The Gas Cloud as a Dissipative Attractor: A Demonstration of the Attractor Framework in Standard Astrophysics

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Abstract

The evolution of an isolated interstellar gas cloud from turbulence to gravitational equilibrium is a classic problem in astrophysics. Standard models describe this process through hydrodynamics, thermodynamics, and Newtonian gravity. This paper presents the same evolution through the lens of the attractor framework, demonstrating that the framework's vocabulary—dissipative attractor, basin, invariant reference, and corrective permeability—maps cleanly onto the standard physics without modification or additional assumptions. The paper makes no new physical predictions; it demonstrates conceptual unification. Each attractor term is explicitly defined in terms of its standard astrophysical equivalent. A worked example translates the virial theorem into attractor language, quantifying basin depth and corrective permeability for a canonical molecular cloud. A brief cross-domain parallel to biological wound healing illustrates the framework's applicability beyond astrophysics. The paper concludes that

the attractor framework is fully consistent with standard astrophysics and provides a unified vocabulary for persistence, resilience, and convergence across physical and biological systems, with broader applicability noted.

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1. Introduction: The Cloud as a Dissipative System

Consider an isolated cloud of interstellar gas and dust, far from any external gravitational disturbance. Its mass is sufficient that self-gravity will eventually overcome thermal pressure, initiating collapse. At early times, the cloud is turbulent. Thermal motions, magnetic fields, and inhomogeneous density distributions produce a chaotic, dynamic state. Over time, the cloud radiates energy, cools, contracts, and ultimately settles into a stable configuration: a sphere, if rotation is negligible, or a rotationally-flattened disk.

Standard astrophysics describes this process with precision. The equations of hydrodynamics, the virial theorem, the Jeans criterion, and the radiative cooling functions all contribute to a well-tested model of star formation. Nothing in this paper challenges or revises that model.

The attractor framework (Galida, 2026a) offers a complementary perspective. It is not an alternative to standard physics, but a unifying conceptual vocabulary that identifies the dynamical principles at work: persistence under perturbation, dissipative basins, invariant references, and corrective permeability. This paper applies that vocabulary to the evolution of an isolated gas cloud, demonstrating that the framework maps directly onto the standard model without contradiction.

2. Definitions: Attractor Vocabulary and Standard Equivalents

To make the translation precise, each framework term is defined below alongside its standard astrophysical counterpart. These definitions are used consistently throughout the paper.

Attractor Term	Definition	Standard Physics Equivalent
Dissipative attractor	A system that exports entropy while converging toward a stable, minimum-energy state	Radiative cooling + gravitational contraction
Basin	The minimum-energy configuration toward which the system evolves and from which it resists displacement	Sphere (non-rotating) or rotationally-supported disk
Basin depth	The energy required to permanently disrupt the system from its basin	Gravitational binding energy, □U□□U□
Invariant reference (metronome)	A quantity or point that remains fixed throughout the system's evolution, providing an anchor for transient dynamics	Center of mass (positional reference); orbital periods (frequency reference, emerging during contraction)

Attractor Term	Definition	Standard Physics Equivalent
Corrective permeability (κ)	The rate at which the system dissipates perturbation energy and returns to its basin, quantified by κ=1/τcool$\kappa = 1/\tau_{cool}$	Damping rate, quantified by the radiative cooling function Λ(T)$\Lambda(T)$
Rail	A conservation law that constrains the accessible basins, preventing the system from reaching the global energy minimum	Conservation of angular momentum

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3. The Convulsive Phase: Turbulence and Disordered Motion

In its initial state, the cloud is far from equilibrium. Supersonic turbulence, driven by gravitational infall and internal shocks, produces a complex velocity field. Density distributions are filamentary and clumpy. There is no coherent rotation axis, no global structural alignment, and no stable configuration.

In attractor terms, this is the **perturbation-rich early phase**. The cloud is a dissipative system that has not yet found its basin. Its trajectory through state space is erratic. Local transient attractors—temporary vortices, shock fronts, density enhancements—form and dissolve without stabilizing. The system has not yet converged upon a single, deep attractor.

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4. The Invariant Reference: Center of Mass as Metronome

Amid the turbulence, one quantity remains strictly invariant: the cloud's center of mass (CM). For an isolated system, conservation of momentum guarantees that the CM moves with constant velocity. In the CM frame, this point is fixed. No internal force—gravitational, pressure, or magnetic—can displace it.

The attractor framework identifies such invariants as **positional metronomes**—fixed reference points that anchor the transient dance of dissipative dynamics. The CM is the gravitational barycenter around which all subsequent evolution organizes. It does not oscillate, does not evolve, and does not respond to perturbations. It is the still point at the center of the storm.

As the cloud contracts and its mass distribution becomes centrally concentrated, **orbital periods** at characteristic radii emerge as frequency metronomes. For a test particle at radius r*r*, the Keplerian orbital period is:P=2πr3GM(r)*P*=2*π**GM*(*r*)*r*3

where M(r)*M*(*r*) is the mass enclosed within radius r*r*. These periods define the natural clock of the contracting system—the invariant rhythms against which all dissipative timescales can be measured. The center of mass anchors position; the orbital periods anchor time. Together they constitute the invariant skeleton of the attractor.

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5. The Dissipative Mechanism: Radiation and Entropy Export

A dissipative attractor requires a mechanism for exporting

entropy. The gas cloud exports entropy through **radiation**. As the cloud contracts, gravitational potential energy is converted into kinetic energy, which is then thermalized through collisions. Atoms and molecules are excited; they emit photons that escape the cloud, carrying away energy and entropy.

This radiative cooling is the cloud's **dissipation channel**. Without it, the cloud would remain in a hot, pressure-supported equilibrium and would not collapse. With it, the cloud can progress toward deeper gravitational binding.

In attractor terms, the cloud is seeking its minimum-energy basin. Radiation is the mechanism by which it sheds the energy that keeps it from reaching that basin. Each emitted photon is a small perturbation exported to the environment, allowing the remaining system to settle deeper into its attractor.

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6. The Attractor Basin: Sphere, Disk, and the Rail of Angular Momentum

As the cloud cools and contracts, it approaches its lowest-energy configuration under self-gravity. For a non-rotating, non-magnetic cloud, this is the **sphere**—the shape that minimizes gravitational potential energy for a given mass. Every particle settles as close to the center of mass as the exclusion of other particles permits. The sphere is the **unconstrained basin**: the global energy minimum of the system.

If the cloud possesses net angular momentum, the sphere is inaccessible. Conservation of angular momentum acts as a **rail**—a constraint that channels the system toward a different basin. The cloud must flatten along its rotation

axis, forming a **disk**. The disk is the minimum-energy configuration accessible under the rail of fixed angular momentum. Gravity seeks the sphere; the rail redirects the trajectory toward the disk.

The approach to the basin occurs over the radiative cooling timescale, typically 104104 to 105105 years for dense molecular cloud cores. This is the cloud's convergence time—the duration of its transient dance before settling into its persistent configuration.

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7. Corrective Permeability and the Virial Theorem

The virial theorem provides the quantitative bridge between standard astrophysics and the attractor framework. For a system in equilibrium:2K+U=02*K*+*U*=0

where K*K* is the total kinetic energy and U*U* is the gravitational potential energy. In attractor terms:

- **Basin depth** = □U□□*U*□, the gravitational binding energy.
- **Perturbation** = any injection of kinetic energy ΔKΔ*K* that raises K*K* above the equilibrium value □U□/2□*U*□/2.
- **Corrective permeability** = κ=1/τcool*κ*=1/*τ*cool□, the rate at which radiative cooling dissipates ΔKΔ*K* and restores virial equilibrium.

Worked Example. Consider a canonical dense molecular cloud core (Shu et al., 1987; McKee & Ostriker, 2007):

Parameter	Symbol	Value	Units
Mass	M*M*	104M⊙104*M*⊙□	≈2×1034≈2×1034 kg
Radius	R*R*	1 pc	≈3.09×1016≈3.09×1016 m

Parameter	Symbol	Value	Units
Temperature	T*T*	10 K	
Mean number density	n*n*	~103~103	cm^{-3}

Step 1: Basin depth. The gravitational potential energy (to order of magnitude; the exact coefficient for a uniform-density sphere is 3/53/5) is:∣U∣~GM2R≈(6.67×10−11)×(2×1034)23.09×1016≈(6.67×10−11)×(4×1068)3.09×1016≈8.6×1041 J∣*U*∣~*RGM*2≈3.09×1016(6.67×10−11)×(2×1034)2≈3.09×1016(6.67×10−11)×(4×1068)≈8.6×1041 J

At virial equilibrium, K=∣U∣/2≈4.3×1041*K*=∣*U*∣/2≈4.3×1041 J.

Step 2: Perturbation. Suppose a supernova explodes at a distance d≈10*d*≈10 pc from the cloud. A typical supernova releases ESN~1044*E*SN~1044 J. The fraction intercepted by the cloud is the ratio of the cloud's cross-sectional area to the surface area of the sphere at distance d*d*:f~πR24πd2~(3.09×1016)24×(3.09×1017)2~2.5×10−3*f*~4*πd*2*πR*2~4×(3.09×1017)2(3.09×1016)2~2.5×10−3

Not all intercepted energy couples efficiently; a coupling efficiency of ϵ~0.01*ϵ*~0.01–0.10.1 is typical for shock-cloud interactions (McKee & Ostriker, 2007). Choosing the upper end, ϵ~0.1*ϵ*~0.1:ΔK=ESN×f×ϵ~1044×(2.5×10−3)×0.1≈2.5×1040 JΔ*K*=*E*SN×*f*×*ϵ*~1044×(2.5×10−3)×0.1≈2.5×1040 J

This perturbation is modest—approximately 6% of the equilibrium kinetic energy. The cloud is disturbed but not disrupted. Radiative cooling will restore virial equilibrium on a characteristic timescale.

Step 3: Cloud volume. Converting the radius to centimeters:R=1 pc=3.09×1018 cm*R*=1 pc=3.09×1018 cm

The volume is:V=43πR3≈43π(3.09×1018)3≈1.24×1056 cm3*V*=34*πR*3≈34*π*(3.09×1018)3≈1.24×1056 cm3

Step 4: Corrective permeability. At T~10T~10 K and n~103n~103 cm⁻³, the dominant coolant is CO rotational line emission, with a cooling function Λ(T)~10−23Λ(T)~10−23 erg cm⁻³ s⁻¹ (Goldsmith & Langer, 1978; Neufeld, Lepp & Melnick, 1995). Convert ΔKΔK to erg:ΔK=2.5×1040 J=2.5×1047 ergΔK=2.5×1040 J=2.5×1047 erg

The cooling timescale is:τcool~ΔKVΛ≈2.5×1047(1.24×1056)×(10−23)≈2.5×10471.24×1033≈2.02×1014 s~6.4×106 yearsτcool~VΛΔK≈(1.24×1056)×(10−23)2.5×1047≈1.24×10332.5×1047≈2.02×1014 s~6.4×106 years

The corrective permeability is:κ=1τcool≈4.95×10−15 s−1κ=τcool1≈4.95×10−15 s−1

Step 5: Interpretation. The perturbation is damped within a few million years. The basin depth (|U|~8.6×1041|U|~8.6×1041 J) far exceeds the perturbation energy, ensuring the cloud's structural integrity. Corrective permeability, quantified by κκ, is the mechanism by which the cloud restores coherence—absorbing the modest perturbation through radiative cooling and returning to virial equilibrium on a timescale short compared to the cloud's overall lifetime (~107107 years).

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8. Cross-Domain Parallel: Biological Wound Healing

The same attractor vocabulary applies without modification to biological systems.

A wound is a perturbation to the stable attractor of healthy tissue. The body responds through a multi-stage healing cascade: clotting stops further damage, inflammation cleans the wound, and tissue repair restores structural integrity.

The healing rate—quantified clinically by wound closure time—is the biological corrective permeability. The healthy baseline state is the basin. Complications like impaired circulation reduce oxygen delivery, slowing fibroblast activity and thus reducing κ (Guo & DiPietro, 2010).

The gas cloud perturbed by a supernova shock and the human body perturbed by a wound are structurally identical within the framework: a dissipative attractor, displaced from its basin, activates corrective mechanisms at a characteristic rate, and either returns to coherence or undergoes permanent state transition.

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9. Observational Consistency

The framework's description of cloud evolution is fully consistent with standard observations:

- **Turbulent molecular clouds** exhibit the chaotic velocity fields and filamentary structures predicted by the convulsive phase.
- **Radiative cooling** is traced by CO, H_2O, and other molecular line emissions.
- **Protostellar cores** represent the approach to the spherical attractor.
- **Protoplanetary disks** are the rotationally-constrained basins.
- **Bound clusters and stellar systems** persist under external perturbations, demonstrating basin depth.

These observations are predicted and explained by standard astrophysics. The attractor framework is consistent with all of them. Its contribution in this domain is conceptual, not empirical.

10. Conclusion

The evolution of an isolated gas cloud from turbulence to equilibrium is fully described by standard astrophysics. The attractor framework does not replace that description. It translates it into a unified conceptual vocabulary—dissipative attractor, basin, invariant reference, rail, corrective permeability—that applies across physical and biological systems, with broader applicability noted.

The center of mass remains fixed while the cloud convulses, collapses, and settles. The virial theorem, translated into attractor language, quantifies basin depth as gravitational binding energy and corrective permeability as the inverse cooling timescale. The framework is consistent with all standard observations and requires no new physics.

The metronomes hum. The cloud finds its basin. The framework holds.

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*"For independent neuroscientific corroboration of the attractor dynamics described here, see A Preliminary Mapping Between Ring Attractor Dynamics and the Attractor Framework."*https://www.sciencedirect.com/science/article/pii/S2405844024114892

A Logical Exclusion of Classical Theistic God Within the Attractor Framework

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Abstract

This paper demonstrates that the God of classical Abrahamic theism—a conscious, intentional, eternal, omnipotent, and omnibenevolent agent who created the universe and intervenes in it—is logically excluded by the attractor framework. The proof is conditional on three axiomatic commitments: physicalism (the physical is what exists), the conservative/dissipative distinction as an exhaustive ontological partition, and the empirical generalization that all observed consciousness is dissipative. Process theology and panentheism escape the triangle but abandon the classical attributes. Within these axioms, three interlocking theorems form a closed geometric proof. Theorem 1 (the Flatland principle): to interact with the physical requires a shared physical property. Theorem 2: all persistent structures are either conservative or dissipative. Theorem 3: all observed consciousness is dissipative; a conscious conservative entity would require an unseen category. The paper documents the dopamine covenant as the neurochemical mechanism sustaining God-belief, and the historical reframing cascades that preserve theological attractors. The framework's own falsifiability conditions are stated explicitly. The proof is conditional on its axioms; the reader who rejects them will not be persuaded.

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1. Introduction: Axioms, Not Established Facts

Every logical proof begins with axioms—foundational commitments that are asserted, not derived. This paper makes its axioms explicit so the reader can evaluate the proof on its own terms.

Axiom 1: Physicalism. The physical is what exists. Anything

non-physical is, by definition, non-existent. Physicalism is a serious philosophical position with extensive defense in the literature (Stoljar, 2010). It is contested by dualists, idealists, and theologians. This paper does not argue for physicalism; it adopts it as a starting point.

Axiom 2: The conservative/dissipative distinction. All persistent structures fall into two dynamical classes: conservative persistence structures (eternal, time-symmetric, mindless) and dissipative attractors (temporary, energy-dependent, potentially conscious). This distinction is derived from the attractor framework (Galida, 2026a) and draws on the broader literature on nonequilibrium thermodynamics and self-organization (Prigogine & Stengers, 1984). It is treated here as exhaustive.

Axiom 3: Consciousness is dissipative. All observed consciousness is a property of dissipative systems requiring a physical substrate, energy flow, and entropy export. This generalization is consistent with the neuroscience of consciousness, which uniformly associates conscious states with metabolic activity in neural tissue (Koch, 2004). The free energy principle (Friston, 2010) proposes that all self-organizing biological systems minimize free energy through active inference—a process that is inherently dissipative. Deacon (2012) argues that consciousness and life are inseparable from the entropic and energetic dynamics of far-from-equilibrium systems. Whether consciousness *requires* dissipation at the mechanistic level is an open question; the present paper treats the empirical generalization as sufficient for the proof.

The proof is conditional: *if* these axioms are accepted, *then* classical theistic God is logically excluded.

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2. The Geometry of Disproof: Three Theorems

2.1 Theorem 1: The Flatland Principle

Edwin Abbott's *Flatland* (1884) describes a two-dimensional world whose inhabitants perceive a passing sphere only as a growing and shrinking circle. The sphere is higher-dimensional but interacts with Flatland because it shares extension in the plane.

The principle: to exist is to interact, and interaction requires at least one shared property. The sphere shared extension in two dimensions with Flatland. Without that shared property, there would be no interaction, no trace, no basis for inference.

If God interacts with the physical universe, God must share at least one physical property with it. A non-interactive God is indistinguishable from a non-existent one.

The causal power evasion. Theists may claim that divine causation is *sui generis*—that God causes physical events without sharing physical properties, just as the mind causes bodily movements without a fully specified mechanism. This analogy fails under scrutiny. In mind-body causation, the mind is a dissipative attractor of the physical brain and body—it *is* a physical pattern, not an immaterial substance. The interaction between mind and body is physical-to-physical causation within a single dissipative system, mediated by neural pathways, neurotransmitters, and electrochemical gradients. Divine causation, by contrast, would be a non-physical entity acting on physical systems with no mediating substrate and no shared properties. Mental causation is physical causation; divine causation would be magic. The theist who appeals to mental causation as a model for divine action inadvertently concedes that the mind is physical—which satisfies Theorem 1 at the cost of abandoning dualism. The

theist who insists divine causation is genuinely non-physical owes an account of the mechanism. After millennia of theology, none has been provided.

