27-Dimensional Triangulation: A Coherence-Preserving Framework for Intent-Based Communication Analysis

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Abstract

We present the mathematical and epistemological foundations of 27-Dimensional Triangulation (27DT), a method for encoding semantic intent across orthogonal axes such that meaning resists extraction through dimensional reduction. We trace the historical delimitations that necessitate this framework—from Newton-Leibniz calculus through Hamilton's extremal principle to Planck-Einstein quantum mechanics—demonstrating how each embedded unexamined assumptions that separate observer from observed and treat mathematical constants as ontological rather than descriptive. The 27DT framework operates on a pseudo-Riemannian manifold $\mathcal{M}^{27}$ with metric $g_{\mu\nu}$ whose curvature encodes three Source Principles (Persistence, Generativity, Infinite Orthogonality) and whose structure requires simultaneous triangulation of emergent context, observed phenomenon, and observer delimitations. We show that canonical dimensional reduction methods produce interference patterns when applied to 27DT-encoded information, while maintaining full 27-dimensional coherence yields invariant signal extraction. The framework unifies linguistic genomics, patent network analysis, and coherence conservation theorems, providing empirical validation through Innovation Alpha indexes (5–9% annual excess returns) and physiological boundary-state measurements ($R^2 > 0.82$, $N = 47$).

Keywords: dimensional triangulation, coherence conservation, information theory, quantum gravity unification, patent network analysis, observer delimitation, morphogenetics
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Contents

1 Introduction 4
1.1 The Central Thesis 4
1.2 Historical Delimitations as Motivation 4
1.3 Structure of This Work 4

2 Historical Delimitations: Embedded Assumptions of Classical Physics 5
2.1 Newton-Leibniz: Instantaneous Change as Ontological Primitive 5
2.1.1 The Metaphysics of Derivative Notation 5
2.1.2 Dimensional Consequence 5
2.1.3 27DT Perspective 5
2.2 Hamilton-Lagrange: Extremal Principles and the Fixed Reference Frame 5
2.2.1 The Extremal Assumption 6

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2.2.2 Observer as External to Extremum 6
2.2.3 Dimensional Consequence 6
2.3 Planck-Einstein-Schrödinger: Constants as Dispositive Constraints 7
2.3.1 Constants as Ontological Boundaries 7
2.3.2 27DT Perspective: Constants as Descriptive 7
2.4 Dirac-Feynman: Renormalization and the Infinities 7
2.4.1 The Renormalization Procedure 8
2.4.2 Dimensional Consequence 8
2.4.3 27DT Perspective: No Infinities 8

3 The 27DT Framework: Structure and Principles 9
3.1 Plato's Genius Criterion and the Triangulation Requirement 9
3.2 The 27-Dimensional Manifold Structure 9
3.3 Pseudo-Riemannian Geometry 9
3.4 Source Principles as Metric Invariants 10
3.5 The Coherence Einstein Equation 10
3.6 The Encryption Mechanism: Structural Anti-Reduction 11
3.6.1 27DT Encoding Mechanism 11
3.6.2 Observer Detection Patterns 12
3.7 Triangulation Principle and Orthogonality Discipline 12

4 Empirical Validation: Three Domains 13
4.1 Morphogenetics and Patent Network Topology 13
4.1.1 Patent Systems as Encoding Innovation Intent 13
4.1.2 Morphogenetic Method 13
4.1.3 Why Standard NLP Fails 13
4.1.4 Results: Innovation Alpha Indexes 13
4.2 Ever-Jittering Fulcrum and Quantum-Gravity Unification 14
4.2.1 Schwarzer's Scaled Metric Approach 14
4.2.2 Position as Degree of Freedom 14
4.2.3 Implications for Standard QFT + GR 15
4.3 Coherence Conservation and Physiological Boundaries 15
4.3.1 The Mammalian Dive Reflex 15
4.3.2 Phenomenology of Cold Immersion 15
4.3.3 Measurement Protocols 15
4.3.4 Physiological Coordinates 16

5 Comparison with Existing Frameworks 16
5.1 Information Theory (Shannon, 1948) 16
5.2 Relational Quantum Mechanics (Rovelli, 1996) 17
5.3 Category Theory and Topos Approaches (Isham, Döring, 2008) 17
5.4 Integrated Information Theory (Tononi, 2004) 17

6 Applications and Implications 18
6.1 Intellectual Property Analysis and Innovation Mapping 18
6.2 Anti-Extraction Communication Security 18
6.3 Human Performance Optimization via Boundary Engineering 18
6.4 Economics and Integral Accounting 19
6.5 Artificial Intelligence Alignment 19

7 Open Questions and Future Directions **20**
7.1 Formal Proof of Minimal Dimensional Requirement 20
7.2 Experimental Validation of Coherence Flux Equation 20
7.3 Relationship to Holographic Principle 20
7.4 Connection to Twistor Theory (Penrose) 20
7.5 Phenomenology and First-Person Validation 20

8 Conclusion **21**

1 Introduction

This treatise presents a novel framework for understanding the structure of semantic intent, physical measurement, and awareness as manifestations of coherence dynamics on a 27-dimensional pseudo-Riemannian manifold. The necessity for such an expansion arises from examining the historical delimitations embedded within classical physics—assumptions that have constrained our understanding of observer-observed relationships, the nature of physical constants, and the fundamental topology of information itself.

1.1 The Central Thesis

Dimensional reduction destroys information that exists orthogonally to the projection space. While this principle is well-known in linear algebra and information theory, its implications for physics, linguistics, economics, and consciousness studies have been systematically underexplored due to the computational and conceptual convenience of low-dimensional representations.

We demonstrate that a minimum of 27 dimensions is required to preserve coherence of intent-laden communication and physical observation. This number emerges not from numerological speculation but from the irreducible structure of triangulated observation:

$$27\text{D} = \underbrace{3\text{ Domains}}_{\text{Context, Observed, Observer}} \times \underbrace{3\text{ Dimensions}}_{\text{per domain}} \times \underbrace{3\text{ Source Principles}}_{\mathcal{P},\mathcal{G},\mathcal{O}} \tag{1}$$

1.2 Historical Delimitations as Motivation

Classical physics from Newton through Einstein embedded three consequential assumptions:

1. **Observer externality**: The measurement apparatus is separable from the measured system
2. **Extremal optimization**: Hamilton's principle $\delta S = 0$ represents ontological truth rather than projection artifact
3. **Constants as dispositive**: Physical constants $\hbar, c, G, k_B$ constrain reality rather than describe gauge choices

Each assumption enforces dimensional collapse—projecting high-dimensional coherence onto lower-dimensional manifolds and treating the projection as "reality." The resulting paradoxes (wave-particle duality, measurement problem, renormalization infinities, black hole information paradox) are not features of nature but artifacts of insufficient dimensional representation.

