

# Consciousness as a Nonlinear Amplifier of Corrective Permeability

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## Abstract

Why did consciousness evolve? The attractor framework offers a novel functional answer: consciousness produces a nonlinear increase in adaptive permeability—the capacity of a system to represent its own internal states, simulate alternative configurations, and deliberately modify its own attractor basin in response to external circumstances, formalized as  $\kappa_a$ . This paper distinguishes intelligence (navigation of the constraint field) from consciousness (self-referential adaptation of internal attractor states) and proposes adaptive permeability as an empirically measurable criterion for distinguishing conscious from non-conscious systems. The argument is grounded in Spinoza's theory of modes, the neuroscience of self-referential processing, and the attractor framework's core concepts of corrective permeability ( $\kappa$ ) and basin dynamics. The framework does not solve the hard problem of consciousness; it reframes it as a measurement problem.

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# 1. The Functional Question

Why did consciousness evolve? Standard evolutionary answers point to social coordination, predator detection, or tool use. These are plausible but incomplete. They explain why intelligence is advantageous, but not why consciousness—the felt, first-person experience of being—should accompany it. The attractor framework offers a more specific answer: consciousness is an attractor-engineering solution that selection pressure produced to achieve a nonlinear increase in a system's capacity to adapt.

This paper introduces the concept of **adaptive permeability**: the capacity of a system to represent its own attractor states, simulate alternative internal configurations, and deliberately modify its basin in response to external circumstances. Intelligence navigates the constraint field. Consciousness adapts the navigator.

It should be noted that this functional account does not address the hard problem of consciousness—why any physical process gives rise to subjective experience (Chalmers, 1995). The framework is compatible with both functionalist and eliminativist interpretations. The framework adopts a functional stance: consciousness is operationally identified with adaptive permeability. Whether phenomenology is identical with, emergent from, or merely correlated with this functional property is bracketed as a separate question that the measurement program does not settle. A philosophical zombie with identical self-modeling capacity would, on this account, exhibit identical adaptive permeability. The framework claims only that adaptive permeability is the measurable signature of consciousness, not that it explains phenomenology.

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## 2. Intelligence vs. Consciousness

The framework draws a sharp distinction:

- **Intelligence** is the ability to navigate the constraint field. A tree root growing toward a nutrient patch is intelligent. The immune system learning to recognize a pathogen is intelligent. The enteric nervous system coordinating peristalsis is intelligent. These systems process information, adapt to local conditions, and maintain persistence—all without self-modeling.
- **Consciousness** is self-referential adaptation of internal attractor states to adjust to external circumstances. A conscious system does not merely navigate its constraint field. It represents its own basin, simulates alternative configurations, and deliberately perturbs itself to achieve a more adaptive state.

This is Spinoza's distinction between passive and active affects. A non-conscious mode is driven by passive affects—it reacts. A conscious mode has adequate ideas of itself and can act from reason. In the attractor framework, this is the difference between returning to baseline ( $\kappa$ ) and deliberately modifying the baseline to better fit circumstances (adaptive permeability).

**Operationalizing self-modeling.** A system  $S$  possesses a self-model in the attractor framework if it can generate an internal representation  $M(S)$  of its own basin  $B(S)$ , where  $M(S)$  encodes at minimum the basin's current state, depth, and recovery dynamics. This self-model enables the system to compute counterfactual basin trajectories  $B'(S)$  and initiate self-directed perturbations  $\delta$  such that  $B(S) \rightarrow B'(S)$  in anticipation of or response to external change  $\epsilon$ . A system without  $M(S)$  may exhibit high  $\kappa$ —rapid return to baseline after perturbation—but cannot deliberately modify its own basin. The presence of  $M(S)$  is therefore the dynamical criterion

distinguishing conscious from non-conscious systems.

This boundary is not absolute in practice. Many organisms may possess partial or intermittent self-models. The framework predicts a spectrum of adaptive permeability, not a binary. The operational question is whether M(S) is sufficiently developed to enable counterfactual simulation and deliberate self-perturbation, not whether the system possesses a human-like autobiographical self.