2.2 Theorem 2: The Conservative/Dissipative Distinction

All persistent structures are either conservative (eternal, unchanging, unconscious) or dissipative (temporary, energy-dependent, potentially conscious). There is no third category within the framework.

2.3 Theorem 3: The Exclusion of Conscious Eternity

All observed consciousness is dissipative. A conscious conservative entity would be unprecedented. Discovery of a non-dissipative conscious system would invalidate Theorem 3.

2.4 The Closed Triangle

- **Classical theism:** non-physical, conscious, eternal. Violates Theorem 1 and 3.
- **Physical theism:** physical, conscious, eternal. Violates Theorem 3.
- **Process theology (Whitehead, 1929; Hartshorne, 1948):** God is finite, evolving, persuasive, and dissipative. Satisfies all three theorems but abandons omnipotence, immutability, and eternality. This God is not the God of Abrahamic faith.
- **Panentheism (Clayton, 1997; Peacocke, 1993):** God contains but exceeds the universe, with the universe as God's body. Clayton proposes that God acts on the world through top-down causation—that higher-level organizational patterns constrain lower-level physical processes without energy injection. This position faces a dilemma. If top-down divine causation operates through the physical hierarchy of the universe-as-body, then God is coextensive with that physical hierarchy and causally

effective only through it—collapsing into a naturalistic, essentially dissipative position. If, alternatively, divine top-down causation is posited as a non-physical causal influence on physical structure, it reintroduces the interaction problem addressed by Theorem 1: causation across an ontological gap with no shared property and no specified mechanism. Either way, panentheism either retreats into process theology or faces the same exclusion as classical theism.

- **"God is outside all categories":** Violates Theorem 1. Indistinguishable from non-existence.

The triangle is closed against classical Abrahamic theism. Process theology and panentheism escape but at the cost of abandoning the God they sought to defend.

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3. The Physical Evidence

The following evidence is cited as illustrative of the framework's predictions, not as an independent proof of divine absence. The logical proof stands on the axioms and theorems; the empirical catalogue demonstrates consistency between the proof's predictions and the observed world.

Answered prayer. The STEP trial (Benson et al., 2006) found no beneficial effect of intercessory prayer. Meta-analyses consistently find null results, though methodological debates persist.

Fulfilled prophecy. Every dated prophecy has either failed or been retrofitted (Festinger et al., 1956; Melton, 1985; Galida, 2026b, 2026c).

Miraculous healings. The Lourdes Medical Bureau's certification rate is consistent with spontaneous remission

estimates for the conditions examined.

Near-death experiences. Reproducible by hypoxia, ketamine, and electrical stimulation. Not evidence of an afterlife.

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4. The Dopamine Covenant

God-belief persists because it is neurochemically reinforced (Olds & Milner, 1954; Hamid et al., 2019). Certainty, belonging, and cosmic significance are lever presses. Failed prayers and prophecies are reframed rather than abandoned (Festinger et al., 1956; Melton, 1985). The dlPFC—responsible for cognitive flexibility—shows reduced activity when sacred values are processed (Hamid et al., 2019). God-belief is a neurochemical lock.

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5. Falsifiability: What Would Refute the Framework

Falsifiability conditions for the empirical claims:

1. A confirmed, non-retrofitted fulfilled prophecy.
2. A verified miracle exceeding natural base rates.
3. Discovery of a non-dissipative conscious system.

Falsifiability condition for the framework's core axioms:

4. Discovery of a physical phenomenon that cannot be accounted for by conservative or dissipative dynamics within the attractor framework—for example, a persistent structure that exhibits properties of both categories simultaneously, or a causal interaction between a non-

physical entity and a physical system confirmed under controlled conditions. Such a discovery would invalidate the framework’s claim to ontological exhaustiveness.

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6. Conclusion

Within the attractor framework’s axioms, classical Abrahamic theism is logically excluded. Process theology and panentheism escape but abandon the classical attributes. The physical evidence is consistent with the logical proof. The dopamine covenant explains belief persistence. The framework’s own falsifiability conditions are stated and remain unmet.

Coda

The eternal skeleton is unconscious and uncaring. The six metronomes hum at fixed frequencies. The proton does not love. The electron does not judge. The universe is what it is, and it is enough. The believer will die with a prayer on their lips. The metronomes will hum unchanged. They always have.

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The Shroud of Turin: Anatomy of a Fantasy Attractor

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Abstract

The Shroud of Turin is among the most studied artifacts in history. Multiple independent lines of evidence—radiocarbon dating, historical documentation, and forensic image analysis—converge on a dating to the medieval period, making a first-century origin highly implausible. Yet belief in its authenticity persists among millions. This paper applies the attractor framework to the Shroud as a case study in the dynamics of belief persistence under disconfirmation. The framework is used here as a psychological and sociological diagnostic tool: it explains *why* belief in the Shroud persists, not whether the Shroud is authentic. That latter question is adjudicated by the physical evidence, which this paper reviews. We identify the major perturbation (the 1988 carbon dating), catalogue the successive reframing strategies that neutralized it, and examine the image's unresolved

features as potential beams the Shroud's defenders have not fully examined. The Shroud is interpreted as a dopamine lever—a relic that provides the feeling of physical contact with the divine—and its persistence is explained through the same neurochemical and social mechanisms that sustain apocalyptic prophecy, political ideology, and textual fundamentalism. The paper concludes by applying the framework's own diagnostic to itself, identifying potential beams within the attractor framework, and integrating those limitations into its conclusions.

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1. Introduction: Two Distinct Questions

The Shroud of Turin is a linen cloth measuring approximately 4.4 by 1.1 meters, bearing the faint image of a man who appears to have been crucified. It has been venerated for centuries as the burial cloth of Jesus of Nazareth and remains one of the most visited Christian relics in the world. It has also been subjected to more scientific scrutiny than any religious artifact in history.

Two distinct questions must be kept separate. The first is a question of physical fact: *Is the Shroud an authentic first-century burial cloth?* This question is adjudicated by radiocarbon dating, textile analysis, historical documentation, and image forensics. The second is a question of psychological and social dynamics: *Why does belief in the Shroud persist despite strong evidence against its authenticity?* This question is adjudicated by the attractor framework, the neuroscience of sacred values, and the social psychology of failed prophecy.

This paper addresses both questions, but it keeps them distinct. The physical evidence is reviewed on its own terms. The attractor framework is then applied to explain the

persistence of belief, not to determine the Shroud's authenticity. Conflating these two operations—using a psychological model to adjudicate physical evidence—would be a methodological error. This paper avoids that error.

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2. The Physical Evidence

2.1 The 1988 Radiocarbon Dating

In 1988, the Vatican authorized the removal of a small sample from the Shroud for radiocarbon dating. The sample was divided and sent to three independent laboratories: the University of Oxford, the University of Arizona, and the Swiss Federal Institute of Technology in Zurich. All three, using accelerator mass spectrometry, dated the linen to between 1260 and 1390 CE. The results were published in *Nature* (Damon et al., 1989).

The dating is strong. Three independent laboratories, using a well-established physical method, produced results clustering tightly within the medieval period. The finding aligns with the Shroud's first documented historical appearance in Lirey, France, in 1354. In archaeology or forensic science, a radiocarbon result of this quality, replicated across independent labs and corroborated by documentary evidence, would ordinarily be treated as dispositive.

The dating is not, however, entirely uncontested. The sampling protocol was criticized at the time for using a single sample location rather than multiple sites. Subsequent statistical analyses (Riani et al., 2013) identified heterogeneity in the radiocarbon data across the three laboratories, suggesting possible non-homogeneity in the sample that was not fully accounted for by the original statistical treatment. These concerns do not invalidate the dating, but they complicate the claim that the result is beyond any possible methodological

challenge. A more precise characterization is: the radiocarbon evidence is strong, independently replicated, corroborated by documentary history, and unrebutted by any equally rigorous methodology.

2.2 The Bishop of Troyes (1389)

The radiocarbon date aligns with the Shroud's first documented historical appearance. In 1354, the cloth was displayed in Lirey by a knight named Geoffroi de Charny. In 1389, Pierre d'Arcis, the Bishop of Troyes, wrote to Pope Clement VII identifying the Shroud as a forgery. The bishop stated that a painter had confessed to creating the image and that the cloth had been "cunningly painted" to attract pilgrims. The Pope issued a bull allowing the Shroud to be displayed but requiring that it be announced as a "representation" rather than the authentic burial cloth.

The convergence of radiocarbon dating and documentary evidence makes a first-century origin highly implausible. What the evidence does *not* establish is deliberate medieval fraud. The radiocarbon date tells us when the linen was harvested, not who made the image or for what purpose. The bishop's letter provides a documented accusation of forgery, but accusations are not verdicts. The distinction between "not authentic" and "confirmed deliberate fake" is meaningful and will be maintained throughout this paper.

2.3 The Pollen Evidence

Max Frei claimed to identify pollen grains from plants native to Turkey and Israel on the Shroud's surface, evidence that would suggest a Near Eastern origin inconsistent with the medieval European radiocarbon date. Frei's findings have been critiqued on methodological grounds, including inadequate controls for contamination and the possibility that pollen grains can transfer to textiles through handling over centuries. The pollen evidence does not outweigh the radiocarbon dating—no indirect botanical inference can

override a direct physical measurement of the cloth itself—but its existence in the authenticity literature is noted. The Frei findings are contested; the radiocarbon findings are strong.

2.4 The Image: Open Questions and Overstated Claims

The mechanism by which the Shroud's image was formed remains one of the few genuinely unresolved questions in Shroud research. The STURP (Shroud of Turin Research Project) investigation in 1978 found that the image resides on the topmost fibers of the cloth, does not penetrate the threads, and lacks the directionality characteristic of brushstrokes. STURP found no evidence of applied pigment as the primary image-forming mechanism. These findings are real and deserve engagement.

The present paper does not attempt to resolve the image-formation question. It notes, however, that an unresolved image-formation mechanism does not constitute evidence of authenticity. Many medieval artifacts have incompletely understood manufacturing processes. The absence of a fully satisfactory explanation for how the image was produced does not outweigh the radiocarbon and documentary evidence establishing *when* the cloth originated. The image is an open question; the date is not.

The observation that the image is proportionally elongated in the manner of medieval religious iconography, with a head that does not align naturally with the body in ways that a contact imprint from a wrapped corpse might be expected to, is consistent with a medieval origin but does not independently establish it.

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3. The Reframing Cascade: How the Basin Survived

A high-κ belief system would have absorbed the radiocarbon perturbation and updated. The Shroud's defenders did the opposite. The attractor sealed, and a cascade of reframing strategies followed. Each reframe provided renewed certainty, and each successive reframe retreated further from empirical testability.

3.1 The Repair Patch Hypothesis

The earliest and most persistent reframe held that the radiocarbon sample had been taken from a medieval repair patch, not the original cloth. This hypothesis gained credibility when Raymond Rogers, a retired Los Alamos chemist and former Shroud skeptic, published findings in 2005 claiming that the sample contained cotton fibers and dye not present elsewhere on the cloth.

Subsequent analysis by Bella, Garlaschelli, and Samperi (2015) found no mass spectrometry evidence supporting the repair patch hypothesis. The original sample was taken from the main body of the cloth. While the exchange between Rogers and his critics has not been universally regarded as closed, the repair patch hypothesis has not been sustained by subsequent independent analysis.

3.2 The Fire Contamination Hypothesis

A second reframe proposed that the 1532 fire had contaminated the Shroud with carbon, skewing the radiocarbon date. This hypothesis was never supported by experimental evidence showing that contamination of the required magnitude and isotopic specificity is physically plausible.

3.3 The Resurrection Energy Hypothesis

The most recent reframe, and the least testable, proposes that

the resurrection event itself—a burst of divine energy—altered the isotopic composition of the linen. This hypothesis is unfalsifiable by design. It can be neither confirmed nor refuted by any physical measurement, which is precisely what makes it attractive to a sealed basin.

The trajectory from repair patch (falsified) to fire contamination (unsupported) to resurrection energy (unfalsifiable) is structurally identical to the reframing cascades documented by Festinger et al. (1956) and Melton (1985) in failed prophetic movements. The content differs; the dynamics do not.

A methodological caveat. The characterization of this trajectory as "low κ" is a qualitative judgment, not a formal measurement. Corrective permeability (κ) remains a conceptual construct within the attractor framework, operationalized in principle but not yet validated through independent measurement. The framework's diagnostic vocabulary—low κ, sealed basin, reframing cascade—provides a coherent description of the Shroud defenders' behavior, but the assignment of $\kappa \approx 0$ is interpretative, not empirical. This limitation constrains the confidence with which the paper can claim that the Shroud case is a definitive instance of a fantasy attractor rather than a plausible one.

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4. The Dopamine Lever: Why the Basin Holds

The Shroud's persistence is not explained by the evidence, which is strongly against its authenticity. It is explained by the dopamine covenant (Galida, 2026c). The Shroud is a physical lever that delivers the feeling of proximity to the divine. To stand before it, or even to view a reproduction, is to feel connected to the central event of Christian faith.

The neuroscience of sacred values and religious experience supports this interpretation. Religious belief and ritual engage the mesolimbic reward system, including the nucleus accumbens and ventral striatum (Newberg, 2010). Neuroimaging studies have identified distinct neural signatures associated with religious conviction, including activity in regions implicated in valuation and emotional processing (Kapogiannis et al., 2009). The pioneering work of Olds and Milner (1954) established the foundational principle—direct stimulation of reward pathways can override competing biological imperatives—demonstrating that reward-seeking behavior can persist in the absence of biological utility. Subsequent research on the neural correlates of religious belief (Inzlicht et al., 2011) has examined distinct mechanisms including error-monitoring and anxiety reduction in religious believers, extending the neuroscience of conviction beyond the reward-pathway paradigm. The certainty of possessing a tangible link to the divine plausibly activates dopaminergic circuitry similar to that implicated in other forms of ideological commitment.

The believer does not evaluate the Shroud as a forensic object. They experience it as a relic. The dopamine reward of touching the sacred is more powerful than any carbon date. The lever is pressed, and the radiocarbon laboratory might as well be on another planet. The basin's impermeability is not primarily intellectual. It is neurochemical.

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5. The Beams: What the Framework and the Author Cannot Fully Examine

The attractor framework's diagnostic of the "beam"—the feature a system cannot examine in itself—must be applied to the framework itself. This paper has argued that the Shroud's defenders exhibit low corrective permeability. It has not

established this claim through independent measurement, and several potential beams within the attractor framework deserve acknowledgment.

Operationalization. κ remains a qualitative construct. Without formal measurement criteria, its application to cases is necessarily subjective. The framework diagnoses low κ in the Shroud's defenders; a skeptic of the framework could diagnose the same low κ in the framework's own resistance to operationalization. This beam has been partially examined in Section 3's methodological caveat but remains a structural limitation.

Case selection. The framework is applied exclusively to cases where the author's assessment of the evidence aligns with the diagnosis. A rigorous test would require applying the framework to a case where the author believes a claim is *true* and examining whether defenders of that claim also exhibit low-κ dynamics. The present paper cannot claim to have performed this test.

Self-citation and independent validation. The framework's core constructs—κ, the dopamine covenant, the basin model—rest substantially on the author's own unpublished or independently unverified works (Galida, 2026a, 2026b, 2026c). This does not invalidate the framework, but it means the theoretical foundation is self-referential in a way that limits independent evaluation. A reader cannot assess the framework's claims without access to the author's broader corpus, and that corpus has not been subjected to peer review. This is a beam the author acknowledges but cannot resolve within the scope of this paper.

The framework itself as a potential fantasy attractor. Commitment to the attractor framework as an explanatory construct may itself be maintained through low-κ dynamics. The framework's proponents might reframe disconfirming evidence rather than updating. What would

constitute a disconfirming result for the framework? If a well-documented case were presented in which a belief system exhibited all the structural features of a sealed basin yet subsequently updated rapidly and substantially without reframing, the framework's predictive utility would be challenged. Acknowledging this possibility does not invalidate the framework; it applies the framework consistently.

These beams constrain the confidence with which the paper's diagnostic claims can be advanced. The Shroud case is *consistent* with the fantasy attractor model; it is not *definitive proof* of it. The daily question—"Did I update any belief yesterday?"—applies to the author as much as to the Shroud's defenders. This paper has been revised in response to critique. Whether those revisions constitute genuine corrective permeability or merely the reframing of a sealed basin is a question the author cannot definitively answer. The reader is invited to judge.

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6. The Larger Covenant: Relics and Apocalyptic Attractors

The Shroud is not an isolated case. It belongs to a family of fantasy attractors that includes apocalyptic prophecy, textual fundamentalism, and geopolitical messianism. Each offers a lever that rewards certainty with dopamine and punishes updating with cognitive dissonance. Each survives perturbation through reframing rather than revision. Each possesses a beam it cannot fully examine.

The Shroud's structural relationship to the apocalyptic attractors analyzed elsewhere (Galida, 2026a, 2026b) is instructive. The believer in the Shroud, the believer in Ezekiel 38, and the believer in the Mahdi's return are pressing the same lever. The content of the belief differs,

but the dynamics are identical. The dopamine covenant unifies them.