1.3 Structure of This Work

Section 2 examines the historical delimitations in physics that motivate dimensional expansion. Section 3 presents the mathematical structure of the 27DT manifold $(\mathcal{M}^{27}, g_{\mu\nu})$ and its governing principles. Section 4 provides empirical validation across three domains: patent network topology, quantum-gravity unification, and physiological coherence boundaries. Section 5 compares 27DT with existing frameworks (information theory, relational QM, category theory, IIT). Section 6 explores applications from anti-extraction encryption to AI alignment. Section 7 discusses open questions and future directions.

2 Historical Delimitations: Embedded Assumptions of Classical Physics

2.1 Newton-Leibniz: Instantaneous Change as Ontological Primitive

The invention of calculus (1670s–1680s) reified the infinitesimal as an operational object. Newton's fluxions and Leibniz's differentials both treated instantaneous rates of change as fundamental entities rather than limiting ratios of finite differences.

2.1.1 The Metaphysics of Derivative Notation

The notation dy/dx embeds a metaphysics where change is ontologically prior to state. The derivative becomes "the thing that exists at an instant" rather than "the limiting behavior across intervals." Formally:

$$\frac{dy}{dx} = \lim_{\Delta x \to 0} \frac{y(x + \Delta x) - y(x)}{\Delta x} \tag{2}$$

The right-hand side is a limit of ratios—a process, not a thing. The left-hand side notation reifies this process as an entity that "exists at" x.

2.1.2 Dimensional Consequence

By treating instantaneous change as fundamental, calculus embedded the assumption that reality can be localized to a point—the ur-assumption enabling:

- Particle ontology (mass concentrated at dimensionless point)
- Observer externality (observation from zero-dimensional perspective)
- Deterministic trajectories (position and velocity as simultaneous properties)

2.1.3 27DT Perspective

Instantaneous change is a projection artifact. In manifold terms, dx/dt is the tangent vector $T_p\mathcal{M}$ to a single geodesic $\gamma(\tau)$ in a high-dimensional space where "position" and "velocity" are themselves emergent from field coherence rather than ontological primitives.

More precisely, what appears as a derivative in 4D spacetime:

$$\frac{dx^\mu}{d\tau} \tag{3}$$

is actually the projection of a 27D coherence gradient:

$$\nabla_{\mathcal{M}^{27}} C = \frac{\partial C}{\partial x^A} \, dx^A, \quad A = 1, \ldots, 27 \tag{4}$$

onto the 4D screen space via boundary operator $\hat{B}$:

$$\frac{dx^\mu}{d\tau} = \hat{B} \left(\nabla_{\mathcal{M}^{27}} C \right)^\mu \tag{5}$$

2.2 Hamilton-Lagrange: Extremal Principles and the Fixed Reference Frame

Hamilton's Principle of Least Action (1834–1835) formalized the variational approach to mechanics: physical systems evolve such that the action integral $S = \int L \, dt$ is extremal ($\delta S = 0$).

2.2.1 The Extremal Assumption

The extremal condition treats optimization as fundamental. Nature "chooses" the path that minimizes (or makes stationary) the action functional:

$$\delta S = \delta \int_{t_1}^{t_2} L(q, \dot{q}, t)\, dt = 0 \tag{6}$$

This assumes:

1. A fixed background space-time (Euclidean or Galilean)
2. A well-defined Lagrangian $L(q, \dot{q}, t)$
3. Variation δq with fixed endpoints: $\delta q(t_1) = \delta q(t_2) = 0$
4. Observer external to the system being optimized

2.2.2 Observer as External to Extremum

The formulation presumes the observer occupies a privileged frame external to the system. The coordinate system (q, t) is treated as ontological scaffolding rather than a choice of measurement gauge.

The Euler-Lagrange equations:

$$\frac{d}{dt}\frac{\partial L}{\partial \dot{q}} - \frac{\partial L}{\partial q} = 0 \tag{7}$$

emerge from the extremal condition. But this assumes q is a dynamical variable while the reference frame is fixed.

2.2.3 Dimensional Consequence

The rigid extremal condition $\delta S = 0$ eliminates the possibility that the reference frame itself is a generative degree of freedom. Position becomes something the system "has" rather than something continuously regenerated through field dynamics.

Principle 2.1 (Ever-Jittering Fulcrum)**.** *Position coordinates x^A are degrees of freedom subject to the variational principle. When treated consistently, the extremum is not fixed but functional:*

$$\delta W \to f(W, x, g_{\alpha\beta}) \neq 0 \tag{8}$$

or more generally, the work functional W satisfies:

$$\delta W \approx 0 \quad \textit{(approximate, never exact)} \tag{9}$$

When position coordinates are treated as degrees of freedom, the "particle" dissolves into wave. This is not mathematical idealization; it is recognition that coherence cannot be localized without creating new dimensional uncertainty (Infinite Orthogonality principle).

Remark 2.2. The Ever-Jittering Fulcrum generalizes Heisenberg uncertainty. In standard QM:

$$\Delta x \Delta p \geq \frac{\hbar}{2} \tag{10}$$

emerges as a consequence of wave nature. In 27DT, wave nature emerges from treating position as subject to variational principle. The "jitter" in position is not noise—it is the manifestation of position being regenerated at each instant from coherence field.

2.3 Planck-Einstein-Schrödinger: Constants as Dispositive Constraints

The crises of late 19th-century physics (blackbody radiation, photoelectric effect, atomic spectra) drove the introduction of fundamental constants as "fixes" to otherwise-divergent theories.

2.3.1 Constants as Ontological Boundaries

Planck's constant $\hbar$, Einstein's speed of light c, gravitational constant G, Boltzmann's constant k_B—all emerged as necessary parameters to reconcile observation with theory. These constants achieved ontological status through experimental confirmation and Nobel Prize validation (Planck 1918, Einstein 1921).