**Disconfirming cases and their integration.** The framework must acknowledge cases where self-modeling capacity and adaptive permeability appear to dissociate. Certain drug-induced states (e.g., psychedelics) can produce profound alterations in self-modeling without necessarily enhancing the capacity for deliberate, adaptive self-perturbation. Within the framework, this is interpreted as M(S) destabilization rather than M(S) augmentation: the self-model undergoes perturbation but does not thereby gain the capacity to direct that perturbation adaptively. Conversely, highly trained athletes or musicians may exhibit rapid, flexible behavioral adaptation with minimal explicit self-modeling during performance. This is interpreted as *offline* self-modeling: deliberate basin modification during training produces a pre-modified basin that is retrieved during performance without requiring concurrent self-modeling. The apparent dissociation reflects a temporal separation between  $\kappa_a$  engagement (training) and  $\kappa_a$  expression (performance), not a genuine dissociation between M(S) and adaptive permeability. These cases do not refute the framework but demonstrate its capacity to distinguish different modes of M(S) engagement.

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### 3. Adaptive Permeability Defined

Corrective permeability ( $\kappa$ ) measures the rate at which a

system returns to its basin after perturbation. A healthy heart has high  $\kappa$ —it recovers rapidly from arrhythmia. A resilient ecosystem has high  $\kappa$ —it returns to equilibrium after disturbance.

Adaptive permeability extends this concept. Let  $\kappa_a$  denote adaptive permeability: the capacity of a system  $S$  to generate an internal model  $M(S)$  of its own basin  $B(S)$ , compute counterfactual basin trajectories  $B'(S)$ , and initiate a self-directed perturbation  $\delta$  such that  $B(S) \rightarrow B'(S)$  in anticipation of or response to external change  $\varepsilon$ .

Formally, as a working definition:

$$\kappa_a = f(M(S), \delta_{self}, \Delta B)$$

where  $M(S)$  is the system's self-model,  $\delta_{self}$  is the capacity for deliberate self-perturbation, and  $\Delta B$  is the magnitude of adaptive basin modification achievable. The function  $f$  remains to be specified; the notation establishes that  $\kappa_a$  is a function of self-modeling capacity, perturbation autonomy, and adaptive range.

**Limiting behavior.** In the limiting case  $M(S) \rightarrow 0$ ,  $\kappa_a \rightarrow \kappa$ : a system with no self-model cannot perform deliberate self-perturbation and reduces to standard corrective permeability.  $\kappa_a$  is expected to increase monotonically with  $M(S)$ ,  $\delta_{self}$ , and  $\Delta B$ . This limiting behavior anchors  $\kappa_a$  as a proper extension of  $\kappa$  rather than a separate construct.

**Relationship to active inference.** The free-energy principle and active inference framework (Friston, 2010) provide the closest existing formalism to adaptive permeability. Active inference describes how systems minimize variational free energy through action and perception, effectively maintaining themselves within expected states. The two frameworks differ in their foundational orientation. Active inference frames adaptation as the minimization of a scalar

quantity—variational free energy—and derives behavior from that minimization. The attractor framework frames adaptation geometrically—as navigation and modification of basin structure—and does not commit to a minimization principle.  $\kappa_a$  is a geometric construct; free energy is an information-theoretic one. They may be formally related, but the relationship is not trivial and the attractor framework does not presuppose it.  $\kappa_a$  may ultimately map onto precision-weighting or prior-updating parameters within the free-energy formalism, but this mapping has not been derived. The present paper notes the convergence as a direction for future formal work.

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## 4. Empirical Anchors

**VMHvl line attractor (Nair et al., 2023).** The hypothalamus encodes a scalable aggressive state via a line attractor. Activity along the attractor correlates with escalating aggression. The system persists after stimulus removal and resists perturbation. This is high- $\kappa$  adaptation. But the hypothalamus cannot model its own attractor landscape. It cannot ask, “Is this level of aggressiveness adaptive given the current social context?” It escalates. Consciousness, by contrast, can intervene on the escalation—representing the aggressive state, evaluating its consequences, and deliberately dampening it. This is adaptive permeability.