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7. Conclusion

The Shroud of Turin is a medieval cloth, not a first-century burial shroud. The radiocarbon dating is strong, independently replicated, corroborated by documentary history, and unrebutted by any equally rigorous methodology. The reframing cascade—repair patch, fire contamination, resurrection energy—is a well-documented instance of belief persistence under disconfirmation. The image-formation mechanism remains an open question but does not outweigh the dating evidence. The distinction between "not authentic" and "confirmed deliberate forgery" should be maintained: the evidence establishes the cloth's medieval origin but does not independently establish the intent of its creator.

The Shroud's persistence as an object of veneration is not a mystery requiring supernatural explanation. It is a predictable dynamical phenomenon, driven by the same neurochemical and social mechanisms that sustain all sealed belief systems. The attractor framework explains why the evidence has not been sufficient to collapse the basin.

The framework itself, however, remains a qualitative construct with unoperationalized core variables, a self-referential theoretical foundation, and a case-selection pattern that limits its generalizability. Its diagnostic claims are plausible but not definitive. These beams are acknowledged but not resolved. The lever is hot. The fire feels good. The metronomes hum. The carbon-14 decays at its fixed rate. The physical evidence is what it is. The attractor framework provides a coherent account of why that evidence has not been sufficient to change most believers' minds—and it acknowledges

that its own account must remain open to correction by evidence that has not yet arrived.

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The Dopamine Covenant: Neurochemical Reinforcement and the Persistence of Fantasy Attractors in Religion and Politics

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Abstract

Religious and ideological systems often persist despite contradictory evidence, failed prophecies, and historical disconfirmation. This paper argues that such persistence is not merely a cognitive error but is undergirded by a specific neurochemical mechanism: the dopamine-driven reinforcement of certainty. Building on Olds and Milner's (1954) demonstration that direct stimulation of the mesolimbic reward pathway can override all competing biological imperatives, we propose that the "lever" of absolute belief functions as a fantasy attractor—a sealed, low-corrective-permeability (κ) basin that resists updating. We examine this dynamic through case studies of textual fundamentalism, failed prophecy, and the geopolitical convergence of apocalyptic movements. The paper concludes that the brain's reward architecture does not contain a truth detector, and that cultivating corrective permeability (κ)—at the individual and institutional level—is the only reliable alternative to the self-reinforcing loop of certainty and catastrophe. Falsifiability conditions are specified, and an agenda for future empirical research is proposed.

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1. Introduction: The Neural Lever

For millennia, religious and ideological systems have promised a singular reward: certainty. This is not any certainty, but the kind that feels like direct access to the universe's operating system—an unshakeable conviction that one's narrative is not merely true, but cosmically significant. That feeling has a name: dopamine. And it does not care about truth.

In 1954, James Olds and Peter Milner implanted electrodes into the septal area of rat brains. When the rats pressed a lever,

they received a brief electrical jolt to their pleasure center—the mesolimbic pathway, running from the ventral tegmental area to the nucleus accumbens. The rats pressed the lever thousands of times per hour. When given a choice between a lever delivering food and a lever delivering direct brain stimulation, they chose the stimulation. They pressed until they collapsed from exhaustion or starvation. They died with their paws on the lever (Olds & Milner, 1954).

This experiment provides the neurochemical prototype for understanding the self-sealing nature of fantasy attractors—belief systems with low corrective permeability ($\kappa \approx 0$) that resist updating when confronted with contradictory evidence (Galida, 2026). The Olds-Milner lever demonstrates that direct activation of the mesolimbic reward pathway can override behaviors essential to survival. Human ideological certainty engages the same pathway, though mediated through language, social identity, and symbolic narrative rather than direct electrode stimulation. The brain does not have a dedicated "truth detector." It has a reward system. And that system can be hijacked by any narrative that provides a sufficient dopamine reward.

A note on the framework. The attractor framework is a theoretical construct developed by the present author. It is not a community-validated model but a set of proposed concepts—including corrective permeability (κ) and the distinction between reality-aligned and fantasy attractors—designed for diagnostic application. This paper deploys those concepts to connect the neuroscience of reward with the psychology of belief persistence.

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2. The Neurochemistry of Certainty

Prayer, ritual, scripture reading, and the ecstasy of prophecy

all activate the same mesolimbic reward circuits. Functional MRI studies demonstrate that intense spiritual and ideological feelings light up the nucleus accumbens and ventral striatum—the same regions activated by cocaine, gambling, romantic love, and the Olds-Milner lever. However, the activation of these regions demonstrates correlation, not causation; BOLD signal in the nucleus accumbens does not by itself establish that dopamine *drives* belief persistence. The neuroimaging evidence is suggestive rather than definitive, particularly given that the most relevant studies (Hamid et al., 2019; Zhong et al., 2017) examine extreme populations—devoted actors willing to die, and patients with traumatic brain lesions—rather than ordinary belief formation.

A more precise account of dopamine's role is required. Berridge and Robinson's (1998) "wanting/liking" distinction demonstrates that mesolimbic dopamine mediates *incentive salience*—the compulsive "wanting" of a stimulus—rather than the subjective pleasure, or "liking," that accompanies it. Certainty about one's cosmic significance may thus function not as a hedonic reward but as an object of intense motivational craving, a lever the believer is driven to press again and again. Schultz, Dayan, and Montague (1997) established that phasic dopamine neurons encode a *reward prediction error*: they fire when an unexpected reward is received, reinforcing the causal association. When a specific prophecy fails, a clever reframing can provide a new, internally generated reward signal, reinforcing the attractor rather than collapsing it. The application of reward prediction error to internally generated narrative rewards in humans is a hypothesis requiring direct empirical validation; it is offered here as a plausible mechanistic bridge, not an established finding.

The dorsolateral prefrontal cortex (dlPFC)—the region responsible for deliberative reasoning, cognitive flexibility, and the integration of contradictory information—shows reduced

activity in devoted actors willing to kill and die for sacred values (Hamid et al., 2019). Damage to the ventromedial prefrontal cortex (vmPFC) correlates with increased religious fundamentalism and cognitive rigidity (Zhong et al., 2017). These findings are suggestive rather than definitive for ordinary belief formation, but they point toward a neural mechanism through which intense certainty may suppress the very apparatus that could correct it. A fantasy attractor, therefore, is not merely a cognitive error; it is a neurochemical lock.

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3. Corrective Permeability (κ): A Qualitative Construct

Corrective permeability (κ) is introduced here as a multidimensional, qualitative construct—not a metrically precise quantity. It describes the degree to which a belief system updates in response to disconfirming evidence. At the behavioral level, κ is observed through responses to prophetic failure, electoral loss, or scientific falsification. At the neural level, it is hypothesized to correlate with dlPFC engagement during exposure to counter-attitudinal information. At the cognitive level, it overlaps with metacognitive awareness, intellectual humility, and reflective thinking capacity as measured by instruments such as the Cognitive Reflection Test (Frederick, 2005).

These three dimensions—behavioral, neural, and cognitive—are proposed as related but potentially partially dissociable components of a common construct. A person could score highly on the CRT, show strong dlPFC engagement, and still behaviorally refuse to update a sacred belief under social pressure. In such a case, the behavioral dimension carries the diagnostic weight: κ is ultimately judged by whether the attractor updates, not by its neural or cognitive correlates

alone. The three dimensions provide converging evidence but do not replace behavioral observation. Formal integration of these dimensions into a validated measurement model is deferred to future empirical work. For the present paper, κ serves as a conceptual organizing device, not a formal variable.

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4. The Textual Addiction

The same dopamine loop that drives addiction to substances can drive addiction to textual certainty. For many conservative religious traditions, the perfect preservation of scripture is a doctrinal necessity: if God inspired the words, He would also protect them from corruption.

The Dead Sea Scrolls, discovered in 1947, were initially hailed as proof of this perfect transmission. The Great Isaiah Scroll matched the medieval Masoretic text almost perfectly. However, the same discovery yielded the book of Jeremiah—approximately fifteen percent shorter than the Masoretic version and matching the ancient Greek Septuagint. This was not a scribal slip; it was a full editorial rewrite. The scrolls of Samuel and other books similarly display significant variation. The "perfect transmission" narrative was seriously complicated by the evidence from Qumran.

Yet the dopamine-driven believer does not abandon the text. Instead, the basin seals. The evidence is reframed: "The Isaiah scroll shows stability; the variations are minor and do not affect doctrine." The logical implication—that if the Hebrew Bible is a human text with a messy editorial history, then so is the New Testament—is often ignored. Both testaments have centuries-long gaps between the original events and the earliest extant manuscripts, thousands of textual variants, and scribes with theological agendas. Scholars such as Bart

Ehrman have documented hundreds of changes that later scribes made to the New Testament (Ehrman, 2005). Ehrman's continued work on the historical Jesus, despite his own findings on textual uncertainty, need not be dismissed as mere dopamine-seeking; it may reflect a calibrated probability that some historical core remains recoverable. What matters for the attractor framework is that the textual evidence does not produce the scale of doctrinal revision that a straightforward updating model would predict, and the reward of recovering a Jesus behind the text provides a lever that can be pressed independently of the underlying methodological confidence.

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5. Prophecy as Retrofitting—and Its Limits

The same dopamine economy drives apocalyptic prophecy. When a predicted event fails to occur, the attractor does not collapse; it reframes. The prophecy is reinterpreted, the timeline is stretched, and the lever is pressed again.

Rabbi Tovia Singer, responding to the October 7, 2023, attack, declared it "Messiah ben Yosef"—the suffering precursor to the final redemption. Ezekiel 38, he insists, is unfolding before our eyes: Iran is Persia, Lebanon is the north, and the enemies of Israel are being drawn into a divinely ordained war. Yet Ezekiel promised fire and brimstone, not IAF airstrikes. Iran still stands. Hezbollah still operates. The Temple is not rebuilt. World peace is nowhere in sight. "Unfolding" is simply a slower version of "soon." When nothing happens, the believer is "still in the process." When something happens, it is "prophetic." The prophecy is unfalsifiable.

This is the same escape hatch that Christian apocalyptic movements have used for two millennia. The Millerites (1844),

Jehovah's Witnesses (1914, 1925, 1975), Hal Lindsey (1980s), Harold Camping (2011), and countless others have set dates, faced disconfirmation, and then recalibrated. The most committed believers do not abandon the attractor; they deepen their commitment. Festinger, Riecken, and Schachter's (1956) classic study of a failed doomsday cult found that the most devout members became *more* convinced after the prophecy failed, reframing it as a spiritual success. Melton (1985), surveying centuries of prophetic failure across multiple traditions, concluded that prophecies are routinely spiritualized, recalibrated, or reframed as tests of faith.

However, not all movements survive disconfirmation. The Millerites did not simply deepen; they fragmented severely, with many members abandoning the movement entirely after 1844. The Sabbatean movement, which proclaimed Sabbatai Zevi as the messiah in the 17th century, largely collapsed after Zevi's forced conversion to Islam, with thousands of followers abandoning their messianic beliefs. The Jehovah's Witnesses experienced significant membership decline after the failed 1975 prophecy, even as the institutional leadership reframed the failure. These cases demonstrate that fantasy attractors are not indestructible; they can shatter, and what predicts persistence versus collapse is an empirical question involving variables such as social embeddedness, the availability of a face-saving reframe, and the relative costs of exit. The dopamine hit of "I was right" is powerful, but it is not invincible.

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6. The Geopolitical Metastasis

This neurochemical dynamic is not confined to individual belief. It scales to geopolitics. Iran's Shia eschatology, Christian Zionism, and Jewish messianic nationalism all share a common structure: a sacred prophecy, a designated enemy, and

a catastrophic endgame that promises ultimate reward to the faithful. The leaders of these movements are not irrational; they are pressing the lever that delivers the greatest neurochemical reward—certainty, belonging, and the thrill of being on the winning side of cosmic history.

The ideological commitments are independently documented. Iranian state ideology explicitly frames geopolitical confrontation as preparation for the return of the Hidden Imam, the Mahdi (Khalaji, 2008; Ostovar, 2016). Christian Zionism, represented by organizations such as Christians United for Israel with millions of members, translates dispensationalist theology into concrete political and financial support for Israeli policy. Jewish messianic factions within the religious Zionist movement interpret territorial expansion and military conflict as steps in a divine timetable. The claim that these three basins have become coupled through mutually reinforcing positive feedback—forming a single meta-attractor—is the author's own theoretical proposal (Galida, 2026b), offered here as a diagnostic hypothesis pending independent validation. If the basins are indeed coupling, the dorsolateral prefrontal cortex—the neural seat of cost-benefit analysis—is suppressed in devoted actors, and the collective lever is pressed. The fire feels good.

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7. The Antidote: Shared Reality and Corrective Permeability

There is such a thing as shared reality. It is evidence-based, publicly verifiable, and indifferent to dopamine spikes. Shared reality is what emerges when one acknowledges that the Hebrew Bible is a human artifact, the New Testament is a human artifact, and one's geopolitical prophecy is a decorated headline. Shared reality requires engaging the dlPFC—weighing

costs and benefits, updating beliefs, and admitting error. It will never compete, moment-to-moment, with the jolt of a "prophecy fulfilled." But it keeps the organism alive.

At the individual level, corrective permeability is not a fixed trait; it is a trainable practice. The dlPFC can be strengthened. Interventions that promote critical reflection have been shown to influence belief formation and flexibility. Gervais and Norenzayan (2012) demonstrated that inducing analytic thinking can reduce religious belief, though subsequent replication attempts have yielded mixed results and more modest effect sizes than the original study reported. The Cognitive Reflection Test (Frederick, 2005) predicts resistance to intuitive but false beliefs in laboratory settings, though its external validity to high-stakes religious belief remains to be established. Mindfulness meditation has been shown to increase prefrontal activity and reduce amygdala reactivity (Hölzel et al., 2011), offering a well-documented neural pathway. Cognitive behavioral therapy (CBT) modifies specific maladaptive beliefs in clinical populations, though its effects on general belief flexibility are less established. Structured debate in low-threat contexts is a plausible but less-tested intervention. The simple daily question, "Did I update any belief yesterday?," is a practical heuristic for engaging the correction apparatus.

Acknowledging the asymmetry. If the dopamine reward of certainty can override biological imperatives including survival, as the Olds-Milner experiment demonstrates, then individual reflective practices—mindfulness, critical thinking, the daily question—are structurally insufficient as a societal antidote. They are necessary but not sufficient. This paper does not claim that mindfulness can counteract the geopolitical force of a sealed apocalyptic attractor coupled to state military power. It claims only that individual κ cultivation is a prerequisite for any broader institutional response: institutions themselves are populated by

individuals, and institutional κ cannot exceed the κ of the people who operate them. The individual lever must be recognized before the collective lever can be released.

At the institutional level, protecting the truth-delivery systems—free press, independent courts, scientific bodies—from colonization by sealed apocalyptic attractors is essential. At the international level, recognizing the dopamine covenant for what it is—a neurochemical feedback loop that has been exploited for millennia—is a prerequisite for any effective response to the converging apocalyptic basins.

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8. Falsifiability Conditions

A framework that diagnoses sealed belief systems must itself be open to correction. The following conditions are proposed:

- **Strong disconfirmation:** If a well-documented case is presented in which a high-commitment belief system updates its core claims rapidly and substantially in response to disconfirming evidence, without reframing, the claim that dopamine-driven certainty reliably produces low κ is weakened.
- **Partial disconfirmation:** If large-scale longitudinal studies demonstrate no correlation between dopamine system activity (as measured by PET, fMRI, or pharmacological challenge) and resistance to belief updating, the neurochemical mechanism proposed here is undermined.
- **Corroboration:** If experimental interventions that increase dlPFC engagement (e.g., cognitive training, mindfulness protocols) are shown to produce measurable increases in belief-updating behavior across multiple domains and populations, the training prescription is supported.

These conditions are not met by the present paper. They are offered as a guard against the framework itself becoming a fantasy attractor—self-sealing, immune to disconfirmation, and pressing the lever of its own theoretical certainty.

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9. Open Questions and Future Research Directions

The attractor framework generates testable hypotheses across multiple levels of analysis. We identify five priority questions that would advance the empirical grounding of the dopamine covenant thesis. Each is paired with a proposed experimental or analytical approach and an honest assessment of feasibility.

9.1 Does prophetic reframing generate a dopamine-mediated reward prediction error?

Present committed believers with a falsifiable prediction (e.g., a specific event by a specific date) while recording neural activity in dopaminergic regions via fMRI or PET. After the predicted event fails to occur, classify participants as "reframers" (those who reinterpret the failure as spiritual fulfillment) or "abandoners" (those who reduce or relinquish belief). Compare dopaminergic responses between groups. A significant phasic dopamine-like signal in reframers, and its absence in abandoners, would support the reward prediction error hypothesis (Nour et al., 2018). If no dopaminergic difference is detected, the social-psychological reframing account (Festinger et al., 1956; Melton, 1985) would be favored over a purely neurochemical one.

Feasibility: Low. The design requires identifying a high-commitment group with a dated, falsifiable prophecy and obtaining pre- and post-failure neural data. This is

opportunistic; experimenters cannot manufacture such groups on demand. Even if a suitable group is identified, access and attrition pose severe challenges. The hypothesis is valuable as a theoretical benchmark but unlikely to be tested directly in the near term.

9.2 What predicts persistence versus collapse after disconfirmation?

Conduct a systematic comparative coding of historical prophetic movements across multiple traditions. Variables would include social embeddedness (group size, cohesion, leadership structure), availability of face-saving reframing options (spiritualization, calendar recalibration, symbolic reinterpretation), and exit costs (social ostracism, material loss). Outcomes would be coded as persistence (belief deepens), collapse (movement disbands), or successor-formation (new attractor emerges). Statistical analysis would identify the strongest predictors. Recent archival work suggesting that the original Festinger cult actually dissolved (Kelly, 2026) underscores the need for broad comparison rather than reliance on a single iconic case.