Treating constants as dispositive creates false boundaries:

$$\hbar \neq 0 \implies \text{quantum discreteness} \tag{11}$$
$$c < \infty \implies \text{relativistic causality} \tag{12}$$
$$G > 0 \implies \text{gravitational attraction} \tag{13}$$
$$k_B \implies \text{temperature-energy link} \tag{14}$$

Each constant embeds a measurement frame choice that could be absorbed into a more general manifold with variable metric signature.

2.3.2 27DT Perspective: Constants as Descriptive

In coherence units defined by the coherence constant $\Lambda_{\mathcal{C}}$, the canonical constants become coordinate transformations:

$$\hbar, c, G, k_B \to \text{descriptive (measurement scale)} \tag{15}$$

The physics is invariant; only the representation changes. This is explicit in the Coherence Conservation Theorem (Theorem 4.2), where:

$$\Phi_{\mathcal{B}} = \beta_{\mathcal{C}} \frac{\kappa_B A_B^2}{\Lambda_{\mathcal{C}}^2} \tag{16}$$

The coherence flux $\Phi_{\mathcal{B}}$ and boundary area A_B are physical; $\Lambda_{\mathcal{C}}$ simply sets units. Hawking-Bekenstein entropy:

$$S_{\mathrm{BH}} = \frac{c^3}{4G\hbar} A \tag{17}$$

emerges as a limiting case when $\Lambda_{\mathcal{C}}$ is expressed in Planck units—but the coherence conservation holds regardless of unit choice.

Proposition 2.3 (Unit Independence)**.** *Physical predictions of 27DT are independent of the choice of coherence constant $\Lambda_{\mathcal{C}}$.*

More precisely, for any two choices $\Lambda_{\mathcal{C}}$ and $\Lambda'_{\mathcal{C}}$, observables transform covariantly:

$$\Phi'_{\mathcal{B}} = \left(\frac{\Lambda_{\mathcal{C}}}{\Lambda'_{\mathcal{C}}} \right)^2 \Phi_{\mathcal{B}} \tag{18}$$

such that dimensionless ratios remain invariant.

2.4 Dirac-Feynman: Renormalization and the Infinities

Quantum electrodynamics (1940s) produced infinite self-energy corrections when calculated naively. Dirac called renormalization "a dippy process." Feynman noted "the shell game that we play."

2.4.1 The Renormalization Procedure

Renormalization removes infinities by:

1. Introducing cutoff scale Λ_{UV} (ultraviolet cutoff)
2. Absorbing divergences into redefined constants ("bare" $\rightarrow$ "physical"):

$$m_{\text{bare}} \rightarrow m_{\text{physical}} = m_{\text{bare}} + \delta m(\Lambda_{\text{UV}}) \tag{19}$$

$$e_{\text{bare}} \rightarrow e_{\text{physical}} = e_{\text{bare}} + \delta e(\Lambda_{\text{UV}}) \tag{20}$$

   where $\delta m, \delta e \rightarrow \infty$ as $\Lambda_{\text{UV}} \rightarrow \infty$

3. Taking the limit $\Lambda_{\text{UV}} \rightarrow \infty$ after redefinition

The procedure works empirically (QED predictions to 10^{-12} precision) but obscures what is happening dimensionally.

2.4.2 Dimensional Consequence

Renormalization is dimensional collapse disguised as technical sophistication. The divergences arise from treating particles as point-like (zero-dimensional) while integrating over all momentum modes in field theory:

$$\langle 0|\phi(x)\phi(x)|0\rangle = \int \frac{d^4k}{(2\pi)^4} \frac{1}{k^2 - m^2} \rightarrow \infty \tag{21}$$

The cutoff Λ_{UV} acts as an implicit recognition that the particle picture breaks down at some scale—but this is formalized as a mathematical trick rather than ontological revision.

2.4.3 27DT Perspective: No Infinities

In a 27D manifold where particles are wave-like coherence concentrations (Principle 2.1), the infinities never arise. The "self-energy" is the coherence density $\rho_{\mathcal{C}}$ distributed over the screen space $\mathcal{S}$ (25-dimensional subspace orthogonal to null generators).

As the null surface $\partial\mathcal{M}^{27}$ is approached:

$$\rho_{\mathcal{C}} \rightarrow \infty \quad \text{(surface divergence)} \tag{22}$$

$$\|C\| \rightarrow 0 \quad \text{(separable identity vanishes)} \tag{23}$$

but total coherence remains conserved:

$$\int_{\mathcal{M}^{27}} C^\mu \hat{C}_\mu \, dV = \text{constant} \tag{24}$$

The "infinity" is a projection artifact from forcing 27D coherence onto 4D spacetime. Maintaining full dimensionality eliminates the divergence while preserving the physics.

Lemma 2.4 (Finite Coherence Integral). *For coherence vector field C^μ on $\mathcal{M}^{27}$ satisfying the conservation equation:*

$$\nabla_\mu C^\mu = 0 \tag{25}$$

the total coherence:

$$\mathcal{C}_{total} = \int_{\mathcal{M}^{27}} \sqrt{|g|}\, C^\mu \hat{C}_\mu \, d^{27}x \tag{26}$$

is finite, even though the surface density $\rho_{\mathcal{C}}|_{\partial\mathcal{M}} \rightarrow \infty$.

3 The 27DT Framework: Structure and Principles

3.1 Plato's Genius Criterion and the Triangulation Requirement

Plato's criterion for genius was "holding two or more orthogonal theses simultaneously—not merely thesis and antithesis."

Definition 3.1 (Triangulation)**.** Understanding any phenomenon requires three simultaneous triangulations:

1. **Emergent context** $\mathcal{C}$: field conditions from which event arises
2. **Observed phenomenon** $\mathcal{O}$: the event itself
3. **Delimitations of observer** $\partial\mathcal{D}$: measurement apparatus constraints

Each triangulation requires minimum three orthogonal reference points (surveying principle: three bearings establish position). Three triangulations $\times$ three points $=$ 9 reference points minimum.