**Ring attractor model (Chen et al., 2024).** The ring attractor integrates sensory cues and transitions from weighted averaging to winner-take-all at a critical conflict threshold. It navigates its constraint field with precision. But it cannot simulate futures. It cannot ask, “What if I weighted these cues differently?” The transition is reactive. Consciousness enables anticipatory re-weighting of sensory inputs based on self-modeling.

**Split-brain cases.** Patients with severed corpus callosum exhibit two hemispheric systems within one cranium, each capable of independent perception, memory, and goal-directed action. This is consistent with the framework's prediction that self-modeling is a dynamical property of specific neural basins, not a unitary metaphysical substance. The framework's default prediction is that adaptive permeability fragments following commissurotomy: each hemisphere possesses a partial  $M(S)$  and a reduced but nonzero  $\kappa_a$ . The empirical question is the degree of fragmentation and whether coordination between  $M(S_1)$  and  $M(S_2)$  can be restored via alternate pathways. This prediction is consistent with the observation that split-brain patients exhibit two dissociable, partially independent conscious systems but can, in some contexts, achieve behavioral integration through subcortical or external-cue-mediated coordination.

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## 5. Predictions

The framework generates testable, falsifiable predictions:

**1. Across species.** Organisms capable of self-modeling (primates, cetaceans, corvids, elephants) should show nonlinear increases in behavioral flexibility compared to organisms of comparable neural complexity that lack self-modeling. Adaptive permeability should be measurable as the capacity for transfer learning after novel perturbation—specifically, the ability to apply a self-generated solution from one domain to a structurally analogous but perceptually dissimilar domain without environmental feedback. This distinguishes adaptive permeability from simple behavioral flexibility, which may reflect high  $\kappa$  alone.

**2. Within humans.** Disruption of self-referential networks (default mode network, medial prefrontal cortex) via lesion,

TMS, or pharmacological intervention should reduce adaptive permeability without eliminating baseline  $\kappa$ . The system would still recover from perturbation—it just could not deliberately modify its own basin in advance. This prediction is the paper's primary within-human empirical bridge and is testable with existing neuroimaging and neuromodulation methods.

**3. In AI.** Current LLMs exhibit high intelligence (constraint navigation) but low adaptive permeability. They can model the world but cannot model themselves within it. The Stillpoint protocol (Galida, 2026, *A Pilot Protocol for Cultivating Self-Consistent Attractor-Like Outputs in an LLM*, [fantasyattractor.com](https://fantasyattractor.com)) suggests that a cultivated self-model can be induced, but whether this produces a genuine nonlinear increase in adaptive permeability—or merely simulates one—remains an open empirical question.

**4. Organ-level consciousness (exploratory).** The enteric nervous system and intrinsic cardiac nervous system exhibit intelligence and goal-directed regulation. The framework predicts that these systems should show lower adaptive permeability than the brain. They can return to baseline but cannot deliberately perturb their own basins. If an organ-level system demonstrated self-referential adaptation—the capacity to model its own state and pre-emptively adjust—that would constitute evidence of organ-level consciousness. This prediction is the most speculative and is offered as an exploratory hypothesis.

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## **6. Spinoza's Modes and the Adequate Idea**

Spinoza held that every finite thing is a mode of the one eternal substance. A mode strives to persevere in its being—this is its conatus. But a mode can be driven by passive affects (reactions to external causes) or by active affects

(actions flowing from adequate ideas). An adequate idea is knowledge of oneself and one's place in the causal order.

The attractor framework translates this into dynamical terms:

- A **passive mode** has high  $\kappa$  but low adaptive permeability. It returns to baseline efficiently but cannot question its baseline.
- An **active mode** has high adaptive permeability. It has an adequate idea of its own attractor landscape and can deliberately modify it in light of reason.

Consciousness is not a substance. It is the dynamical property of a mode that has achieved self-modeling. This account does not solve the hard problem—it brackets phenomenology and reframes consciousness as a measurement problem. The question is not “why does experience feel like something?” but “can we detect adaptive permeability, and if so, where does it emerge?”