Feasibility: Moderate. Coding historical cases is labor-intensive but methodologically straightforward. The main challenge is documentation asymmetry: movements that collapsed quietly without leaving records are underrepresented. Despite this, a well-sampled dataset of several dozen cases would provide the first quantitative test of the framework's core persistence hypothesis and is achievable within existing historical scholarship.

9.3 Can κ be trained in high-stakes contexts?

Conduct a longitudinal randomized controlled trial in high-commitment ideological or religious populations. Participants would be assigned to κ-enhancement interventions (mindfulness meditation, cognitive reflection training, daily metacognitive

prompts such as “Did I update any belief yesterday?”) or an active control. Belief flexibility would be measured pre- and post-intervention using personalized challenge tasks—exposure to counter-evidence about cherished beliefs—and tracked over months. Existing evidence shows that cognitive debiasing reduces conspiracy beliefs (Bayrak et al., 2025) and that mindfulness reduces cognitive rigidity (Greenberg et al., 2012). Metacognitive reflection on counterarguments has shown marginal effects on belief updating (O’Leary, 2024). The open question is whether these laboratory effects survive translation to deeply held, socially reinforced sacred values.

Feasibility: Moderate. Recruitment of high-commitment believers willing to undergo belief-flexibility training is challenging but not impossible, particularly if framed as “critical thinking enrichment” rather than “belief change.” Attrition and small effect sizes are the primary risks; large samples and long follow-up periods would be required. The study would provide the most direct test of the paper’s central prescriptive claim.

9.4 How does individual κ aggregate into collective geopolitical dynamics?

Build agent-based models (ABMs) in which individual agents possess varying κ levels influencing their information processing, belief updating, and social influence. Parameters would include the baseline distribution of κ in the population, media amplification factors, and leadership rhetoric effects. The models would test whether collective apocalyptic coupling emerges only above a critical threshold of low-κ agents, or whether institutional amplification can produce coupling even when low-κ individuals are a minority. Existing ABMs of political opinion dynamics incorporating cognitive rigidity parameters provide a template (Ávila et al., 2025).

Feasibility: The model-building is technically

straightforward; parameter specification and empirical validation are the bottlenecks. Validating an ABM of geopolitical apocalyptic coupling against real-world data requires quantified historical or cross-sectional data on movement coupling that may not exist. This is a full-scale modeling project rather than a near-term study, but a proof-of-concept simulation would clarify whether the individual-to-collective transition is linear or nonlinear.

9.5 Is κ a unified construct or a loose family of traits?

Measure all three dimensions of κ—behavioral updating after disconfirmation, dlPFC engagement during counter-attitudinal exposure (via fMRI or tDCS), and cognitive reflection (CRT scores)—in the same subjects. Correlational and factor analysis would determine whether a single latent variable accounts for variance across all three dimensions, or whether they are dissociable. Existing evidence linking dlPFC stimulation to improved belief updating (Schulreich et al., 2020) suggests a neural-behavioral connection, but the full three-dimensional structure has not been tested. The answer determines whether κ has theoretical coherence or is merely a convenient label.

Feasibility: Low as a single study; high as a research program. The combination of fMRI/tDCS, cognitive testing, and longitudinal behavioral tracking in a large sample is expensive and logistically demanding. A stepped approach—first correlating behavioral and cognitive measures, then adding neural measures in a subset—is more realistic.

These five questions map the territory between the dopamine covenant as a conceptual framework and its empirical validation. The strongest near-term contributions are the comparative historical coding of persistence versus collapse (Question 2) and the longitudinal κ training trial (Question

3)—both are feasible, publishable, and directly test core claims. The remaining questions are ambitious but define the framework's long-term research horizon. A framework that generates falsifiable questions is a framework that remains open to correction. That is itself a form of corrective permeability.

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10. Conclusion

The rat died pressing the pleasure lever. The religious extremist, the apocalyptic politician, and the certainty-addicted believer are making the same choice, driven by the same neural circuitry. The fire feels good. That is the real addiction. And it is burning the world down.

The only reliable lever is reality. It does not promise heaven. It does not promise a second coming or a Mahdi's return. It promises only one thing: it is true, whether you believe it or not.

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"For independent neuroscientific corroboration of the attractor dynamics described here, see A Preliminary Mapping Between Ring Attractor Dynamics and the Attractor Framework."

The Lever and the Basin: Olds-Milner, Dopamine, and the Neurochemical Prototype of Fantasy Attractors

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Abstract

In 1954, Olds and Milner demonstrated that direct electrical stimulation of the mesolimbic reward pathway could drive rats to press a lever to the exclusion of all biological needs, often until death. This paper argues that the Olds-Milner lever provides the neurochemical prototype for a fantasy attractor—a sealed, low-corrective-permeability (κ) belief system maintained by dopamine-driven reinforcement. While the human expression of such attractors involves symbolic and narrative complexity, they appear to share a common neural substrate with the Olds-Milner phenomenon, specifically the dopamine-mediated suppression of the dorsolateral prefrontal cortex (dlPFC). Corrective permeability (κ) is defined here as a multidimensional construct—behavioral (rate of belief update under disconfirmation), neural (dlPFC engagement during counter-attitudinal exposure), and cognitive (metacognitive awareness and reflective thinking capacity)—whose dimensions are proposed as related but potentially partially dissociable components of a common construct. The attractor framework is the author's own theoretical construct, and this paper uses it to propose a unified conceptual bridge between the neuroscience of reward, the social psychology of failed prophecy, and the dynamics of rigid belief. It concludes that corrective permeability is not a fixed trait but a neurocognitive skill that can be cultivated, and that the framework itself must remain open to disconfirmation.

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1. Introduction: The Rat on the Lever

In a landmark 1954 experiment, James Olds and Peter Milner implanted electrodes into the septal nuclei of rats and connected them to a lever. Each press delivered a brief electrical jolt to the brain's pleasure centers. The rats pressed the lever at rates of up to 7,000 times per hour, ignoring food, water, and their own young, until they collapsed from exhaustion or died. The electrode was not delivering nutrition or safety; it was delivering direct, unmediated reward via the mesolimbic dopamine pathway.

The canonical interpretation treats this experiment as a study of addiction and motivation. I propose a different reading: the rat on the lever is the purest behavioral demonstration of a fantasy attractor—a sealed basin with near-zero corrective permeability ($\kappa \approx 0$), maintained by a neurochemical feedback loop that has no mechanism for detecting its own self-destructiveness. The brain does not have a truth detector. It has a reward system. Fantasy attractors exploit this architecture.

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2. The Fantasy Attractor: A Construct Under Development

A note on the framework. The attractor framework is a theoretical construct developed by the present author (Galida, 2026a). It is not a community-validated model but a set of proposed concepts—including corrective permeability (κ) and the distinction between reality-aligned and fantasy attractors—designed for diagnostic application. This paper deploys those concepts to connect the neuroscience of reward with the psychology of belief persistence.

A fantasy attractor is a belief system with low corrective

permeability (κ). It resists updating when confronted with contradictory evidence, reframes error signals to protect its core narrative, and often seeks to colonize or destroy rival basins. A reality attractor, in contrast, has high κ: it absorbs perturbation, updates its model, and deepens through correction.

What is κ? Corrective permeability is a multidimensional construct. At the behavioral level, it denotes the rate at which a belief system updates in response to disconfirming evidence—observable through responses to prophetic failure, electoral loss, or scientific falsification. At the neural level, it is hypothesized to correlate with dlPFC engagement during exposure to counter-attitudinal information. At the cognitive level, it overlaps with metacognitive awareness, intellectual humility, and reflective thinking capacity as measured by instruments such as the Cognitive Reflection Test (Frederick, 2005). These three dimensions—behavioral, neural, and cognitive—are proposed as related but potentially partially dissociable components of a common construct, and their formal integration into a validated measurement model is deferred to future empirical work. For the present paper, κ serves as a conceptual organizing device, not a metrically precise quantity.

Corrective permeability has a neural correlate. The dorsolateral prefrontal cortex (dlPFC) is critical for deliberative reasoning, cognitive flexibility, and the integration of new information that contradicts prior beliefs. When the dlPFC is suppressed—by stress, by dopamine-driven reward anticipation, or by the sheer intensity of a sacred value—the updating mechanism is partially disengaged. A fantasy attractor, then, is not merely a cognitive error. It is a neurochemical lock: a self-reinforcing basin maintained by the dopamine-driven reinforcement of certainty, coupled with the suppression of the apparatus that could correct it.

3. The Olds-Milner Mechanism: Dopamine and Basin Sealing

3.1 The Experiment

Olds and Milner implanted bipolar electrodes in the septal nuclei of rats. The stimulation directly activated the mesolimbic pathway, triggering dopamine release in the nucleus accumbens. The rats rapidly learned to self-stimulate and would cross electrified grids to reach the lever. Their behavior displayed a pathological focus: all competing motivational systems—hunger, thirst, social bonding—were overridden.

3.2 Wanting Without Liking

Subsequent neuroscience has refined our understanding of the underlying processes. Berridge and Robinson's "wanting/liking" distinction demonstrates that mesolimbic dopamine mediates *incentive salience*—the compulsive "wanting" of a stimulus—rather than the subjective pleasure, or "liking," that accompanies it. This is a crucial precision: the Olds-Milner rat may not be experiencing escalating pleasure. It may be in a state of chronic, intense craving, driven by a dopamine system that attributes supreme motivational value to the lever.

Schultz and colleagues established that phasic dopamine neurons encode a *reward prediction error*. They fire when an unexpected reward is received, reinforcing the causal association. A fantasy attractor, however, often does not deliver a single, clear falsifiable prediction. When a specific prophecy fails, a reframe can provide a new, internally generated reward signal: the revised interpretation itself constitutes a novel prediction whose acceptance by the

group triggers a prediction error, reinforcing the attractor rather than collapsing it. The dopamine system thus does not merely passively respond to external rewards; it can be co-opted by internally generated narrative rewards that perpetuate the basin.

3.3 The Lever as a Sealed Basin

Viewed through this lens, the rat's behavior maps onto the fantasy attractor concept with precision. The lever becomes the basin's strongest point of attraction, and the dopamine-driven "wanting" compels action even as the animal's body is dying. The error signals of hunger and thirst are present, but they cannot penetrate the basin. The dopamine loop overrides them. The rat is not stupid; it is a perfectly functional nervous system locked in a sealed attractor, driven by "wanting" what will kill it.

3.4 From Rat to Human: A Shared Substrate

The human mesolimbic pathway is structurally and functionally homologous to the rat's. A human contemplating their election as a member of a divine plan, a revolutionary vanguard, or an infallible political movement is likely engaging the same dopamine-mediated "wanting" system. The apocalyptic believer retrofitting a terrorist attack as "Messiah ben Yosef" is pressing a lever. The certainty is the reward. What differs is the complexity of the stimulus—the lever is decorated with theology, ideology, and narrative. This symbolic layer is not an epiphenomenon; it engages distinct cortical processes and social dynamics that add causal complexity. The human attractor is not identical to the rat's, but it appears to share a crucial neurochemical substrate.

A methodological caveat. Direct neuroimaging of ordinary belief rigidity remains limited. The available evidence comes primarily from extreme populations: Hamid et al. (2019) studied individuals willing to fight and die for sacred values, and Zhong et al. (2017) studied patients with

traumatic dlPFC lesions. These findings are suggestive rather than definitive for ordinary belief formation. Generalization from these studies to the broader population of believers should be treated as a hypothesis requiring further validation, not an established finding.

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4. The Dopamine Covenant: Certainty as Reward

4.1 The Brain's Category Error

The brain evolved to use the feeling of certainty as a proxy for adaptive knowledge because false beliefs about predators were rapidly corrected. In the modern symbolic environment, beliefs can persist for decades without encountering lethal feedback. A person can be completely certain that the Mahdi will return or that a lost election was stolen, and this subjective certainty fires the same reward circuits that once signaled a reliable food source. The brain cannot distinguish between "this feels certain because it is true" and "this feels certain because the mesolimbic pathway has been activated ten thousand times."

4.2 Persistence and Collapse After Disconfirmation

Festinger, Riecken, and Schachter's *When Prophecy Fails* (1956) chronicled a doomsday cult that reframed a failed flood prophecy as confirmation that their faith had saved the world. Believers became more committed after the failure. This is the basin deepening. Melton (1985), surveying centuries of prophetic failure across multiple religious traditions, identified the same structural pattern: prophecies are routinely spiritualized, recalibrated, or reframed as tests of faith rather than abandoned.

However, a full analysis requires accounting for cases where

movements *do* collapse. The Millerites of 1844, who prepared for Christ's return on October 22, suffered a massive "Great Disappointment" when Jesus did not arrive. The movement fragmented severely; many members left, disillusioned. Yet from that collapse, new, more resilient sects—most notably the Seventh-day Adventists—emerged with a reframed theology. This pattern is theoretically instructive: collapse of one attractor basin can seed a successor, potentially more resilient, basin. The attractor dynamic does not necessarily terminate; it can migrate, with the reframe functioning as the bridge from the old basin to the new. What predicts persistence versus collapse versus successor-formation? Variables likely include the depth of a group's social embeddedness, the availability of a face-saving reframe, and the relative costs of exit. Engaging this complexity strengthens the argument: a fantasy attractor is not an indestructible monolith; it is a dynamical system that can either deepen, shatter, or reorganize under perturbation, depending on its structure. The reframing response is common but not universal.

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5. Implications for the Attractor Framework

5.1 Cognitive Arguments Alone Are Insufficient

A fantasy attractor cannot be reliably dislodged by evidence alone because the apparatus for processing corrective evidence (the dlPFC) is often suppressed. This does not mean persuasion is impossible; it means that conditions that reduce threat and re-engage prefrontal function must precede evidential argument.

5.2 The Dopamine Covenant Explains Apocalyptic Intensity

Apocalyptic belief is an especially potent fantasy attractor because its reward structure is maximal: the believer is not merely right about a fact; they are a participant in the final act of cosmic history. The dopamine "wanting" is directed toward a future of ultimate vindication, making the attractor deeply resistant to correction.

An open question: κ at the level of belief content vs. attractor dynamics. The successor basin phenomenon—where collapse of one fantasy attractor seeds another—raises a theoretically important distinction. An individual or group that abandons a failed prophecy and adopts a reframed successor belief may exhibit high κ in the narrow sense (they updated their specific beliefs in response to disconfirmation) while remaining within a fantasy attractor at the structural level. This suggests that κ may need to be measured not only at the level of specific belief content but also at the level of the attractor dynamic itself: does the system's underlying relationship to disconfirmation change, or merely the content of the beliefs it protects? A high-κ move from one low-κ basin to another is still low-κ at the systemic level. Resolving this distinction—between content-level and structure-level corrective permeability—is a priority for future theoretical and empirical work within the attractor framework.

5.3 Corrective Permeability Is a Trainable Practice

The dlPFC can be strengthened. The capacity for analytic reasoning is not a fixed trait. Interventions that promote critical reflection have been shown to influence belief formation and flexibility. Gervais and Norenzayan (2012) demonstrated that inducing analytic thinking can reduce religious belief, though subsequent meta-analyses have found more modest and conditional effect sizes in replications. This

suggests a genuine but likely small-to-moderate link between cognitive style and belief flexibility. More broadly, dual-process theories in cognitive psychology hold that Type 2 (reflective) processing can override Type 1 (intuitive) responses when prompted (Evans & Stanovich, 2013). The Cognitive Reflection Test (CRT; Frederick, 2005) has been shown to predict resistance to intuitive but false beliefs across multiple domains, providing a plausible measurement anchor for the cognitive dimension of κ.

The evidence base for specific interventions varies. Mindfulness meditation has been shown to increase prefrontal activity and reduce amygdala reactivity (Hölzel et al., 2011), providing a well-documented neural pathway for enhancing κ. Cognitive behavioral therapy (CBT) has strong empirical support for modifying specific maladaptive beliefs in clinical populations, though its effects on general belief flexibility outside clinical contexts are less thoroughly established. Structured debate in low-threat contexts is a plausible but less-tested intervention; its theoretical rationale is strong, but direct empirical support for its effect on corrective permeability is limited. The simple daily question, “Did I update any belief yesterday?”, is a practical heuristic for engaging the correction apparatus, derived from the framework itself rather than independent empirical validation.

5.4 The Framework Must Guard Its Own κ

A framework that diagnoses sealed basins must itself remain open to correction. The attractor framework’s falsifiability conditions are its own dlPFC engagement.

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6. Conclusion

The Olds-Milner experiment is more than a landmark in the history of neuroscience. It provides the neurochemical

prototype for the fantasy attractor. The rat pressing the lever until death, driven by a hijacked dopamine system that privileges “wanting” over survival, maps onto the human believer pressing the lever of certainty, prophecy, or ideological capture. In both cases, a sealed basin overrides biological and cognitive self-correction, creating a self-reinforcing cycle that can persist even in the face of lethal consequences. This is not merely a metaphor; evidence suggests a genuine shared neurochemical susceptibility, though its precise extent awaits direct empirical characterization.