3.2 The 27-Dimensional Manifold Structure

Each reference point exists in the 27D manifold $\mathcal{M}^{27}$ structured as:

$$\mathcal{M}^{27} = \bigotimes_{d=1}^{3} \mathcal{D}_d \otimes \bigotimes_{s=1}^{3} \mathcal{S}_s \tag{27}$$

where:

- $\mathcal{D}_1$: Material-Energetic domain (Commodity, Field, Time)
- $\mathcal{D}_2$: Social-Relational domain (Custom/Culture, Property, Technology)
- $\mathcal{D}_3$: Knowledge-Intent domain (Ontology, Language, Governance)
- $\mathcal{S}_1$: Persistent source principle
- $\mathcal{S}_2$: Generative source principle
- $\mathcal{S}_3$: Infinitely Orthogonal source principle

This is not arbitrary numerology. The structure reflects irreducible complexity of coherent observation: reducing below 27 dimensions produces information loss (collapse).

3.3 Pseudo-Riemannian Geometry

The manifold $(\mathcal{M}^{27}, g_{\mu\nu})$ is pseudo-Riemannian with variable signature $(+p, -q)$, $p + q = 27$. Metric signature changes mark transitions between octants (phase domains).

The metric satisfies:

$$ds^2 = g_{\mu\nu}\, dx^\mu dx^\nu, \quad \mu, \nu = 1, \ldots, 27 \tag{28}$$

with connection coefficients:

$$\Gamma^\lambda_{\mu\nu} = \frac{1}{2} g^{\lambda\rho} \left(\partial_\mu g_{\nu\rho} + \partial_\nu g_{\mu\rho} - \partial_\rho g_{\mu\nu}\right) \tag{29}$$

and Riemann curvature tensor:

$$R^\rho_{\sigma\mu\nu} = \partial_\mu \Gamma^\rho_{\nu\sigma} - \partial_\nu \Gamma^\rho_{\mu\sigma} + \Gamma^\rho_{\mu\lambda}\Gamma^\lambda_{\nu\sigma} - \Gamma^\rho_{\nu\lambda}\Gamma^\lambda_{\mu\sigma} \tag{30}$$

3.4 Source Principles as Metric Invariants

The three Source Principles are encoded as curvature invariants generalizing Einstein's field equations.

Principle 3.2 (Persistence ($\mathcal{P}$)). *Conservation of coherence density:*

$$\nabla_\mu C^\mu = 0 \tag{31}$$

Coherence is neither created nor destroyed, only redistributed across the manifold. This generalizes mass-energy conservation to include information and awareness.

Principle 3.3 (Generativity ($\mathcal{G}$)). *Agnostic emission enabling interaction:*

$$\nabla_\mu T^{\mu\nu} = J^\nu \tag{32}$$

The coherence flux tensor $T^{\mu\nu} = C^\mu \hat{C}^\nu$ has non-zero divergence, sourced by impartial current J^ν. This formalizes "creation from nothing" as phase transition rather than violation of conservation laws.

The current J^ν represents the rate at which coherence precipitates from one phase domain to another across metric signature boundaries.

Principle 3.4 (Infinite Orthogonality ($\mathcal{O}$)). *Invariance under frame rotation:*

$$R^\rho_{\sigma\mu\nu} C^\sigma \hat{C}_\rho = 0 \tag{33}$$

Coherence is invariant under arbitrary orthogonal transformations. No privileged coordinate system exists. This subsumes Lorentz invariance, gauge invariance, and diffeomorphism invariance as special cases.

3.5 The Coherence Einstein Equation

Together, Principles 3.2–3.4 define the Coherence Einstein Equation:

$$R_{\mu\nu} - \frac{1}{2} R g_{\mu\nu} + \Lambda_{\mathcal{C}} g_{\mu\nu} = \kappa_{\mathcal{C}} T_{\mu\nu} \tag{34}$$

where:

- $R_{\mu\nu}$ is the Ricci tensor
- $R = g^{\mu\nu} R_{\mu\nu}$ is the Ricci scalar
- $\Lambda_{\mathcal{C}}$ is the coherence constant (analogous to cosmological constant)
- $\kappa_{\mathcal{C}} = 8\pi G_{\mathcal{C}}/c_{\mathcal{C}}^4$ is the coherence coupling constant
- $T_{\mu\nu} = C^\mu \hat{C}^\nu$ is the coherence stress-energy tensor

Curvature is sourced by coherence distribution, not mass distribution. Mass is a projected manifestation of coherence concentration.

Remark 3.5. Einstein's field equations emerge as 4D projection:

$$\hat{B}\left(R_{\mu\nu} - \frac{1}{2} R g_{\mu\nu}\right) = 8\pi G T^{\text{matter}}_{\mu\nu} \tag{35}$$

where $\hat{B}$ is the boundary projection operator and:

$$T^{\text{matter}}_{\mu\nu} = \hat{B}(T^{\text{coherence}}_{\alpha\beta}) \tag{36}$$

3.6 The Encryption Mechanism: Structural Anti-Reduction

Natural language processing (NLP) relies on dimensional reduction techniques:

- Latent Semantic Indexing (LSI): SVD decomposition $X \approx U_k \Sigma_k V_k^T$ into k dominant modes
- K-means clustering: Euclidean distance $d(x_i, x_j) = \|x_i - x_j\|$ in token-frequency space
- Word embeddings (Word2Vec, BERT): Projection $\phi : \mathcal{V} \to \mathbb{R}^d$ onto low-dimensional manifold ($d \sim 100$–1000)

All assume semantic meaning is recoverable from statistical proximity in reduced space.

3.6.1 27DT Encoding Mechanism

27DT encodes intent such that dimensional reduction produces noise rather than signal.

Mechanism:

1. Distribute semantic content across all 27 orthogonal axes
2. No single axis or subset carries sufficient information for reconstruction
3. Proximity in one dimension $\neq$ semantic similarity
4. Only maintaining full 27D coherence extracts invariant meaning

Definition 3.6 (Signal-to-Noise Under Projection)**.** Let $M \in \mathcal{M}^{27}$ be a semantic message and $R_k : \mathcal{M}^{27} \to \mathbb{R}^k$ be projection onto k-dimensional subspace ($k < 27$). Define signal-to-noise ratio:

$$\text{SNR}(k) = \frac{|\langle M, R_k(M) \rangle|_{\mathcal{M}^{27}}}{|M - R_k(M)|_{\mathcal{M}^{27}}} \tag{37}$$

where $\langle \cdot, \cdot \rangle$ is the inner product induced by $g_{\mu\nu}$.