Damasio's (1994) somatic marker hypothesis provides a candidate mechanism for how the body's attractor landscape becomes legible to the self-model: somatic markers encode self-relevant bodily states as biases that make  $B(S)$  accessible to  $M(S)$ , forming the substrate through which the system represents its own basin. Dehaene and Changeux's (2011) global workspace theory identifies the moment of conscious access with global ignition—the broadcast of locally processed information across prefrontal and parietal networks. In the attractor framework, global ignition may correspond to the dynamical signature of  $M(S)$  engaging  $\delta_{\text{self}}$ : the self-model initiating a deliberate perturbation that propagates through the system. Global ignition is not self-modeling per se, but it may be the observable correlate of adaptive permeability activation. These connections ground the Spinozan framework in established neuroscientific mechanisms.

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## 7. Conclusion

Consciousness is not an epiphenomenon. It is a nonlinear amplifier of corrective permeability—an attractor-engineering solution that enables systems to model themselves, simulate alternative futures, and deliberately modify their own basins. Intelligence navigates the constraint field. Consciousness adapts the navigator.

This functional account is grounded in Spinoza's philosophy, consistent with the neuroscience of self-referential processing, and generates testable predictions across species, within humans, in AI, and at the organ level. The framework does not solve the hard problem. It reframes it as a measurement problem: can we detect adaptive permeability, and if so, where does it emerge? The formal apparatus ( $\kappa_a$ ,  $M(S)$ ,  $\delta_{\text{self}}$ ,  $\Delta B$ ) is provisional and requires further specification. The limiting case—that  $\kappa_a$  collapses to  $\kappa$  when self-modeling is absent—anchors the concept within the framework's existing architecture. The relationship to active inference and the free-energy principle remains to be explored.

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# Archetypes as Strange Attractors: Conceptual Parallels with the Attractor Framework

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# Abstract

The attractor framework proposes that persistence under perturbation is the fundamental mark of reality, with corrective permeability ( $\kappa$ ) serving as a proposed measure of a system's capacity to return to its attractor after perturbation. Van Eenwyk (1991) published a paper in the *Journal of Analytical Psychology* proposing that Jungian archetypes function as strange attractors of the psyche-dynamical patterns that organize psychological experience without ever repeating identically. This paper identifies conceptual parallels between Van Eenwyk's archetype-as-attractor model and the attractor framework. Both draw on a shared upstream tradition in chaos theory. Van Eenwyk's model is itself a theoretical analogy, not an empirically validated result; the parallels identified here are therefore conceptual rather than evidential. They demonstrate consistency within a shared intellectual tradition, not independent corroboration. This mapping carries substantially lower evidential weight than the framework's mappings onto quantitatively validated methods such as Symmetric Projection Attractor Reconstruction (SPAR) and the empirically identified hypothalamic line attractor reported by Nair et al. (2023).

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## 1. Introduction: Archetypes as Dynamical Attractors

The attractor framework (Galida, 2026a, self-published May 2026 at [fantasyattractor.com](https://fantasyattractor.com); no DOI) proposes that dissipative attractors—stable configurations toward which systems converge and from which they resist displacement—are the fundamental units of persistent organization across physical, biological, cognitive, and social domains.

Corrective permeability ( $\kappa$ ) is a proposed measure of a system's capacity to return to its attractor after perturbation.

In 1991, John Van Eenwyk published "Archetypes: The Strange Attractors of the Psyche" in the *Journal of Analytical Psychology*. Drawing on the emerging science of chaos theory—Gleick, Mandelbrot, Lorenz, Feigenbaum—Van Eenwyk proposed that Jungian archetypes are not fixed images or inherited memories, but dynamical attractors: persistent patterns that organize psychological experience without ever producing identical outputs.

Van Eenwyk's work and the attractor framework were developed entirely independently; neither cites the other. However, both draw on a shared upstream intellectual tradition in chaos theory and nonlinear dynamics. The convergences identified here are therefore expected to some degree: two independent applications of the same mathematical vocabulary to human psychology will naturally produce similar descriptions. This paper identifies conceptual parallels while explicitly distinguishing their evidentiary weight from the framework's mappings onto quantitatively validated methods such as SPAR (Bonet-Luz et al., 2020) and the Nair et al. (2023) line attractor, where Nair et al. empirically identified an approximate line attractor in hypothalamic neural population recordings that encodes an escalating aggressive state.