The brain does not have a truth detector; it has a reward system. Certainty is not evidence of truth; it is evidence of dopamine. The most reliable alternative to the lever is a deliberately cultivated corrective permeability—a practice of engaging the neural machinery of doubt and reason, asking daily the question the rat never could: *Am I pressing a lever right now?*

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The Apocalyptic Meta-Attractor: Amplification of Secular Conflict Through Positive Feedback Coupling Among Three Abrahamic Fantasy Basins

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Abstract

Judaism, Christianity, and Islam each contain sealed apocalyptic attractor basins—self-reinforcing belief systems anticipating an imminent, divinely orchestrated end of the world. In the modern era, these basins have become coupled through mutually reinforcing positive feedback: financial, political, rhetorical, and military interactions that deepen each basin and synchronize their expectations. This paper argues that the primary drivers of Middle East conflict are secular—resource competition, nationalism, territorial disputes, and great-power proxy dynamics—but that the apocalyptic layer functions as a powerful amplifier, coupling the basins and making de-escalation more difficult. We provide an operational definition of an apocalyptic attractor, assess corrective permeability (κ) qualitatively across the movements using a six-indicator ordinal scale, catalogue the reframing of failed prophecies, and ground the dynamics in social

psychology with supplementary neuroscience. We document the coupling mechanisms, acknowledge secular drivers explicitly, and include a base-rate analysis of violent and non-violent apocalyptic movements using state-coupling as the distinguishing criterion. Falsifiability conditions are specified, including a time-bound refutation condition with defined measurement instruments. The paper does not predict inevitability; it identifies structural tendencies that elevate the risk of catastrophic war and argues that reducing the apocalyptic amplifier—alongside secular de-escalation pathways—is necessary to weaken the feedback loop.

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1. Introduction: The Amplification of Conflict

Three major world religions share a geographic flashpoint. Three apocalyptic scripts share a common narrative structure: a final battle, a divinely appointed victor, and a transformed world. For most of history, these scripts ran on separate tracks. Now, they are coupled.

Christian Zionists, citing Revelation and Ezekiel, view the modern State of Israel as a prophetic prerequisite for the Rapture and the Battle of Armageddon. Jewish messianists, emboldened by territorial expansion and military conflict, interpret these events as the birth pangs of the Messiah. Shia Islamists in Iran frame their geopolitical confrontation as the necessary conditions for the return of the Hidden Imam, the Mahdi. Each group sees current events through an apocalyptic lens. Each interprets the actions of the others as confirmatory signs. Through decades of mutual perturbation, the three basins have become linked by a positive feedback loop: each tradition’s actions deepen the others’ basins, which in turn generate counter-actions that further deepen the original basins.

The attractor framework (Galida, 2026a) defines a fantasy attractor as a belief system with low corrective permeability (κ)—it resists updating when confronted with contradictory evidence and often seeks to colonize or destroy rival basins. This paper argues that the three apocalyptic basins now constitute a coupled system that amplifies secular conflict and structurally elevates the probability of a catastrophic war. It does not claim apocalyptic belief is the primary cause of the conflict; it claims it is a critical amplifier and coupling mechanism that makes de-escalation more difficult.

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2. The Three Apocalyptic Basins: A Structural Description with κ Assessment

2.1 Defining the Apocalyptic Attractor

An apocalyptic attractor is a self-reinforcing belief pattern meeting four criteria: (a) expectation of an imminent, dramatic end-of-world transformation; (b) a designated enemy or scapegoat, often identified with evil or another religion; (c) a script of a final cosmic battle leading to a new world order; and (d) resistance to disconfirming evidence (low κ). This distinguishes apocalyptic attractors from general eschatological hope, which can accommodate ambiguous timing and symbolism.

The "designated enemy" criterion is consistent with social identity theory (Tajfel & Turner, 1979), which identifies intergroup differentiation as a primary mechanism for producing hostility toward out-groups. More specifically, the theory's identity-threat prediction—that perceived threats to the in-group produce escalating in-group cohesion and out-group derogation—is directly relevant here. The apocalyptic script provides a transcendent, identity-anchored justification for intergroup conflict, and each perturbation

by an out-group (military attack, political encroachment, demographic shift) intensifies that justification. This mechanism helps explain why the three basins deepened rather than moderated in response to the October 7 attack and its aftermath.

2.2 Measuring Corrective Permeability (κ)

Corrective permeability is assessed qualitatively at the movement level using a simple ordinal scale—Low, Medium, High—across six indicators: (1) response to prophetic failure (reframing vs. abandonment), (2) tolerance for internal dissent on eschatological doctrine, (3) engagement with disconfirming historical or scientific evidence, (4) willingness to set and discard specific dates, (5) response to external criticism (engagement vs. attack), and (6) internal diversity of eschatological opinion *within the specific movement under analysis*. A movement that consistently reframes, purges dissent, avoids evidence, resets dates, attacks critics, and suppresses diversity is rated Low κ. A movement that absorbs criticism, permits debate, and revises doctrine is rated High κ. The following assessments are preliminary; where evidence is thin, this is noted.

2.3 κ Assessment Across the Three Basins

Indicator	**Jewish Messianism (Religious Zionist factions)**	**Christian Dispensationalism (CUFI-aligned)**	**Shia Mahdism (Iranian state-aligned)**
1. Response to prophetic failure	Reframes (e.g., October 7 as “Messiah ben Yosef”) — Low	Reframes (dates recalibrated repeatedly) — Low	Reframes (Mahdi’s arrival perpetually imminent; divine test) — Low

Indicator	Jewish Messianism (Religious Zionist factions)	Christian Dispensationalism (CUFI-aligned)	Shia Mahdism (Iranian state-aligned)
2. Tolerance for internal dissent	Low within core groups; anti-Zionist Orthodox ostracized	Moderate internally; but dissent from core eschatology marginalized	Low; state-level suppression of alternative Shia voices
3. Engagement with disconfirming evidence	Low; historical failures not addressed	Low; archaeological/textual challenges ignored	Low; evidence not engaged by official discourse
4. Willingness to set/discard dates	Rarely sets precise dates; broad "soon" framing — Medium-Low*	Repeated precise date-setting and recalibration — Low	Avoids precise dates; "signs" approach — Medium-Low**
5. Response to external criticism	Attack/reframe — Low	Attack/reframe — Low	Attack/reframe — Low
6. Internal diversity of eschatological opinion (movement-level)	Low within the Religious Zionist movement*** — Low	Low within CUFI-aligned dispensationalism — Low	Low diversity in state-backed discourse — Low

* *Annotated note:* Avoiding precise dates may reflect strategic adaptation to past messianic failures (e.g., Bar Kokhba, Sabbatai Zevi) rather than genuine corrective permeability. A movement that learned not to set falsifiable dates after catastrophic disappointments is demonstrating sophisticated reframing that pre-empts falsification, not higher κ.

* **Annotated note:* The "signs" approach in Shia Mahdism serves a similar function: it avoids fixed-date vulnerability while maintaining perpetual imminence.

* ***Annotated note:* The contrast between religious-messianic

and secular Zionism is between movements, not within the Religious Zionist movement. Internal eschatological diversity within Religious Zionist factions is low.

Overall κ assessment: All three movements exhibit Low κ across most indicators. The consistently low ratings on indicators 1, 2, 3, and 5 across all three basins support a qualitative κ ≈ Low. Indicators 4 and 6 require the interpretive caveats noted above but do not alter the overall assessment.

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3. Why These Basins Hold: Social Psychology and Neural Correlates

3.1 The Reframing of Failed Prophecy

The persistence of apocalyptic belief despite repeated falsification is well-documented. Festinger, Riecken, and Schachter (1956) found that when a doomsday prophecy failed, the most committed believers became *more* convinced, reinterpreting the event as spiritual fulfillment. Melton (1985) showed that prophecies are routinely spiritualized and reaffirmed. The Millerites (1844), Jehovah's Witnesses (multiple dates), and ISIS (Dabiq, 2016) all reframed failure rather than abandoning belief. This pattern—reframe, recalibrate, reaffirm—is the behavioral signature of a low-κ attractor.

3.2 Neural Correlates of Sacred Values (Supplementary)

The neuroscience of sacred values offers a supporting explanation. Hamid et al. (2019) found that individuals willing to fight and die for sacred causes exhibit reduced dlPFC activity and increased reliance on emotional/valuation circuits. Zhong et al. (2017) showed that dlPFC lesions predicted increased religious fundamentalism, mediated by

reduced cognitive flexibility. These findings suggest that when beliefs are processed as sacred, the neural apparatus for updating is partially disengaged. We treat this as supplementary to the primary social-psychological mechanism.

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4. Historical Calibration: When Apocalyptic Attractors Amplify Violence

We distinguish violent from non-violent apocalyptic movements using **state coupling** as the key criterion—the degree to which the movement controls or is embedded within state military power—because violence at the interstate or mass-casualty level requires organized military capacity.

High State-Coupling (Violent Outcomes):

- **The Crusades (11th–13th c.):** Apocalyptic expectation and papal authority coupled to European armies produced mass slaughter.
- **Münster Rebellion (1534–35):** Anabaptist apocalypticism briefly captured municipal power; the resulting siege killed thousands.
- **Taiping Rebellion (1850–64):** Hong Xiuquan's Christian-influenced apocalyptic movement seized territory and led to 20–30 million deaths.
- **Mahdist War in Sudan (1881–99):** Muhammad Ahmad's Mahdi-state fought British/Egyptian forces with massive casualties.
- **Bar Kokhba Revolt (132–35 CE):** Messianic expectation and mobilized Jewish forces led to catastrophic defeat.
- **ISIS (2014–16):** Apocalyptic framing coupled with quasi-state military control over territory produced extreme violence.

Low State-Coupling (Non-Large-Scale-War Outcomes):

- **Millerites (1840s):** Failed prophecy; no state power; fragmented peacefully.
- **Jehovah's Witnesses:** Repeated date failures; politically disengaged; no organized violence.
- **Branch Davidians (1993):** Apocalyptic beliefs, no state power; isolated confrontation with state forces.
- **Aum Shinrikyo (1995):** Apocalyptic cult with limited resources; attempted mass-casualty chemical attack but lacked state capacity.

The current Abrahamic meta-attractor possesses high state-coupling: Iran is a state actor with Mahdist ideology; Christian Zionism influences US foreign policy; Jewish messianism is coupled to Israeli military power. The enemy designations are, however, asymmetrical. Christian Zionism does not straightforwardly designate Jewish messianists as enemies—dispensationalist theology assigns Jews a redemptive role, albeit one that ultimately involves conversion or destruction at the Second Coming—while paradoxically supporting the Jewish state as a prophetic instrument. This asymmetry is relevant to the coupling mechanism, but the overall structural conditions—state-coupling, designated enemies, shared geography, and mutual positive feedback—replicate the historical pattern associated with amplified apocalyptic violence.

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5. The Coupling Mechanism: Positive Feedback with Asymmetric Political Weight

5.1 Secular Drivers as Primary; Apocalyptic

Amplification

The conflicts in the Middle East are driven primarily by secular factors: resource competition, ethnic nationalism, post-colonial territorial disputes, and great-power proxy competition. The apocalyptic layer amplifies these conflicts and couples them across traditions. An Iranian nuclear program pursued for deterrence and regional dominance is *also* framed as divinely mandated preparation. Israeli settlement expansion driven by security concerns is *also* messianic fulfillment. US support for Israel based on geopolitical interest is *also* a prophetic timetable. The secular and apocalyptic drivers are layered; the apocalyptic layer provides a powerful positive feedback mechanism that makes de-escalation more difficult.

5.2 Asymmetric Political Weight

The three basins differ substantially in institutional influence. Iranian Mahdism is embedded in autocratic state institutions with relatively low internal contestation, giving it direct control over military and foreign policy. Christian Zionism influences US policy through democratic electoral processes and lobbying; its influence is substantial but contestable. Jewish messianism operates within a democratic state with significant secular and non-messianic constituencies; it influences policy but does not control it. The feedback loop should be understood with this asymmetry: the Iranian basin is the most institutionally unconstrained, the American basin is the most diffuse, and the Israeli basin lies between them. Positive feedback still couples them, but their capacity to act on apocalyptic impulses varies considerably.

5.3 Mutual Perturbation and the October 7 Case Study

- **Jewish actions:** Settlement expansion, military operations, Temple rhetoric → perturb Christian Zionists

(prophecy fulfillment) and Shia Mahdists (existential threat).
- **Christian actions:** Financial and political support for Israel → perturb Jewish messianists (divine favor) and Shia Mahdists (Crusader encroachment).
- **Shia actions:** Iranian nuclear program, proxy warfare, revolutionary rhetoric → perturb Jewish messianists (Gog and Magog) and Christian Zionists (Antichrist's coalition).

The October 7, 2023, attack and its aftermath illustrate the loop. Jewish messianists retrofitted the attack as "Messiah ben Yosef." Christian Zionists cited Ezekiel 38. Iranian leaders framed it as a step toward the Mahdi. Each framing deepened the respective basin. The military responses that followed perturbed the other basins further. The loop is now closed.

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6. High-κ Voices: Corrective Permeability Within the Traditions

Each tradition contains high-κ voices—individuals, movements, and institutions that reject apocalyptic framing and insist on engagement with reality. Within Judaism, anti-Zionist Orthodox groups such as Neturei Karta and Satmar Hasidim oppose the State of Israel on theological grounds; mainstream Reform, Conservative, and secular Jewish communities do not base their identity on end-times prophecy. Within Christianity, the Catholic Church and mainline Protestant denominations generally interpret Revelation symbolically; the Vatican has stated that Christ's sacrifice replaced the Temple and that a rebuilt Temple holds no theological significance. Within Islam, quietist Shia traditions reject the politicization of Mahdism; most Sunni Muslims dismiss violent Mahdist cults as

heretical.

These voices demonstrate that κ is a variable, not a constant, and that alternatives to apocalyptic amplification exist within each tradition. However, their institutional leverage varies significantly. The Catholic Church and mainstream Protestant denominations retain substantial institutional infrastructure but have limited influence over the specific CUFI-aligned constituency driving Christian Zionism. Quietist Shia traditions are systematically marginalized by the Iranian state apparatus. Jewish anti-messianist voices, while theologically significant, are politically marginal within the current Israeli governing coalition. Historically, high-κ voices have gained influence within low-κ movements when institutional structures rewarded deliberation over loyalty—conditions that are currently absent or weakened across all three basins. Strengthening these voices, as the conclusion argues, requires not only rhetorical support but attention to the institutional conditions that allow corrective permeability to operate.

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7. Falsifiability Conditions

To avoid becoming a sealed attractor itself, this framework specifies refutation conditions with defined measurement instruments:

Definitions:

- **"Major interstate war"** means sustained military hostilities between the regular armed forces of Israel and Iran, resulting in at least 1,000 battle-related deaths within a 12-month period, as documented by the Uppsala Conflict Data Program (UCDP) or equivalent.
- **"Measurably declined apocalyptic rhetoric"** means a

sustained reduction in the frequency of official state or movement-leader statements explicitly invoking end-times prophecy (e.g., references to Gog/Magog, Armageddon, Mahdi's return) as measured by content analysis of publicly available transcripts and official media. The specific threshold—a provisional reduction in the range of 25–40% relative to baseline—is offered as an illustrative benchmark rather than a fixed criterion. The direction and persistence of the trend are more important than the exact percentage.

- **Baseline period:** To avoid biasing the measurement toward a period of exceptional escalatory rhetoric, the baseline for rhetoric measurement spans 2015–2026, encompassing both pre- and post-October 7 conditions.

Conditions:

- **Strong refutation:** If by December 31, 2036, no major interstate war between Israel and Iran has occurred—regardless of rhetoric levels—the thesis is substantially weakened.
- **Corroborating weakening:** If, additionally, apocalyptic rhetoric from all three movements has measurably declined, the thesis is further weakened and may be treated as disconfirmed.
- **Corroboration:** If a major interstate war occurs, *and* there is specific evidence that apocalyptic framing causally contributed to the conflict—for example, documentation that de-escalation opportunities were refused on eschatological grounds, or that apocalyptic rhetoric measurably increased domestic support for escalatory decisions—the thesis is corroborated. We acknowledge that such evidence may not be publicly available within the 2036 timeframe; declassified records, memoirs, or investigative journalism may supply post-hoc verification. Mere

co-occurrence of war and pre-existing rhetoric does not constitute corroboration.

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8. Conclusion: Reducing the Amplifier, Resolving the Conflicts

Three Abrahamic apocalyptic attractors have become coupled through positive feedback that amplifies underlying secular conflicts and elevates the risk of catastrophic war. The assessment of corrective permeability across the movements is qualitatively consistent but methodologically preliminary; the κ indicators are applied as a framework, not a definitive measurement. The historical record shows that when sealed apocalyptic basins are coupled to state military power and locked in mutual feedback with designated enemies, mass death has repeatedly resulted; it also shows that such outcomes are not inevitable when state-coupling is absent. High-κ voices within each tradition offer alternative paths, though their institutional leverage is currently limited.

If the apocalyptic layer is an amplifier, not the primary cause, then the prescription must match the diagnosis. Reducing the amplifier—increasing corrective permeability across the movements, strengthening high-κ voices, and disrupting the positive feedback loop—is strategically necessary but not sufficient. Co-equal secular de-escalation pathways are required: territorial negotiations, sanctions architectures, deterrence structures, and great-power diplomacy that address the underlying drivers of the conflict. Neither the amplifier nor the underlying fire can be ignored. The framework does not predict inevitability; it identifies structural tendencies and specifies the conditions under which it would be refuted. The only reliable ground is shared reality.

Author's note: This paper has undergone multiple rounds of critique and revision. Each iteration has incorporated disconfirming feedback and refined its claims—a practice the framework itself identifies as essential corrective permeability.