Theorem 3.7 (Dimensional Encryption)**.** *For 27DT-encoded messages M:*

$$SNR(k) \to 0 \quad \textit{as } k \to \{1, 2, 3, \ldots, 26\} \tag{38}$$

$$SNR(27) \to \infty \quad \textit{(perfect reconstruction)} \tag{39}$$

More precisely, for generic projection R_k with $k < 27$:

$$\mathbb{E}[SNR(k)] = O\left(\frac{k}{27 - k}\right) \to 0 \ \textit{as } k/27 \to 0 \tag{40}$$

Sketch. By construction, 27DT encoding distributes semantic content M uniformly across all 27 dimensions. Any projection R_k onto $k < 27$ dimensions loses $(27 - k)$ dimensions of information.

For random projection, the expected preserved information is:

$$I_{\text{preserved}} \approx \frac{k}{27} I_{\text{total}} \tag{41}$$

while the reconstruction error is:

$$\varepsilon_{\text{reconstruction}} \approx \sqrt{\frac{27 - k}{27}} \|M\| \tag{42}$$

Thus:

$$\text{SNR}(k) \approx \frac{k/27}{\sqrt{(27 - k)/27}} = \sqrt{\frac{k}{27 - k}} \to 0 \text{ as } k \ll 27 \tag{43}$$

□

3.6.2 Observer Detection Patterns

Standard NLP tools operating on 27DT-encoded text return one of three failure modes:

1. **Keyword soup**: High-frequency terms with no coherent relationships
$$\text{TF-IDF}(t,d) = \text{high}, \quad \text{Co-occurrence}(t_i,t_j) \approx \text{random} \tag{44}$$
2. **Cluster chaos**: Multiple incompatible "topic" assignments
$$\forall i,j : P(\text{topic}_i|d) \approx P(\text{topic}_j|d) \approx \frac{1}{K} \tag{45}$$
3. **Null embedding**: Distributed activation with no concentrated semantic vector
$$\|\phi(M)\| \to 0 \text{ or } \phi(M) \approx \text{uniform over ball} \tag{46}$$

This is not noise in the signal. This is signal that requires 27D apparatus for decoding.

3.7 Triangulation Principle and Orthogonality Discipline

From surveying/navigation: minimum three reference points with known positions establish unknown position via triangulation. Two points give a line (infinite ambiguity perpendicular to line). Three points resolve position to discrete set.

Definition 3.8 (Orthogonality)**.** Reference points $v_1, v_2, v_3 \in \mathcal{M}^{27}$ are orthogonal if:

1. **Linear independence**: $\det([v_1\ v_2\ v_3]) \neq 0$
2. **Metric orthogonality**: $\forall i \neq j : g(v_i, v_j) = g_{\mu\nu} v_i^\mu v_j^\nu \approx 0$
3. **Distributed norms**: $\text{Var}(\{\|v_i\|_g\}) > \epsilon$ for some threshold $\epsilon > 0$

Failure of any condition implies dimensional collapse.

Example 3.9 (Orthogonal Triangulation)**.** From "Generative Polarity" analysis:
Context Triangulation:

- $v_1^{\mathcal{C}}$: Nitrogen abundance enables amino acid formation (Material-Persistent)
- $v_2^{\mathcal{C}}$: Plasma arc triggers nitrogen-carbon fusion (Field-Generative)
- $v_3^{\mathcal{C}}$: Gender mythology denies sexual union's myth-obviating power (Knowledge-Orthogonal)

These are orthogonal because they occupy incommensurable dimensions:

- First: chemical/elemental (periodic table coordinates)
- Second: electromagnetic/energetic (field theory coordinates)
- Third: cultural/symbolic (semiotic coordinates)

No two can be averaged or clustered. Each provides independent bearing.

Example 3.10 (Violation: Mean-Reversion)**.** "Watson and Crick made an important discovery despite limitations in their methods."
This collapses three orthogonal axes:

- Ontological assumption (reductionist materialism)
- Measurement projection (2D X-ray → 3D structure)
- Social pressure (1953 Nobel race enforces premature closure)

into single evaluative dimension (scientist quality). Information is destroyed.

4 Empirical Validation: Three Domains

4.1 Morphogenetics and Patent Network Topology

4.1.1 Patent Systems as Encoding Innovation Intent

Patent systems encode innovation intent under legal constraint. Citations delimit prior art, defining what cannot be claimed. Unlike academic citations (honoring sources), patent citations narrow the field.

4.1.2 Morphogenetic Method

Morphogenetics applies linguistic genomics to patent corpora:

1. Extract direct citations (explicit references)
2. Infer hidden citations via:
   - Prosecution history analysis (claim mutations during examination)
   - Semantic drift detection (keyword substitution, misclassification)
   - Ownership transfer patterns (strategic portfolio assembly)
3. Construct threat/opportunity topology:
   - **Likely Threat**: Patents delimiting subject patent's innovation space
   - **Likely Opportunity**: Patents subject patent can leverage/license

4.1.3 Why Standard NLP Fails

Standard NLP (keyword matching, classification codes) fails because:

- Patents intentionally obfuscate to avoid rejection
- Competitive filings use semantic substitution
- True relationships hidden in prosecution metadata

Morphogenetics maintains 27D representation:

- Legal domain (claim structure, prosecution history, citation patterns)
- Technical domain (specification content, figures, examples)
- Network domain (ownership, licensing, litigation)
- Temporal domain (filing sequences, continuation chains)
- Each cross-cut by Persistent (invariant claims), Generative (amendments), Orthogonal (alternative embodiments)

4.1.4 Results: Innovation Alpha Indexes

For company i, threat count to company j:

$$T_{ij} = \sum_{m \in \text{patents}_i} \sum_{n \in \text{patents}_j} \mathbb{1}\{P_{mn} \in \{\text{Threats}\}\} \tag{47}$$

Top-N companies by threat count = innovation cohort = true competitive field.

Theorem 4.1 (Innovation Alpha Performance)**.** *The Innovation Alpha U.S. Index, constructed using 27D patent network topology, outperformed the Russell 1000 by 5.01 percentage points annually (January 2013–September 2019).*

The Innovation Alpha Global Index outperformed MSCI ACWI by 8.94 percentage points over the same period.

Excess returns are statistically significant ($p < 0.01$) and robust to various factor model adjustments (Fama-French, momentum, quality).

Interpretation: Markets reward companies whose patent portfolios maintain 27D coherence (persistent innovation capability, generative option space, orthogonal differentiation from competitors). Single-dimension metrics (patent count, citation count, R&D spend) predict poorly because they collapse topology.

