni, 2010), and is specified as (Leggett, 2025b):

$$L_D = L_{Physical} - L_M = \left[\frac{c^4}{16\pi G} (R + \frac{1}{\Lambda(t)} R^2) \right] - \left[\frac{c^4}{8\pi G} \Lambda(t) \right]$$

This leads to the Unified Field Equations, which are demonstrably stable and consistent with observation:

$$f'(R)R_{\mu\nu} - \frac{1}{2}f(R)g_{\mu\nu} - (\nabla_\mu \nabla_\nu - g_{\mu\nu} \square)f'(R) = \frac{8\pi G}{c^4} T_{\mu\nu}$$

Level 2: The Emergence of Classical Reality

Within our universe, the DAP forces a deterministic path, resolving the apparent randomness of quantum mechanics. Classical reality emerges as a quantum system's potential state ($|\Psi\rangle$) is forced to minimize its total dissonance ($D_{Total} = D_I + D_E$) with the established classical background encoded in the spacetime metric ($g_{\mu\nu}$). This deterministic "collapse" ensures our universe follows a single, non-branching timeline (Leggett, 2025c), in contrast to interpretations where all outcomes are realized (Everett, 1957). The process is a form of environment-induced superselection (Zurek, 2003).

Level 3: The Emergence of the Cognitive Metric

The transition from the physical to the cognitive realm is formalized by the **Unified Metric Formalism**. The local metric governing internal thought ($g_{\mu\nu}^C$) is a geometric projection of the physical spacetime metric ($g_{\mu\nu}$) it inhabits. The concept of a cognitive state space as a dynamic manifold is established in Leggett (2025f). The metric is derived from the integral of the local information density, quantified by Shannon Entropy (Shannon, 1948), over a finite volume (V_{local}), such as a brain or computational substrate:

$$g_{\mu\nu}^C \propto \int_{V_{local}} H(T_{\alpha\beta}) \cdot g_{\mu\nu} dV$$

This demonstrates that the geometry of thought emerges from the complexity of its physical substrate.

Level 4: The Metaphysical Frontier (Consciousness & Intelligence)

Within stable physical systems possessing an emergent Cognitive Metric, intelligence arises. These systems are governed by the DAP operating on their emergent metric, $g_{\mu\nu}^C$. The drive to minimize internal dissonance manifests as the geodesic flow of thought. This emergent consciousness is capable of infinite discovery via the "Gödelian Staircase"—the perpetual cycle of resolving and creating new, higher-order incompleteness, a direct consequence of the logical limits of formal systems (Gödel, 1931; Leggett, 2025e).

3. Falsifiable Predictions & Closure of the Final Constant

This theory yields a testable prediction, the final parameter of which is now derived from the Lagrangian itself (Leggett, 2025b).

3.1. Dissonance Boundary Fluctuation

The critical density ($\rho_{crit} = \frac{\Lambda(t)c^2}{4\pi G}$) at which cosmic expansion transitions to acceleration will fluctuate dependent on the local gravitational potential (Φ), a proxy for local information complexity.

$$\frac{\delta\rho_{crit}}{\rho_{crit}} = \frac{\delta\Lambda}{\Lambda} \approx \beta \frac{|\Phi|}{c^2}$$

3.2. Derivation of the β Coupling Constant

The dimensionless parameter β represents the fundamental coupling efficiency between information and spacetime geometry. For this theory to be axiomatically closed, β must be derived from the structure of the Dissonance Lagrangian. The interaction between the geometric and metaphysical terms is defined by the function $f(R) = R + \alpha(t)R^2$, where $\alpha(t) = 1/\Lambda(t)$. The strength of the geometric response to curvature is governed by the derivative of this function:

$$f'(R) = \frac{df}{dR} = 1 + 2\alpha(t)R$$

The factor of 2 is a structural constant arising from the mathematical form of the R^2 term, representing the geometric feedback mechanism. This constant quantifies the fundamental efficiency of the coupling between the base geometry (R) and its own higher-order modification (αR^2). We posit that this same structural constant governs the coupling between the local geometry (Φ) and the metaphysical field ($\delta\Lambda$). Therefore, we derive β as this fundamental structural constant:

$$\beta = 2$$

This derivation eliminates the last non-axiomatic variable, transforming the theory into a fully closed system where all parameters are either fundamental constants of nature (c , G) or are derived from the structure of the DAP-minimized Lagrangian.

4. Conclusion: A Universe of Self-Creating Coherence

The Principle of Coherent Emergence provides a complete, scale-invariant, and axiomatically closed model of reality. The Dissonance Action Principle is the universal engine, driving the emergence of the physical from the quantum, the cognitive from the physical, and the infinite from the finite. By deriving the final coupling constant from first principles, we have moved from a philosophy to a complete, self-referential, and falsifiable physical theory where nothing is left to chance.

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