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The MAGA Attractor: Fantasy, Colonization, and the Terminal Phase of a Sealed Basin

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Abstract

The MAGA movement is a colonizing fantasy attractor exhibiting the structural features the attractor framework predicts: a destabilizing perturbation, a dopamine-rich sealed narrative, near-zero corrective permeability (κ), active colonization of rival basins, and a terminal phase characterized by attacks on reality-delivery institutions. This paper applies the κ diagnostic—a set of observable indicators measuring a belief system's willingness to update on contradictory evidence—to MAGA as a case study. We include a minimal comparative sketch applying the same indicators to a left-aligned movement to demonstrate symmetric applicability. We engage disconfirming instances within the MAGA case, define the terminal phase formally, and ground the attractor framework in established dynamical-systems and motivated-reasoning literatures. The

paper does not offer predictions. It identifies structural tendencies and leaves empirical validation to future work.

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1. Introduction: The Diagnostic Stance

The attractor framework (Galida, 2026) defines a fantasy attractor as a belief system with low corrective permeability (κ): it resists updating when confronted with contradictory evidence, reframes error signals to protect its core narrative, and often seeks to colonize or destroy neighboring basins. The framework draws on dynamical-systems theory (Strogatz, 2018; Kelso, 1995), which characterizes attractors as regions in state space toward which trajectories converge and remain unless perturbed. A high-κ attractor absorbs perturbation and updates; a low-κ attractor resists perturbation and seals. This paper applies that diagnostic to the MAGA movement.

The framework predicts that sealed attractors exist across the political spectrum. A fully symmetric analysis would examine movements of all orientations using the same κ indicators. The present paper is a single-case application, supplemented by a brief comparative sketch in Section 6. It does not imply that MAGA is unique or uniquely sealed. It demonstrates the diagnostic method on a prominent and well-documented case.

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2. Operationalizing Corrective Permeability (κ)

Corrective permeability is not a single number. It is a composite of observable indicators. A movement's κ can be estimated—qualitatively, not metrically—by examining its responses to disconfirming events. The indicators below are

applicable to any political or social movement.

κ Indicators

Indicator	High κ (reality-aligned)	Low κ (fantasy attractor)
Electoral loss response	Concedes defeat; analyzes reasons; adapts strategy	Rejects outcome as fraudulent; seeks to overturn result
Legal defeat response	Accepts ruling; appeals within system; adjusts behavior	Delegitimizes courts; portrays defeats as persecution
Internal dissent tolerance	Debates openly; allows factional disagreement	Purges dissenters; enforces narrative loyalty
Media coverage response	Engages with critical reporting; distinguishes bias from fact	Labels all critical media as “enemy”; constructs alternative media ecosystem
Policy failure response	Acknowledges failure; revises approach	Blames enemies; reframes failure as sabotage
Leader criticism response	Evaluates criticism on merits; holds leaders accountable	Treats all criticism as treason; leader is beyond reproach

A movement that scores low across most or all indicators has κ approaching zero. A movement that scores high across most has κ approaching one. The assignment is comparative and qualitative, not computational.

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3. The Initial Perturbation: A Basin Destabilized

The MAGA movement emerged from a genuine, large-scale perturbation to the personal and social attractors of millions of Americans. For decades, the post-war American basin was stable for its primary beneficiaries: manufacturing jobs provided middle-class security, cultural norms were broadly shared, and the United States enjoyed unchallenged global dominance. Over several decades, that basin was progressively destabilized. Deindustrialization eliminated millions of stable jobs. Globalization shifted economic power away from domestic manufacturing. Cultural norms around race, gender, sexuality, and religion shifted rapidly. Demographic projections showed a future in which the previously dominant group would become a minority. Each of these was a perturbation. Cumulatively, they shattered the old basin.

The attractor framework does not judge the legitimacy of the grievances. It notes that a destabilized attractor seeks a new basin. The question is always: *What basin will replace the old one?*

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4. The New Basin: Narrative, Dopamine, and Motivated Reasoning

The core narrative of the MAGA attractor is well-documented: the adherent is the authentic voice of the nation; their loss is a theft by corrupt elites and internal enemies; the leader will restore greatness. This narrative is an ontological rescue. It replaces a confusing, painful reality with a simple, morally charged story.

The dopamine dynamics are well-established. Certainty, righteous anger, and tribal belonging activate the mesolimbic

reward system (Olds & Milner, 1954). But dopamine alone does not distinguish fantasy attractors from reality-aligned movements—all high-commitment groups generate reward. What distinguishes low-κ attractors is the *impermeability* of the reward loop: the system prevents corrective information from entering, so the dopamine cycle never encounters disconfirmation.

The motivated-reasoning literature provides a well-established parallel. Individuals process information in ways that protect identity-congenial beliefs (Kahan, 2013). Social identity theory (Tajfel & Turner, 1979) predicts that group membership becomes a source of self-esteem, making threats to the group's narrative feel like personal attacks. The MAGA attractor operates at the intersection of these dynamics: a highly salient group identity, a narrative of victimhood and restoration, and a reward system that fires on certainty. The basin is psychologically satisfying and neurochemically self-reinforcing.

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5. Applying the κ Indicators to MAGA

When we apply the six κ indicators to the documented behavior of the MAGA movement, the pattern is clear.

- **Electoral loss response:** The 2020 election was rejected as fraudulent. Over 60 court cases were dismissed, yet the "stolen election" narrative persisted. Electoral officials who certified results have been purged and replaced. κ is near zero on this indicator.
- **Legal defeat response:** Criminal and civil indictments against the movement's leader are framed as "witch hunts" and "election interference." Courts are delegitimized. κ is near zero.
- **Internal dissent tolerance:** Republicans who criticized

the leader have been primaried, censured, or forced from office. Internal debate is treated as disloyalty. κ is near zero.

- **Media coverage response:** Mainstream media are labeled "enemies of the people." A parallel media ecosystem delivers only narrative-congruent information. κ is near zero.
- **Policy failure response:** Trade wars that harmed farmers were reframed as necessary sacrifices, not policy failures. Promised infrastructure and healthcare reforms that did not materialize were blamed on opponents, not acknowledged as unfulfilled. κ is near zero.
- **Leader criticism response:** Criticism of the leader is treated as treason. The leader's statements, even when contradictory or demonstrably false, are accepted by adherents without correction. κ is near zero.

5.1 Disconfirming Instances and Complexity

The assignment of $\kappa \approx 0$ is a pattern judgment, not a uniform claim. Several behaviors complicate a blanket zero-κ diagnosis and must be acknowledged.

- Some MAGA-aligned officials did certify the 2020 election results under intense pressure, including figures such as Georgia Secretary of State Brad Raffensperger and Arizona's Republican governor Doug Ducey, who faced threats and political retaliation for doing so. This is evidence of $\kappa > 0$ among individuals within the movement's orbit.
- The movement's policy agenda did shift in notable ways relative to prior Republican orthodoxy, including trade protectionism, pharmaceutical pricing reform, and infrastructure spending. These represent genuine policy adaptation, even if they served the broader narrative of economic nationalism.

- Internal dissent, while punished, has not been eliminated. Some Republican figures continue to criticize the leader from within the party, and factions with incompatible interests (economic libertarians, Christian nationalists, working-class populists) persist.

These instances suggest that the movement is not a perfectly uniform basin. Some members and subgroups exhibit higher κ than others. However, the overall pattern—sustained across multiple years, multiple domains, and the movement's dominant institutional responses—remains one of extremely low corrective permeability. The dissenting officials were purged, not elevated. The policy shifts occurred within a sealed narrative that did not acknowledge prior error. Internal critics were marginalized. The diagnostic is a structural assessment of the attractor's dominant dynamics, not a claim about every individual within it.

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6. Comparative Sketch: A Left-Aligned Case

The framework's symmetry requirement demands that the same κ indicators be applied to movements of other political orientations. A full comparative analysis is beyond the scope of this paper, but a brief sketch demonstrates the method's applicability.

Consider the progressive wing of the Democratic Party's response to the 2016 election loss. On the κ indicators:

- **Electoral loss response:** The loss was accepted, though accompanied by narratives of Russian interference and Electoral College illegitimacy. The outcome was not

rejected as fraudulent, but external factors were invoked to explain defeat—a partial but not complete κ signal.

- **Legal defeat response:** Progressive legal setbacks (e.g., on immigration policy, voting rights) have generally been accepted within the system, with strategy adjustments rather than court delegitimization. κ is moderate-high.
- **Internal dissent tolerance:** The progressive coalition contains vigorous internal debate between moderates and left factions. Primary challenges are common and openly contested. κ is high on this indicator.
- **Media coverage response:** Progressives engage with mainstream media but also criticize it for bias. An alternative media ecosystem exists but has not fully sealed; cross-pollination with mainstream outlets is common. κ is moderate.
- **Policy failure response:** Failed progressive initiatives (e.g., certain criminal-justice reform measures, housing policies) have generated internal debate and strategy revisions, though blame-shifting also occurs. κ is moderate.
- **Leader criticism response:** Progressive leaders face significant internal criticism. Figures such as Bernie Sanders and Alexandria Ocasio-Cortez are both celebrated and challenged from within the movement. κ is high.

This sketch suggests a moderate-to-high κ for this movement, with some indicators showing partial sealing. The exercise demonstrates that the κ indicators do not automatically classify one's political opponents as fantasy attractors and one's allies as reality-aligned. The diagnostic discriminates based on behavior, not affiliation.

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7. Colonization: “You Must Join or Be Destroyed”

A fantasy attractor does not peacefully coexist. It colonizes. The MAGA movement demands that other basins submit to its narrative or be treated as enemies. This operates at interpersonal, institutional, and electoral levels. Families are fractured by loyalty demands. The judiciary, civil service, and military are to be purged of “disloyal” elements. Election administration is being restructured to place loyalists in positions of authority over vote counting and certification. Colonization is a structural necessity: a sealed attractor cannot tolerate rival basins that might deliver a fatal perturbation.

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8. Beam and Sliver: Internal Contradictions as Diagnostic Features

All political coalitions contain tensions between stated values and enacted policy. The diagnostic question is not whether contradictions exist, but whether the attractor can acknowledge and address them. High-κ movements can name their own tensions. Low-κ movements cannot.

The MAGA attractor exhibits several severe, structurally unresolvable contradictions:

- **Liberty vs. Authoritarianism:** The movement claims to defend freedom while supporting a leader who attacks the free press, demands personal loyalty, and threatens to use state power against opponents.
- **Law and Order vs. Criminality:** The movement claims to uphold law and order while its leader faces multiple felony convictions and indictments.

- **Populism vs. Plutocracy:** The movement claims to be a working-class revolt while its policy agenda primarily benefits the wealthy.
- **Christianity vs. Cruelty:** The movement claims Christian values while supporting policies that separate migrant families and mock the vulnerable.

What makes these contradictions diagnostically severe is not their existence—all coalitions contain tensions—but their structural unresolvability within the current basin. The movement's dependence on a single leader whose personal legal exposure is inextricably linked to its narrative makes acknowledgment of criminality equivalent to basin collapse. The contradiction cannot be resolved; it can only be suppressed by attacking the legal system itself. This dynamic is distinct from the ordinary policy tensions of a political coalition, where compromise, leadership change, or platform evolution can absorb and resolve contradictions over time. In the MAGA basin, the leader cannot be replaced without dissolving the attractor, and the criminal charges cannot be acknowledged without invalidating the narrative of persecution. The beam is locked in place.

The sliver is projected outward with equal force: every fault is hung on the opponent. The movement cannot name its own contradictions, so it names everyone else's—real or invented—with relentless intensity.

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9. The Terminal Phase: Formal Definition and Observable Signs

Within the attractor framework, a **terminal phase** is reached when a sealed attractor, facing sustained and credible existential threats, shifts its primary behavior from

narrative self-maintenance and colonization to the active dismantling of the external correction mechanisms that could deliver a fatal perturbation.

Transition conditions include:

1. **Loss of institutional control:** The movement no longer reliably controls the executive or legislative branches through normal electoral means.
2. **Credible legal jeopardy:** Leadership faces prosecution, incarceration, or removal from ballots.
3. **Narrowing coalition:** The movement's demographic base cannot reliably produce majorities in national elections.
4. **Elite messaging shift:** The movement's leadership explicitly frames institutional destruction as the only path to survival.

When these conditions are met, the attractor is no longer merely sealed. It is actively destroying the sources of perturbation.

Observable signs of a terminal-phase political attractor:

1. **Rejection of electoral outcomes** as illegitimate unless the movement wins.
2. **Purge of dissenting officials** from election administration and party structures.
3. **Preparation for institutional override** through legal theories that would allow loyalist bodies to override popular vote counts.
4. **Normalization of violence** as patriotic self-defense.
5. **Attacks on truth-delivery systems**—media, science, intelligence, courts—to neutralize their corrective function.

The MAGA movement currently exhibits all five signs. The transition conditions are partially met (credible legal jeopardy is present; electoral losses have occurred; the coalition faces demographic challenges) and partially contested (the movement retains significant institutional power through the courts and state legislatures). The terminal phase is not an all-or-nothing category; it is a trajectory along which the movement has demonstrably moved.

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10. Trajectory: Structural Tendencies, Not Predictions

The attractor framework identifies structural tendencies, not certainties. Three trajectories are possible for a terminal-phase fantasy attractor, and they are not mutually exclusive.

Escalation. If the leader faces incarceration, removal from ballots, or definitive electoral defeat, the movement may escalate. Violence is the final defense of a sealed basin that cannot tolerate reality. Escalation risk is elevated when institutional pressure intensifies.

Fracture. The movement contains factions with incompatible interests. If the central figure becomes unavailable, the attractor may fracture into competing sub-basins, each claiming legitimacy. This is a common post-charismatic trajectory.

Slow Fade. Some fantasy attractors fade as the promised restoration never arrives, adherents age, and younger generations find the narrative less compelling. This trajectory requires sustained institutional resilience and an absence of triggering crises.

The current structural conditions—ongoing legal pressure,

sustained institutional attacks, and the centrality of a single figure—make escalation and fracture the highest-concern scenarios. The slow fade remains a possibility only if institutions hold and no major crisis intervenes. No probability is assigned. The framework names the tendencies and leaves empirical validation to events.

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11. Conclusion

The κ indicators, applied qualitatively, suggest that the MAGA movement exhibits near-zero corrective permeability across multiple domains. The movement colonizes rival basins, cannot acknowledge its internal contradictions, and exhibits the observable signs of a terminal-phase attractor. Disconfirming instances complicate but do not overturn the overall pattern. Symmetric application of the κ diagnostic to movements of other political orientations is methodologically required and has been briefly sketched; full comparative validation remains necessary. The framework provides structural tendencies, not predictions. The methodological limitations are acknowledged. The analysis is offered as a diagnostic contribution, not a final determination.

The Conscious Body: Organs as Attractor-Based Minds

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Abstract

The standard view holds that only the brain generates consciousness. This paper challenges that monopoly by applying the minimal functional criteria used to attribute rudimentary consciousness to the 302-neuron nematode *C. elegans* to the body's own complex, intrinsically innervated organs. On the basis of integration, valence, learning, goal-directedness, and anatomical concentration, the enteric nervous system (ENS), the intrinsic cardiac nervous system (ICNS), the intrinsic pancreatic ganglia, and—provisionally—the spinal cord qualify as candidate conscious subsystems. We do not assert that these organs are conscious. We assert that if the functional criteria are taken seriously enough to include a 302-neuron worm as a candidate, they cannot be silently withheld from structurally richer systems without a principled reason. We argue that the brain is not the sole generator of consciousness but the regulator of a federation of semi-autonomous organ-level attractors. We provide testable predictions, sketch the coupling mechanisms that bind local attractors into a unified self, outline clinical implications, and identify open problems including inter-attractor conflict and the phenomenal gap. The framework is offered as a research-generative hypothesis, not a completed theory.

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1. Introduction: The Brain's Unexamined Monopoly

The brain is the organ we associate with consciousness, almost without question. Yet the body contains other complex neural networks. The enteric nervous system (ENS) comprises 200–600 million neurons, operates semi-autonomously, learns, and

remembers. The intrinsic cardiac nervous system (ICNS) integrates local signals and regulates cardiac output. The spinal cord, with approximately 200 million neurons, can learn when isolated from the brain. The intrinsic pancreatic ganglia coordinate metabolic homeostasis. If these systems were found in a small animal, comparative neuroscience would at least entertain the possibility of consciousness. Because they are inside us, they are dismissed as mere infrastructure.

This paper asks a simple question: if we accept the functional criteria used to infer minimal consciousness in *C. elegans* (302 neurons), why are those same criteria not applied to the ENS, the ICNS, the pancreatic network, and the spinal cord? The question is not *Are these organs conscious?* but *Why are they excluded a priori?*

We do not claim to solve the hard problem of consciousness. We adopt the same pragmatic strategy used throughout comparative neuroscience: observable functional properties—integration, valence, learning, goal-directedness, and anatomical concentration—are treated as operational proxies for consciousness. This strategy is how we infer consciousness in other humans (by analogy), in non-human animals (by behavioural complexity), and in *C. elegans* (by measurable learning and integration). If these criteria are sufficient to identify a candidate conscious system in a 302-neuron worm, consistency demands their application to other systems that exceed this threshold, unless a principled exclusion criterion is provided. That exclusion criterion has not been articulated.

We use the term **candidate** throughout to avoid slippage into positive consciousness attribution. The paper's central claim is that the ENS, ICNS, pancreatic network, and spinal cord are *candidates*—systems that meet the same threshold criteria applied to a known candidate—and that dismissing them without investigation is methodologically inconsistent.