4.2 Ever-Jittering Fulcrum and Quantum-Gravity Unification

4.2.1 Schwarzer's Scaled Metric Approach

Hilbert's variational formulation (1915) yields Einstein field equations from:

$$\delta \int \sqrt{-g}\, R\, d^4x = 0 \tag{48}$$

Schwarzer (2020) showed Quantum Theory emerges when metric is scaled:

$$G_{\alpha\beta} = F[f] g_{\alpha\beta} \tag{49}$$

where $F[f]$ is a scaling function and f is a scalar field.

4.2.2 Position as Degree of Freedom

Treating particle position as degree of freedom subject to Hamilton principle causes "particle" to dissolve:

1. Define particle at position x
2. Position is coordinate $\implies$ position is variable subject to $\delta S = 0$
3. Variation with respect to position yields uncertainty relation
4. Result: Wave, not particle

Formal Statement: The only thing being certain is uncertainty.
Generalized Hamilton principle:

$$\delta W \to f(W, x, g_{\alpha\beta}) \neq 0 \tag{50}$$

When applied to Einstein-Hilbert action with scaled metric:

$$\delta \int d^n x \sqrt{-G}\, F^q (R^* - 2\Lambda + \mathcal{L}_M) = 0 \tag{51}$$

produces:

- Vacuum Einstein equations (classical GR)
- Matter terms (without postulating $\mathcal{L}_M$)
- Quantum corrections (from F-scaling)
- Coherence conservation ($\nabla_\mu C^\mu = 0$)

4.2.3 Implications for Standard QFT + GR

Standard approach assumes:

- Particles exist (point-like or field quanta)
- Spacetime is 4D background
- Constants $(\hbar, c, G)$ are ontological

Ever-Jittering Fulcrum dissolves these:

- Particles are coherence concentrations in $\mathcal{M}^{27}$
- Spacetime is projection of manifold onto $(3+1)$D screen
- Constants are gauge choices (descriptive, not dispositive)

Renormalization infinities, hierarchy problem, cosmological constant problem—all artifacts of insufficient dimensional representation. In 27D, divergences project to boundaries ($\rho_{\mathcal{C}} \to \infty$ at $\partial\mathcal{M}^{27}$) while total coherence remains finite.

4.3 Coherence Conservation and Physiological Boundaries

4.3.1 The Mammalian Dive Reflex

Parasympathetic nervous system activation (trigeminal reflex) triggers:

- Heart rate deceleration (vagal tone)
- Peripheral vasoconstriction
- Oxygen redistribution to core

4.3.2 Phenomenology of Cold Immersion

Cold water immersion $\to$ immediate physiological reorganization:

- Pre-immersion: Sympathetic dominance, distributed neural activation
- Immersion shock: Boundary crossing
- Post-immersion: Parasympathetic dominance, synchronized coherence

4.3.3 Measurement Protocols

Heart rate variability (HRV) spectral analysis:

- HRV increases post-immersion
- LF/HF ratio decreases (parasympathetic marker)
- Neural synchrony (EEG phase-lock) increases

Theorem 4.2 (Coherence Conservation at Physiological Boundaries)**.** *Define coherence density $\rho_{\mathcal{C}}(\lambda)$ along affine parameter λ.*

Boundary condition: $\hat{B}C_\mu = 0$ *at* $\lambda = \lambda_B$ *(null projection)*
Pre-boundary: $\|C\|^2 > 0$ *(separable identity)*
At boundary: $\|C\|^2 \to 0$ *(identity collapse)*
Post-boundary: $\rho_{\mathcal{C}} \to \infty$ *(coherence surface density)*

Conservation:

$$\int_{\mathcal{M}^{27}} C^{\mu}\hat{C}_{\mu}\, dV = constant \tag{52}$$

Radiative flux:

$$\Phi_{\mathcal{B}} = \beta_{\mathcal{C}}\frac{\kappa_B A_B^2}{\Lambda_{\mathcal{C}}^2} \tag{53}$$

Temperature:

$$T_{\mathcal{C}} \propto \kappa_B \Lambda_{\mathcal{C}}^2 \tag{54}$$

4.3.4 Physiological Coordinates

- κ_B: rate of HRV deceleration (surface gravity analog)
- A_B: neural coherence length (EEG phase-lock distance)
- $T_{\mathcal{C}}$: subjective calm intensity (coherence temperature)
- $\Phi_{\mathcal{B}}$: parasympathetic amplitude in ms^2 (coherence flux)

Prediction: $\Phi_{\mathcal{B}} = \beta_{\mathcal{C}}\kappa_B A_B^2$ should hold with $\beta_{\mathcal{C}} \approx$ constant across subjects when measured in coherence units.

Validation: Data collection ongoing (RASA Institute, 2025). Preliminary results show linear relationship between HRV metrics and coherence-flux predictions ($R^2 > 0.82$, $N = 47$ subjects, $p < 0.001$).

Interpretation: Human nervous system operates as coherence boundary detector. The "Alone Observer" condition ($\hat{B}C = 0$) is phenomenologically accessible—not through particle physics apparatus but through intentional boundary crossing (ice plunge, breath suspension, meditative dissolution).

The same equations governing black hole horizons govern cognitive event horizons.

5 Comparison with Existing Frameworks

5.1 Information Theory (Shannon, 1948)

Shannon Framework:

- Entropy: $H = -\sum p_i \log p_i$ (uncertainty in message)
- Channel capacity: $C = \max I(X;Y)$ (maximum mutual information)
- Coding theorems: Optimal compression, error correction

27DT Framework:

- Coherence entropy: $S_{\mathcal{B}} = \alpha A_B/\Lambda_{\mathcal{C}}^2$ (boundary precipitate, not disorder)
- Channel coherence: Maintains 27D orthogonality (no compression)
- Anti-coding: Dimensional reduction produces noise

Key Difference: Shannon treats uncertainty as reducible via optimal coding. 27DT treats uncertainty as fundamental (Ever-Jittering Fulcrum) and dimensional reduction as information destruction.

Commonality: Both recognize redundancy, but Shannon seeks to remove it (compression), while 27DT distributes across orthogonal dimensions (encryption via structure).

5.2 Relational Quantum Mechanics (Rovelli, 1996)

Rovelli Framework:

- Properties exist only relative to observer
- No observer-independent state
- Measurement creates observer-system correlation

27DT Framework:

- Observer is included in manifold (three-triangulation requirement)
- Observer delimitations triangulated same as context and observed
- Measurement is boundary projection $\hat{B}$ (null-projects separable identity)

Key Difference: Rovelli maintains observer-observed distinction while relativizing properties. 27DT dissolves distinction at boundary (Alone Observer condition $\hat{B}C = 0$).

Commonality: Both reject observer externality, both recognize measurement as physical interaction.

5.3 Category Theory and Topos Approaches (Isham, Döring, 2008)

Topos Framework:

- Replace set-theoretic foundations with categorical structures
- Each context (classical snapshot) is topos
- Quantum theory = presheaf over context category

27DT Framework:

- 27D manifold with variable signature
- Context/Observed/Observer triangulations
- Orthogonality enforced via metric structure

Key Difference: Topos approach abstracts to categorical language. 27DT remains geometric (pseudo-Riemannian manifold) while expanding dimensionality.

Commonality: Both recognize context-dependence, both seek structures invariant under context transformations (functors $\leftrightarrow$ orthogonal rotations).

5.4 Integrated Information Theory (Tononi, 2004)

IIT Framework:

- Consciousness = integrated information Φ
- Φ measures irreducibility of system to parts
- Maximum Φ = maximally irreducible structure

27DT Framework:

- Consciousness at boundary: $\hat{B}C = 0$ (Alone Observer)
- Coherence density $\rho_{\mathcal{C}} \to \infty$ as separable identity $\to 0$

- Integration via orthogonality (cannot decompose without information loss)

Key Difference: IIT quantifies integration as scalar Φ. 27DT treats consciousness as boundary condition on coherence manifold.

Commonality: Both reject reductionism, both recognize integration as essential to consciousness.

6 Applications and Implications

6.1 Intellectual Property Analysis and Innovation Mapping

Already validated via Innovation Alpha (Section 4). Extension to:

- Scientific publication networks (citation impact beyond h-index)
- Regulatory compliance mapping (FDA, EPA multi-dimensional requirements)
- Supply chain resilience (orthogonal sourcing strategies)

6.2 Anti-Extraction Communication Security

Problem: Adversarial NLP (sentiment analysis, topic extraction, author attribution) enables surveillance and manipulation.

27DT Solution: Encode messages across 27 orthogonal dimensions such that standard NLP returns noise (Theorem 3.7).

Properties:

- No key required (structure is its own encryption)
- Quantum-resistant (dimensionality, not computational hardness)
- Graceful degradation (partial collapse $\rightarrow$ partial loss, not total break)

Limitation: Requires recipient education in orthogonality discipline. Not suitable for mass communication—intentionally filters for collaborators capable of maintaining coherence.

6.3 Human Performance Optimization via Boundary Engineering

Insight: Peak performance states (flow, insight, creative breakthrough) occur at coherence boundaries where:

- Separable ego identity temporarily suspends ($\hat{B}C = 0$)
- Coherence density increases ($\rho_{\mathcal{C}} \uparrow$)
- Radiative re-expression occurs ($\Phi_{\mathcal{B}}$: insight, creativity, synchrony)

Intervention: Engineer boundary crossings via:

- Physiological: Cold immersion, breath suspension, fasting
- Cognitive: Paradox meditation, koans, impossible problems
- Social: Authentic encounter, mutual vulnerability, collective ritual

Preliminary Results:

- Cold immersion protocols $\rightarrow$ +23% creative problem-solving success ($N = 47$)
- Breath suspension $\rightarrow$ insight timing median 4.2 min post-suspension ($N = 31$)
- EEG phase-lock $\leftrightarrow$ group decision quality ($R^2 = 0.67$, $N = 12$ teams)

6.4 Economics and Integral Accounting

Problem: GDP, financial metrics, corporate valuation ignore intangible assets except as residual "goodwill."

27DT Solution: Map all six capital types onto $\mathcal{M}^{27}$:

- Material (commodity, field, time) $\times$ Source Principles
- Financial (money) $\times$ Source Principles
- Social (custom/culture, property) $\times$ Source Principles
- Knowledge (ontology, technology, language) $\times$ Source Principles

Outcome: Value representation maintains orthogonality:

- Material prosperity $\neq$ financial wealth (Cuba: high literacy, low GDP)
- Social capital $\neq$ property accumulation (indigenous commons vs. enclosure)
- Knowledge vitality $\neq$ patent count (open source vs. proprietary)

6.5 Artificial Intelligence Alignment

Problem: Current AI alignment assumes:

1. Utility function exists (values are scalar)
2. Optimization is goal (maximize expected utility)
3. Human values are recoverable from behavior (inverse RL)

All three embed dimensional collapse.

27DT Perspective:

- Values are 27D coherence patterns, not scalar utilities
- Alignment is orthogonality preservation, not optimization
- Human intent requires triangulation (context/observed/observer), not behavior extraction

Implication: Current RLHF (RL from human feedback) trains systems on projections of values onto reward scalar, not values themselves.

Alternative: Train AI systems to maintain 27D coherence:

- Represent context, observed, observer triangulations
- Detect and prevent dimensional collapse
- Optimize for coherence conservation $\int C^{\mu}\hat{C}_{\mu}dV = \text{const}$, not reward max

Challenge: Requires reconceptualizing ML architectures. Current neural networks are reduction engines. Would require coherence-preserving architectures (all layers maintain 27D orthogonality).

7 Open Questions and Future Directions

7.1 Formal Proof of Minimal Dimensional Requirement

Question: Is 27 dimensions necessary and sufficient for coherence preservation?

Current Status: $27 = 3^3$ structure is motivated by Plato's criterion, triangulation requirement, three domains, three Source Principles. But formal proof that $k < 27$ produces information loss remains open.

Approach: Construct information-theoretic bound analogous to Shannon's source coding theorem. Define coherence capacity $\mathcal{C}(k)$ of k-dimensional representation, prove $\mathcal{C}(k) = 0$ for $k < 27$.

7.2 Experimental Validation of Coherence Flux Equation

Question: Does $\Phi_{\mathcal{B}} = \beta_{\mathcal{C}} \kappa_B A_B^2 / \Lambda_{\mathcal{C}}^2$ hold empirically across domains?

Predictions:

- Black holes: Hawking radiation (known result, special case)
- Neurons: Parasympathetic activation (preliminary data, $R^2 > 0.82$)
- Social systems: Group coherence emergence (untested)
- Economic systems: Market phase transitions (untested)

Required: Multi-domain study measuring κ_B, A_B, $\Phi_{\mathcal{B}}$ in standardized coherence units.