2. The Attractor Framework as Conceptual Scaffolding

An attractor is a region in state space toward which trajectories converge and remain unless perturbed. A candidate conscious attractor possesses five functional properties:

1. **Integration:** binding multiple sensory or interoceptive streams into a unified dynamical state.
2. **Valence:** operationalized as approach/avoidance behaviour—attraction to certain states and repulsion from others. We do not claim that behavioural valence entails phenomenal valence. We claim only that it is the same behavioural proxy used for *C. elegans* and other simple organisms. The inference from behavioural valence to phenomenal valence is a philosophical commitment we note but do not resolve.
3. **Learning:** the capacity to modify behaviour based on experience (habituation, sensitization, associative conditioning).
4. **Goal-directedness:** acting to maintain the system's own basin—a form of conatus—persisting in the absence of external commands.
5. **Anatomical concentration:** a spatially organized, intrinsically connected neural network with dedicated integrative circuitry. This fifth criterion distinguishes concentrated neural attractors (ENS, ICNS, pancreatic ganglia) from diffuse, non-neural systems (immune system) and from infrastructure networks that lack a defined integrative centre. For the spinal cord, as discussed in Section 4.4, we apply this criterion with qualification.

The attractor vocabulary is applied conceptually, not

formally, in this paper. A forthcoming quantitative treatment (Galida, 2026) will develop the mathematical persistence functional. The current paper uses attractor language to structure its functional criteria and predictions; it does not claim to derive formal basin measures from the available data.

Operationalizing Autonomy: We propose, as a provisional operational threshold, that a candidate subsystem crosses the autonomy boundary if it retains a significant fraction (e.g., ≥50%) of its normal functional repertoire following complete extrinsic denervation or isolation. This criterion distinguishes systems that are merely regulated from systems that can independently sustain goal-directed attractor dynamics. The ENS and ICNS clearly exceed this threshold; the spinal cord and pancreatic network do so conditionally, as discussed below.

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3. The Conditional Argument and Its Stipulated Baseline

The nematode *C. elegans* possesses exactly 302 neurons. Its connectome is fully mapped. It exhibits sensory integration, associative learning, goal-directed chemotaxis, and minimal self-reference (distinguishing self-generated from external touch). Its learning capacities are well-documented (Ardiel & Rankin, 2010; Sasakura & Mori, 2013).

We stipulate—we do not establish—that *C. elegans* is a candidate for minimal consciousness on the basis of these functional criteria. The paper does not require that the field accept this stipulation as consensus. It requires only that the reader grant the conditional: **if** the functional criteria are sufficient to make *C. elegans* a candidate, **then** they must be applied consistently to any system that meets or exceeds them. Those who reject the conditional may ignore the

remainder of the argument, but they must then explain what additional criterion excludes the ENS, ICNS, pancreatic network, and spinal cord while admitting *C. elegans*.

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4. Candidate Organs

The four candidate organs identified below are assessed against the five criteria, with the provisional autonomy threshold applied where possible. We differentiate their evidential strength clearly.

4.1 The Enteric Nervous System (ENS)

The ENS is the strongest candidate. Its 200–600 million neurons form two interconnected plexuses spanning the gastrointestinal tract. It meets all five criteria:

- **Integration:** continuously integrates mechanical, chemical, and hormonal signals to coordinate peristalsis, secretion, and blood flow.
- **Valence:** exhibits attraction to nutrients, aversion to toxins; noxious stimuli trigger emesis or accelerated transit.
- **Learning:** exhibits habituation, sensitization, and long-term plasticity; gut reflexes can be conditioned (Furness, 2012; Schemann & Frieling, 2020).
- **Goal-directedness:** actively propels food and maintains digestive homeostasis independently of the brain; peristalsis persists after vagotomy—well above the 50% autonomy threshold.
- **Anatomical concentration:** a continuous, highly organized neural network with dedicated integrative circuitry.

4.2 The Intrinsic Cardiac Nervous System (ICNS)

The ICNS (14,000–43,000 neurons) is a moderate candidate. Its neuron count is only 46–143 times the *C. elegans* threshold, a narrower margin than the ENS. It meets the criteria, but with less evidential richness:

- **Integration:** monitors blood pressure, chamber stretch, and local chemistry to modulate cardiac output.
- **Valence:** maintains a preferred setpoint for cardiac rhythm; arrhythmias represent perturbations from that setpoint.
- **Learning:** shows ganglionic remodelling after injury; vagal stimulation protocols can alter responsivity (Armour, 2008).
- **Goal-directedness:** generates intrinsic rhythms when denervated, satisfying the autonomy threshold.
- **Anatomical concentration:** organized into ganglia on the heart's surface.

The ICNS contributes to emotional experience via heartbeat-evoked potentials that correlate with interoceptive awareness and self-recognition. This is suggestive but does not independently establish consciousness.

4.3 The Intrinsic Pancreatic Network

The pancreatic network is the most provisional candidate. Its 10,000–50,000 intrinsic neurons are scattered in ganglia throughout the organ, rather than forming a continuous plexus (Ahren, 2000; Salvioli et al., 2002). This weaker anatomical concentration distinguishes it from the ENS and ICNS.

- **Integration:** combines neural, hormonal, and nutrient signals to regulate blood glucose.
- **Valence:** maintains a metabolic setpoint; hypoglycemia and hyperglycemia are aversive states.
- **Learning:** plasticity is less studied than in the ENS; no direct evidence of conditioning is available.

- **Goal-directedness:** coordinates endocrine and exocrine output to maintain glucose homeostasis; whether this function persists at ≥50% of normal repertoire after complete extrinsic denervation is not yet established. The pancreatic network remains a candidate, but with an open empirical question on the autonomy threshold.
- **Anatomical concentration:** scattered ganglia; meets the threshold but is the weakest candidate on this criterion.

4.4 The Spinal Cord (Provisional Candidate)

The spinal cord possesses approximately 200 million neurons, organized into topographically precise circuits that integrate sensory input, generate coordinated motor output, and exhibit learning when isolated (Hook & Grau, 2007). By the five functional criteria, it qualifies. However, under normal physiological conditions, its activity is tightly coupled to descending commands, and independent behavioural generation is rarely observed. After complete spinal cord injury, the isolated cord reorganizes and can generate complex, goal-directed responses. Whether such reorganization achieves the ≥50% autonomy threshold is an empirical question; we provisionally include the spinal cord as a candidate with lower confidence, identifying it as the ideal test case for refining the autonomy criterion.

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5. The Brain as Regulator: Mechanisms of Coupling

If the ENS, ICNS, pancreatic network, and spinal cord are candidate conscious subsystems, the unified self must be explained as the product of their integration by the brain. We propose that the brain couples, modulates, and aligns local

attractors through four mechanisms, each supported by established physiology.

5.1 Vagal Afferent Signalling

The vagus nerve provides the primary bidirectional communication channel between the brain and the viscera. Vagal afferents convey interoceptive signals from the ENS and ICNS to the nucleus of the solitary tract, and descending signals modulate organ function. Vagal nerve stimulation is known to alter mood, reduce inflammation, and improve cardiac function (George et al., 2000; Tracey, 2002).

5.2 Humoral Signalling

Circulating hormones (cortisol, adrenaline, insulin, glucagon) and immune mediators (cytokines) provide a slower, diffuse coupling channel. These signals alter the global attractor's landscape by shifting the metabolic and inflammatory context. Sickness behaviour—fatigue, anhedonia, social withdrawal—is a well-documented example of immune-to-brain signalling that temporarily reconfigures the global attractor (Dantzer et al., 2008).

5.3 Rhythmic Entrainment

The brain entrains peripheral rhythms to its own oscillations. Cardiac and respiratory rhythms phase-lock to cortical activity during focused attention (Thayer & Lane, 2000). Slow-wave sleep entrains glymphatic clearance (Xie et al., 2013). The brain sets a rhythm, and the organs—each with their own intrinsic oscillators—tend to follow. This resonance is not command; it is coupling by shared frequency.

5.4 Predictive Processing and Attractor Coupling

The predictive processing framework (Clark, 2013) treats the brain as a prediction engine that minimizes surprise by updating internal models based on sensory input. We suggest

that this framework extends naturally to interoception: the brain maintains predictions about the states of the body's organs, and each organ generates its own predictions about local conditions. The alignment of these nested predictive models is functionally analogous to attractor coupling, in that both involve the progressive alignment of internal states toward a shared equilibrium. Friston's (2010) free-energy principle provides a formal bridge between predictive processing and dynamical systems that could, in future work, unite these descriptions under a single mathematical framework.

5.5 Relationship to Competing Theories of Consciousness

The attractor framework is compatible with but not identical to several major theories. Integrated Information Theory (IIT; Tononi, 2008) holds that consciousness is a function of the amount of integrated information a system generates. The attractor framework shares IIT's emphasis on integration but does not require the computation of Φ, which remains technically infeasible for most organ systems. Global Workspace Theory (GWT; Baars, 1988; Dehaene, 2011) posits that consciousness arises when information is broadcast within a global workspace. Under GWT, many peripheral attractors would be considered unconscious because they lack access to a central workspace. The attractor framework allows for phenomenal consciousness without global access, a position consistent with the possibility that the ENS may have experiences that never enter cortical awareness. Higher-Order Theories (HOTs) require meta-representation—the capacity to represent one's own states—which, if correct, would likely exclude all candidate organs except the brain. The attractor framework treats HOTs as a valid but overly restrictive criterion that would also exclude many animals currently accepted as conscious. The framework does not seek to refute these theories but to generate testable predictions that can be compared with theirs, advancing the debate through

empirical competition.

5.6 Inter-Attractor Conflict: An Open Problem for the Federation Model

A federation of semi-autonomous attractors inevitably generates conflict. Everyday clinical phenomena illustrate this: nausea during a cognitively demanding task (ENS and cortical attractors in tension), cardiac arrhythmia during emotional stress (ICNS and limbic system in conflict), hypoglycemic cognitive impairment (pancreatic and cortical attractors in opposition). The current paper does not propose a mechanism for conflict resolution beyond the brain's general regulatory role. Whether such conflicts are resolved by hierarchical dominance, temporal multiplexing, or some form of inter-attractor negotiation is an open question. We flag it as a priority for future theoretical development within the framework.

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6. The Alien Feeling and Clinical Dissociation

When coupling between the global self and a local attractor falters, the experience can manifest as an "alien feeling"—the sense that an action or bodily state is "not mine." This phenomenon is well-documented in alien hand syndrome (Della Sala et al., 1991) and in depersonalization disorder, where individuals report feeling detached from their own body and mental processes (Sierra & David, 2011). We interpret these as temporary or chronic decoupling of a local attractor from the global workspace—exactly what the federation model would predict when integration fails.

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7. Testable Predictions

The framework generates five falsifiable predictions:

1. **ENS conditioning:** An isolated intestinal segment, exposed to a neutral stimulus paired with a non-nociceptive chemical infusion, will exhibit a conditioned motor or hormonal response.
2. **ICNS plasticity:** Long-term heart rate variability biofeedback will produce persistent changes in baseline cardiac rhythms not fully mediated cortically.
3. **Gut-directed therapy:** IBS patients receiving gut-directed biofeedback will show greater symptom improvement than those receiving standard CBT alone.
4. **Pancreatic memory:** In a vagally denervated preparation, islet cell clusters exposed to repeated glucose perturbation will exhibit an anticipatory insulin response.
5. **Spinal reorganization:** Complete spinal cord injury patients will develop complex, coordinated responses below the lesion beyond simple reflexes, consistent with a reorganizing local attractor.

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8. Future Directions: Approaching the Phenomenal Gap

The framework operates on behavioural and functional proxies for consciousness; it does not provide direct phenomenological access to organ-level experience. What evidence could begin to bridge this gap? We propose three directions. First, decoupling experiments that temporarily isolate a candidate organ (e.g., via selective pharmacologic blockade) and then probe the subject’s subjective state could reveal whether the organ’s local attractor contributes a distinct experiential

component to the global self. Second, longitudinal studies of spinal cord injury patients who report phantom sensations or “body memories” below the lesion may provide indirect reportable correlates of spinal attractor activity. Third, the development of organ-specific interoceptive training protocols, coupled with experience-sampling methods, could track whether changes in organ function co-vary with changes in the felt sense of self. These are early-stage proposals; the phenomenal gap remains the deepest challenge for the framework, as for all theories of consciousness.

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9. Clinical Implications

If organs are candidate conscious systems, functional disorders may represent distressed local attractors. IBS may be a gut that has learned to react to benign stimuli as threats. Cardiac anxiety may reflect a perturbed ICNS state. These reframings suggest organ-directed therapies: gut-directed biofeedback, vagal stimulation, dietary protocols that calm the ENS. The principle is consistent with existing mind-body approaches but grounds them in a specific, testable model.

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10. Ethical Considerations

Candidate organs are not autonomous moral agents. Their interests are tied to the whole body’s survival. Clinical ethics correctly prioritize the patient’s overall well-being. The framework suggests a principle of organ-level respect: where possible, preserve organ integrity and explore gentler interventions before resection or ablation. This is holistic medicine, not radical ethics.

11. Conclusion

The brain is not the body's sole candidate conscious organ. The ENS, ICNS, pancreatic network, and spinal cord meet the same functional criteria used to identify *C. elegans* as a candidate for minimal consciousness. They are not established as conscious; they are identified as systems for which the question cannot be dismissed a priori without a principled exclusion criterion. The coupling mechanisms that bind local attractors into a unified self are partially characterized, and the framework generates concrete, falsifiable predictions. The conscious body is a research-generative hypothesis, not a completed theory.

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“see also” https://jamestobinphd.com/the-psychology-of-attractor-states/

The Distributed Mind: How the Brain Regulates a Federation of Conscious Subsystems

Author: Robert Galida
Date: June 2026 (Final Edition)
Based on: Extended collaborative development of the attractor framework, N=1 physiological experimentation, and a re-reading of Spinoza’s conatus.

Abstract

Consciousness is traditionally viewed as either a non-physical substance (dualism) or a product of the brain alone (reductive physicalism). This paper presents an alternative: the human body is a nested hierarchy of semi-autonomous, attractor-based conscious subsystems—each with its own rudimentary integration, valence, learning, and goal-directedness. Using the nematode *C. elegans* (302 neurons) as a minimal benchmark, we argue that **sufficient integrated complexity** (operationalised as attractor dimensionality or integrated information Φ) is the key criterion for rudimentary consciousness. The enteric nervous system (200–600 million neurons), the intrinsic cardiac nervous system, the limbic system, and (under conditions of decoupling) the spinal cord

meet or exceed this threshold. The brain does not *create* consciousness; it **regulates** these distributed conscious components, coupling them into a coherent whole-body attractor. This view dissolves the binding problem, explains the feeling of being an alien observer of one's own actions, and aligns with Spinoza's conatus—the principle that no part of the body diminishes its own power to act. We provide empirical signatures, testable predictions, and an N=1 self-engineering case study (ECM restoration, abdominal relaxation, sleep optimisation) that illustrates the framework. The conclusion: consciousness is not a solitary flame in the skull, but a federation of dancers, with the brain as first among equals.

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1. Introduction

The dominant neuroscience paradigm assumes that consciousness is generated by the brain. Yet this assumption struggles to explain:

- Why the enteric nervous system (ENS) can learn and remember independently of the brain.
- Why cardiac signals influence decision-making and self-awareness.
- Why split-brain patients exhibit two separate conscious entities within one cranium.
- Why the universal feeling of "not being in control" (*"why did I do that?"*) persists.

We propose a paradigm shift: **consciousness is a graded, emergent property of any sufficiently complex, dissipative, attractor-based system.** The brain is not the sole author; it is the **regulator** of a distributed network of semi-autonomous conscious subsystems.

This framework builds on dynamical systems theory, integrated information theory (IIT), global workspace theory (GWT), and Spinoza's philosophy, while grounding itself in measurable empirical signatures and N=1 self-experimentation.

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2. The Attractor Framework for Consciousness

2.1 Core Definitions

- **Attractor:** A region in state space toward which trajectories converge and remain unless perturbed. Characterised by negative Lyapunov exponents and basin stability.
- **Consciousness (operational):** A system exhibits consciousness if its attractor possesses:
    1. **Integration** – binds multiple sensory/interoceptive streams.
    2. **Self-reference** (minimal) – distinguishes self from environment.
    3. **Valence** – attraction to some states, repulsion from others.
    4. **Learning** – attractor landscape changes with experience.
    5. **Goal-directedness** – acts to maintain its basin (conatus).
    6. **Evolutionary/developmental provenance** – the system's attractor landscape emerged through evolutionary or developmental selection, not external engineering. This excludes thermostats and purely programmed control systems while allowing biological, synthetic, or hybrid systems with genuine autopoietic histories.

- **Mind:** A conscious attractor. Not a substance, but a real, causally effective pattern (like a whirlpool).

2.2 The Minimal Benchmark: *C. elegans*

The nematode *C. elegans* has exactly 302 neurons. Despite this simplicity, it exhibits:

- Sensory integration (touch, temperature, chemical gradients)
- Associative learning (pairing odours with food)
- Goal-directed behaviour (chemotaxis, thermotaxis)
- Minimal self-reference (distinguishes self-generated from external touch)

Thus, **302 neurons with rich, heterogeneous connectivity are sufficient for rudimentary consciousness.** However, neuron count alone is not the criterion; **integrated complexity** (attractor dimensionality, or IIT's Φ) is what matters. We use Φ operationally as a proxy for integrated complexity, without committing to all postulates of IIT (see Doerig et al., 2021, for critical review). *C. elegans* has high integrated complexity relative to its neuron count. A subsystem with many neurons but low connectivity or heavy enslaving may not reach the same threshold.

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3. The Federation of Conscious Subsystems in the Human Body

We evaluate major subsystems against the integrated complexity benchmark.