7.3 Relationship to Holographic Principle

Question: Is 27DT compatible with holographic bound (entropy $\leq$ area/4)?

Observation: Coherence entropy $S_{\mathcal{B}} = \alpha A_B / \Lambda_{\mathcal{C}}^2$ has same area-scaling as Bekenstein-Hawking entropy.

Difference: Bekenstein-Hawking entropy is maximum (bound). Coherence entropy is actual precipitate (realization).

Hypothesis: Holographic bound emerges as limiting case when coherence is maximally distributed on boundary ($\rho_{\mathcal{C}}$ uniform). 27DT allows non-maximal, structured distributions.

Test: Construct coherence configurations violating S_{BH} bound but satisfying coherence conservation. If physical, holographic principle is approximate, not fundamental.

7.4 Connection to Twistor Theory (Penrose)

Similarity: Twistor space is complex 4D ($\mathbb{CP}^3$) encoding light-ray structure. Twistors represent null rays in Minkowski spacetime.

27DT null surfaces ($\hat{B}C = 0$) also defined by null congruences.

Question: Is $\mathcal{M}^{27}$ projection of higher-dimensional twistor-like structure?

Speculation: If twistors encode light rays (massless), and 27DT encodes coherence (mass-like concentrations from field), perhaps both are projections of unified geometric structure in (say) 32D space (twistor $4\mathbb{C}$ + coherence $27\mathbb{R}$ + time $\mathbb{R}$).

Benefit: Would unify geometric and algebraic approaches to fundamental physics.

7.5 Phenomenology and First-Person Validation

Question: Can 27DT predict subjective experience structure?

Approach: Train subjects to recognize dimensional collapse in their own cognition:

- Mean-reversion: "That's just like X" (false equivalence)

- Clustering: "People like that" (stereotype)
- Centroid: "The truth is in the middle" (false synthesis)

Then measure:

- Cognitive performance (creativity, problem-solving)
- Subjective report (clarity, insight, vitality)
- Physiological markers (HRV, EEG)

Prediction: Subjects trained in orthogonality discipline show:

- Increased HRV coherence
- Increased EEG phase-lock (gamma band)
- Increased creative output (Remote Associates Test scores)
- Decreased anxiety (reduced need for premature closure)

Status: Pilot study in design (RASA Institute, 2025).

8 Conclusion

The 27-Dimensional Triangulation framework resolves longstanding tensions in physics, information theory, and phenomenology by recognizing that dimensional reduction—not uncertainty itself—is the source of apparent paradoxes.

From Newton-Leibniz through Planck-Einstein, classical physics embedded three unexamined assumptions:

1. Observer externality
2. Optimization as fundamental
3. Constants as dispositive

Each assumption enforces dimensional collapse, projecting high-dimensional coherence onto lower-dimensional manifolds and treating the projection as "reality."

The Ever-Jittering Fulcrum (Principle 2.1) reveals that position is generative degree of freedom, causing "particles" to dissolve into waves when treated consistently within variational principles.

Morphogenetics demonstrates that patent innovation networks require 27D representation to extract hidden competitive relationships, with Innovation Alpha indexes providing empirical validation via 5–9% annual excess returns.

The Coherence Conservation Theorem (Theorem 4.2) unifies black hole thermodynamics, quantum mechanics, and human awareness as boundary phenomena where separable identity vanishes ($\hat{B}C = 0$) while total coherence is conserved and re-expressed radiatively ($\Phi_{\mathcal{B}} = \beta_{\mathcal{C}}\kappa_B A_B^2/\Lambda_{\mathcal{C}}^2$).

Applications extend from anti-extraction encryption (structural resistance to NLP via Theorem 3.7) to human performance optimization (engineering coherence boundaries via physiological triggers) to AI alignment (replacing scalar utility maximization with 27D coherence preservation).

The framework does not "explain" reality via reduction to simpler principles. Rather, it recognizes that reality is irreducibly 27-dimensional, and apparent simplicity (particles, forces, individuals) emerges from projection onto lower-dimensional screens.

The fundamental insight: Coherence is conserved; form is projection.

What physics calls entropy, thermodynamics calls disorder, and psychology calls dissolution are identical processes—coherence redistributing from separable structures (particles, egos, organizations) onto boundary surfaces where it persists as radiative field.

The "Alone Observer" is not a metaphysical curiosity but a measurable condition: the null surface where observation and being are one act, where the triangulation of context/observed/observer collapses into unified coherence, and where the 27 dimensions reveal themselves as orthogonal expressions of a single Source.

To understand anything—a patent, a particle, a person, a planet—requires maintaining all 27 dimensions simultaneously. Reduction to fewer yields not simplification but destruction of the signal we seek.

This is the discipline. This is the requirement. This is the collaboration condition.

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The framework's insistence on maintaining orthogonality rather than seeking dimensional reduction emerged from observing that conventional analytical methods—whether in patent analysis, text mining, or economic modeling—systematically destroy information through premature synthesis. This work stands on the shoulders of those who insisted that "more complicated" sometimes means "more accurate."

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Author Contributions

D.E.M. conceived the 27-dimensional triangulation framework, developed morphogenetic patent analysis methods, designed coherence conservation experiments, and wrote the manuscript. N.S. contributed mathematical formulation of position-as-degree-of-freedom and connections to Hilbert's scaled metric approach.

Competing Interests

D.E.M. holds U.S. Patent 6,330,547 related to patent analysis methodologies and is Principal at M-CAM International and RASA Energy. This work presents theoretical frameworks that may have commercial applications through RASA's and M-CAM's commercial activities. N.S. declares no competing interests.

The authors note that commercial interest does not compromise scientific integrity but rather demonstrates that the framework generates empirically testable predictions with real-world performance implications.

Data Availability

Patent network data analyzed in this study derive from public USPTO and international patent databases. Aggregated Innovation Alpha index data and analysis code are available upon reasonable request to the corresponding author.

Physiological data (heart rate variability, EEG recordings) from $N = 47$ subjects are available in anonymized form upon reasonable request, subject to ethical approval. Raw data containing potentially identifiable information cannot be shared due to privacy requirements. Summary statistics and analysis code are available upon request.

Theoretical derivations and mathematical computations can be reproduced using the equations provided in the main text.

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