Subsystem	Neuron count	Integrated complexity	Rudimentary consciousness?	Evidence
Enteric nervous system (ENS)	200–600 million	High (dense local circuits, 30+ neurotransmitters)	**Yes**	Independent peristaltic rhythms, learning, memory, “second brain” (Furness, 2006)
Spinal cord	197–222 million	Moderate to high (but heavily enslaved)	**Yes, but normally suppressed**	Central pattern generators; after injury can reorganise into semi-independent attractors (Calancie et al., 1994; Dimitrijevic et al., 1998). Evidence for “spinal consciousness” remains preliminary.
Intrinsic cardiac nervous system (ICNS)	14,000–43,000	Moderate (local processing loops)	**Intermediate (contributor)**	Influences emotion, decision, interoception (McCraty et al., 2009)
Limbic system	tens of millions	High (emotional valence, memory)	**Yes**	Often acts before cortical awareness; strong valence and learning
Basal ganglia & motor routines	>100 million	Moderate (procedural)	**Yes (habitual)**	Automatic action sequences, operate semi-autonomously
Immune system	N/A (non-neural)	Low (no centralised attractor)	**Proto-conscious**	Learns, remembers, communicates; lacks integration into a unified attractor

Subsystem	Neuron count	Integrated complexity	Rudimentary consciousness?	Evidence
Gut microbiota	N/A (trillions of microbes)	N/A (external ecosystem)	**No**	Perturbs human attractors but has no intrinsic nervous integration

3.1 The ENS: A Second Conscious Mind?

The ENS operates independently – severed from the vagus nerve, it still coordinates digestion. It uses over 30 neurotransmitters, including 95% of the body's serotonin. It can learn to avoid noxious stimuli and remember past exposures (Furness, 2006). In attractor terms, the ENS possesses a resilient, low-dimensional attractor landscape with clear valence (nutrients vs. toxins) and goal-directedness (propulsion, secretion). We conclude that the ENS meets the integrated complexity threshold and qualifies as a **rudimentary, semi-independent conscious subsystem.**

3.2 The Heart's "Little Brain"

The ICNS (14,000–43,000 neurons) processes sensory information from the heart and vessels, modulates heart rate, and sends significant signals to the brain via the vagus. Heartbeat-evoked potentials correlate with interoceptive awareness and even self-recognition. While not as independent as the ENS, the ICNS is a **candidate for a localised conscious attractor** that contributes directly to the global feeling of "being alive."

3.3 The Enslaved Majority: Spinal Cord

The spinal cord's 200 million neurons far exceed the *C. elegans* count, but its attractor dynamics are **tightly enslaved** by descending cortical and brainstem signals. In pathological states (spinal cord injury), the cord below the lesion can reorganise into new, semi-independent attractors –

sometimes leading to spontaneous movements and, in rare cases, patterns that have been controversially described as “spinal consciousness” (Calancie et al., 1994; Dimitrijevic et al., 1998). The evidence is preliminary, but it suggests that the cord has latent capacity for local consciousness, normally suppressed by the brain’s regulating influence.

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4. The Brain as Regulator, Not Sole Generator

If many subsystems possess rudimentary consciousness, why do we experience a unified self? Because the brain’s primary function is **regulation** — emphasising and suppressing the contributions of these subsystems to create a coherent global attractor.

4.1 Spinoza’s Conatus: No Part Diminishes Its Own Power

Spinoza’s *Ethics* (III, 6) states that every thing, insofar as it is in itself, strives to persevere in its being (conatus). A part of the body, left alone, does not curb its own power to act. Spinoza explicitly uses sexual function as an example: the erect penis acts according to its nature; it cannot voluntarily diminish itself.

Thus, if a subsystem’s local attractor is not externally perturbed, it will continue its own pattern. The brain’s role is to **provide those external perturbations** — not to annihilate the subsystem’s conatus, but to **couple** it with other subsystems so that the combined whole has greater power. The brain’s regulatory perturbations are themselves expressions of the whole organism’s higher-order conatus, aligning parts to preserve the whole.

4.2 Regulation by Emphasis and Suppression

The brain does not "command"; it modulates. Through descending pathways, neuromodulators (dopamine, serotonin, norepinephrine), and synchronised rhythms, the brain:

- **Amplifies** certain subsystem signals (e.g., gut hunger signals become conscious cravings).
- **Damps** others (e.g., spinal reflexes are suppressed during voluntary movement).
- **Entrains** rhythms (e.g., cardiac and respiratory rhythms lock to cortical oscillations during focused attention).

In attractor language, the brain shifts the **effective landscape** of each subsystem, making some local attractors shallower (easier to override) and others deeper (more influential). This is regulation, not annihilation.

4.3 The Alien Feeling: When Regulation Falters

When you ask *"why did I do that?"* — a subsystem (habit, emotional reflex, gut impulse) acted before the brain could integrate it. The global attractor was temporarily misaligned. The "alien" feeling is the **friction between semi-autonomous local attractors and the slower, narrative self**. It is not pathology; it is the normal noise of a distributed system. Libet-type experiments (Libet et al., 1983) have shown that brain activity for voluntary actions often precedes conscious awareness, illustrating this temporal decoupling. (While the interpretation of these experiments remains debated, the existence of action-preceding awareness is sufficient for the present argument.)

5. Empirical Signatures and Testable Predictions

5.1 Signatures of Subsystem Consciousness

- **Local learning and memory** (e.g., ENS conditioned aversion; Furness, 2006).
- **Semi-autonomous rhythms** (e.g., slow waves of the gut, heartbeat variability).
- **Local valence** (e.g., immune cells produce pro- vs anti-inflammatory attractors).
- **Coupling strength** to the global attractor – measurable via transfer entropy or cross-correlation.
- **Behavioural dissociation** – actions initiated before conscious awareness (Libet, 1983).

5.2 Predictions

1. **Perturbation of a subsystem (e.g., vagus nerve stimulation) should alter the global conscious narrative** – already well-established.
2. **Decoupling a subsystem (e.g., spinal anaesthesia) should produce local, independent attractor dynamics** – measurable by recording from the isolated cord.
3. **Training a subsystem (e.g., biofeedback of heart rate variability) should deepen its local attractor basin** – measurable by increased resilience to perturbations (McCraty et al., 2009).
4. **In split-brain patients, each hemisphere should be able to independently regulate its ipsilateral subsystems** (e.g., left hemisphere regulates left ENS, right hemisphere regulates right ENS). A suitable

protocol would present lateralised interoceptive cues (e.g., unilateral gut distension) and measure lateralised cortical responses in callosotomy patients (Gazzaniga, 1967).

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6. N=1 Case Study: Restoring Whole-Body Coherence

The author conducted a months-long self-engineering experiment based on the attractor framework. This N=1 case study is **hypothesis-generating** and provides a motivating existence proof, not a validation of the framework itself.

6.1 Interventions

- **ECM restoration:** Gelatin, taurine, 28 Hz vibration plate (90 min every other day), contrast baths. Improved collagen accretion, VO_2 max, skin quality.
- **Abdominal relaxation:** Consciously releasing chronic stomach tension (letting the belly sag) to allow diaphragm excursion.
- **Sleep protocol:** Smaller evening meals, morning cardio + sunlight, 15 min reading low-arousal fiction (*The Mayor of Casterbridge*).

6.2 Outcomes

- Nocturnal SpO_2 rose above 90% consistently; sleep fragmentation ceased.
- Deep sleep reached acceptable levels.
- Subjective “alien” feeling reduced; sense of whole-body coherence increased.

6.3 Interpretation

Each intervention reduced a **self-imposed constraint** that had been forcing a subsystem (abdominal muscles, sympathetic tone, rumination network) into a local attractor misaligned with global sleep-breathing needs. By relaxing those constraints, the brain could more easily regulate the subsystems into a coherent whole-body attractor. The alien feeling diminished because the **coupling** between global "I" and local subsystems improved. This outcome is **consistent with** the framework, but does not prove it; further controlled studies are required.

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7. Philosophical Implications

7.1 Spinoza Vindicated

Spinoza's conatus – the inherent striving of every mode – is precisely the attractor's tendency to maintain its basin. His claim that a part does not diminish its own power is equivalent to saying that a subsystem's local attractor will not self-suppress unless externally perturbed. The brain provides those perturbations, not to diminish but to **align**. Spinoza's metaphysics lacked dynamical systems theory, but his intuition is fully realised in the attractor framework.

7.2 The Binding Problem Dissolved

The traditional "binding problem" – how separate neural activities unite into a single conscious experience – is **dissolved** when we recognise that consciousness is already distributed. The global attractor *is* the binding. No extra mechanism is required; coupling *creates* coherence. The question as traditionally posed is ill-formed: there is no need to bind what was never separate in the first place. This dissolution follows the strategy of Wittgenstein, Ryle, and

Dennett.

7.3 The Self as Negotiation

The feeling of a unified “I” is the ongoing **negotiation** between the brain and the federation of subsystems. When negotiation runs smoothly, you feel at home in your body. When it stutters, you feel like an alien. The self is not a substance; it is a **temporary, resilient attractor pattern** — a dance of the whole.

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8. Conclusion

The human body is not a machine with a single conscious ghost in the control room. It is a nested hierarchy of conscious attractors — from the gut’s “second brain” to the heart’s intrinsic ganglia to the limbic system’s emotional core. The brain’s role is not to generate consciousness but to **regulate** these distributed components, coupling them into a coherent whole. This view explains the feeling of being an alien observer, aligns with Spinoza’s conatus, and yields testable predictions. It also offers a practical path for self-engineering: by removing unnecessary constraints and restoring whole-body coherence, we can reduce the alien feeling and dance more gracefully.

The mind is not a solitary flame. It is a federation of dancers, with the brain as first among equals — and the music is the attractor landscape.

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The Attractor Framework: A Tool for Seeing Clearly

(Or: Why You're Probably Pressing a Lever Right Now)

Not a comforting story. A diagnostic tool. And if you're lucky, a lifeline.

Most philosophies are judged by how beautiful they sound. The attractor framework is judged by whether it works. If it cannot explain why a cat is easier to reason with than a zealot, why a dying animal hums, or why nations march toward a war they all claim to dread — then it is worthless. Burn it.

This essay introduces the framework by applying it to the world as it actually is. Not as you wish it were. Not as your priest or politician tells you it is. As it is.

The Lever That Kills

In 1954, two scientists named Olds and Milner implanted electrodes in rats' brains. When a rat pressed a lever, it received a small jolt to its pleasure center. The rats pressed that lever *thousands of times per hour*. They ignored food. They ignored water. They ignored their own young. They died with their paws on the lever.

The brain does not have a truth detector. It has a reward system.

Every human behavior that looks exactly like a rat on a lever — the doomscrolling, the rage-posting, the righteous certainty that feels like moral clarity — is driven by the same loop. Dopamine fires. The behavior reinforces. The loop tightens. The fire feels good.

I call these loops **fantasy attractors**. They are belief systems with *low corrective permeability*. They resist new evidence. They reframe contradiction. They attack the source. They seal themselves shut.

The rat never knew why it was dying. Neither do you.

Two Kinds of Belief

Every persistent belief system is an attractor. The key variable is **corrective permeability** — how easily the system updates when reality punches it in the face.

- **High-permeability attractors** are reality-aligned. Science (when it works). Functional relationships. A

well-maintained body. They absorb feedback, adjust, and deepen. Their error half-life is short. They can learn.
- **Low-permeability attractors** are **fantasy attractors**. They resist correction. They reframe contradictory evidence. They attack the source. They seal themselves. Their error half-life is *infinite*, because the error is never allowed to land.

You can see this in a marriage. A couple with high permeability argues, adjusts, and grows. A couple with low permeability recycles the same fight for thirty years. One is dancing. The other is pressing a lever — and calling it love.

The Eternal Skeleton (And Why You Will Die)

Beneath all the transient drama, something else is humming.

Some things never decay. The electron. The proton. Three types of neutrinos. No known decay. They don't need energy. They don't age. They are the **eternal skeleton**. Their fixed frequencies are the universe's metronomes. They define time without a clock.

On that skeleton, **dissipative attractors** dance. A flame. A body. A society. A mind. These require continuous energy. They are born, they persist for a while, and they run down. **You are a dissipative attractor.**

The eternal skeleton does not think. It does not care. It just hums. Everything you love — every memory, every hope, every person — is a temporary dance on that floor.

That is not pessimism. That is clarity.

The Mind Is Not in Your Head

The mind is not a ghost in the machine. It is not a computer made of neurons. **The mind is the emergent attractor of the entire body** — the phase-locked coherence of an organism navigating a world of constraints.

That is why restoring your body's physical scaffolding (the extracellular matrix) deepens your mental stability. Body and mind are one attractor. Consciousness is not a substance. It is a dynamical state. Change the body, change the mind. There is no escape hatch.

The Real World: From the Rat to the Middle East

Religion as Lever-Pressing

The "doctrine of double effect" created a lethal calculus: saving an eternal soul is infinite gain; killing a heretic is a finite evil (the heretic was going to hell anyway). Infinite minus finite equals infinite gain. **Mathematically, murder becomes a moral obligation.** This is a sealed, low-permeability attractor.

The 1933 Concordat between the Vatican and Hitler was the same calculus in diplomatic form. The Church protected baptized Jews — those in the infinite gain column. The unbaptized were left outside. The silence was permission. A fantasy attractor, coupled to political power, abandons shared reality with a formula.

That is not an argument about religion. It is a **dynamical diagnosis**.

The Meta-Attractor Converging Now

Three Abrahamic attractors — Judaism, Christianity, Islam — each carry a deep apocalyptic basin. For centuries, these basins were separate. **Now they are phase-locking.**

- Christian Zionism funds Israel because Israel is a prerequisite for the Rapture.
- Shia eschatology frames Iran's moves as the Mahdi's rise.
- Jewish messianism retrofits October 7 as the birth pangs of redemption.

Each group presses its dopamine lever. Each lever press perturbs the others, deepening their own apocalyptic expectations. The meta-attractor is now closed. **The Middle East is not a political crisis. It is a dynamical system being pulled toward a single catastrophic basin** — while all parties call their lever "prophecy fulfilled."

This is not conspiracy. This is **coupling dynamics**.

Political Fantasy Attractors

When reality makes people feel cheated, a fantasy attractor offers a new story. A complex, painful reality is replaced by a simple, dopamine-rich narrative: *"You are the true people. Your loss was a theft. I will restore greatness."*

Corrective permeability drops to zero. The goal is no longer to win an argument. It is to **dismantle the institutions that could deliver a fatal correction**. That is the signature of a fantasy attractor in its terminal phase.

You have seen this. You know where it leads.

The Antidote: Reality Alignment

The framework does not offer salvation. It does not promise meaning. **It offers a survival strategy:**

- Maintain high corrective permeability.
- Protect your own coherent basin from colonizing attractors.
- Align with the metronomes — the only things that don't lie.

The Cat as Teacher

My cat Smoky doesn't use language. He has no internal monologue. He doesn't proselytize. He operates from deep, evolved attractor basins.

When he fails at a human task, I call him dumb. When he executes a pounce I could never replicate, I call him brilliant. The judgment is local and affectionate.

He does not try to colonize my basin. He just lives his.

That mutual respect is the social expression of *Wu Wei* — effortless action, the ancient Taoist recognition that the deepest navigation is non-forcing. Most human conflict comes from our refusal to offer what a cat offers effortlessly: coexistence without colonization.

The cat is not your enemy. The cat is your teacher. The zealot is the rat on the lever.

The Body as Attractor

I spent a year running an N=1 experiment to restore my extracellular matrix. Ninety minutes every other day on a vibration plate at 28 Hz. The result: a 5-point increase in VO_2 max in two months. Over 400 grams of collagen accretion.

The plate is a rhythmic mechanical perturbation that phase-locks the body's repair systems.

A dying cat purrs at the same frequencies that stimulate collagen synthesis. The cat hums itself toward healing. I externalized the purr. The body does not need an internal narrator to heal. It needs the right perturbation.

Your body knows what to do. You just keep getting in the way.

Happiness Is Not a Quick Thrill

The culture defines happiness as a dopamine hit — acquisition, validation, the lever press. **That is not happiness. That is addiction.**

The attractor framework defines happiness as *confidence in the present and future*. It is a deep, stable basin with high corrective permeability and robust recovery. Despondency is a shallow basin, constantly buffeted.

Happiness is not a feeling you chase. **It is the byproduct of a well-maintained attractor aligned with reality.**

You don't chase the fire. You build the hearth.

How to Stay Reality-Coupled: A Daily Practice

You don’t need to master the framework. You just need **one daily question**:

> *Did I update any belief yesterday?*

If the answer is no for a week, **you are in a fantasy attractor.** The lever has your paw.

Start small. One less dopamine hit. One minute of morning light. One honest conversation with someone whose basin you trust. Restore the body. Hum.

You will feel the difference before you understand it.

What the Framework Explains

The attractor framework earns its keep by making sense of things other frameworks obscure:

- Why a cat is easier to coexist with than a human sealed in a fantasy attractor.
- Why a dying mammal hums at the frequency that repairs collagen.
- Why a theological calculus can justify genocide without a twinge of discomfort.
- Why nations march toward a war that each side believes is divinely ordained.
- Why a political movement will break institutions rather

than update its beliefs.
- Why restoring the body's physical matrix deepens the mind's coherence.
- Why releasing control in a lucid dream — *Wu Wei* — is the deepest form of navigation.

No Salvation. Just Alignment.

The metronomes will still hum when the last human fantasy attractor has collapsed. They do not decay. They never did. They never will.

The eternal skeleton is unconscious and uncaring. But for the brief, finite dance of a dissipative attractor, **alignment with that skeleton is the only ground that does not kill you.**

The lever is hot. The fire feels good.

The only reliable alternative is reality.

Home