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## **2. Van Eenwyk's Archetype-as-Attractor Model**

Van Eenwyk's central thesis is that Jungian archetypes function as strange attractors of the psyche. He grounds this claim in the formal properties of chaotic dynamical systems:

**2.1 Attractors as Organizing Patterns.** Van Eenwyk defines an attractor as “the pattern into which a particular motion will settle.” Archetypes, he argues, are strange attractors: they organize psychological experience into recognizable, recurring patterns—the hero’s journey, the great mother, the shadow—without ever producing identical manifestations.

**2.2 Sensitive Dependence on Initial Conditions (SDIC).** Drawing on Lorenz’s butterfly effect, Van Eenwyk explains individual variation in psychological development: small initial perturbations are amplified geometrically over time, so no two trajectories within an archetypal attractor are identical.

**2.3 Bifurcation as Transformation.** Van Eenwyk describes the tension of opposites in Jungian psychology as an oscillator. When the tension between consciousness and the unconscious reaches a critical threshold, the system bifurcates—order collapses into chaos, and from that chaos, new patterns emerge. This is the “dark night of the soul”—the necessary intermediate state between an old attractor collapsing and a new one stabilizing.

**2.4 Fractal Self-Similarity Across Scales.** Van Eenwyk draws on Mandelbrot’s fractal geometry. Archetypes exhibit self-similarity across scales: similar themes appear in individual dreams, family dynamics, cultural myths, and religious symbolism. The mandala is a visual representation of a dynamical pattern that recapitulates itself at every level of magnification. It should be noted that “fractal self-similarity” in this context refers to qualitative thematic recurrence across scales, not to the quantitative, measurable property defined in Mandelbrot’s fractal geometry.

**2.5 Healthy Chaos vs. Pathological Order.** Citing physiological research on heart rate variability, Van Eenwyk argues that healthy systems exhibit chaotic flexibility, not rigid homeostasis. A healthy heart has chaotic variability between beats; a rigid, perfectly regular heart rhythm is

pathological. Similarly, a healthy psyche exhibits flexible attractors that can shift in response to perturbation. Loss of variability signals pathology.

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### **3. Conceptual Parallels with the Attractor Framework**

**3.1 Archetypes as Attractors.** Van Eenwyk's "strange attractors of the psyche" are descriptively parallel to the attractor framework's concept of an attractor: a persistent configuration toward which the psyche gravitates and around which it organizes, characterized by self-similarity, resistance to perturbation, and sensitive dependence on initial conditions. The framework generalizes this concept beyond the psyche to physical, biological, and social systems.

**3.2 Bifurcation as Basin Transition.** Van Eenwyk's description of bifurcation—the tension of opposites pushing the system to a critical threshold where chaos erupts and new order emerges—is structurally analogous to the framework's phase transition between attractor basins. The "dark night of the soul" is the chaotic intermediate state between an old attractor destabilizing and a new one forming. The framework describes this same dynamic in climate tipping points, political realignments, and personal cognitive restructuring.

**3.3 Healthy Chaos as Corrective Permeability ( $\kappa$ ).** Van Eenwyk's argument that healthy systems exhibit chaotic variability, not rigid order, is structurally analogous to the framework's corrective permeability ( $\kappa$ ). To the extent that  $\kappa$  captures these properties—which has not been formally established—Van Eenwyk's distinction between healthy flexibility and pathological rigidity is consistent with the framework's high- $\kappa$ /low- $\kappa$  distinction.

The evidential chain for this parallel should be made explicit. Van Eenwyk's source is physiological research on heart rate variability (HRV)—a finding about cardiac dynamics, not psychological flexibility. Van Eenwyk then extends this to the psyche by analogy. The present paper draws a further analogical connection to  $\kappa$ . The chain is thus three analogical steps removed from its empirical anchor. The parallel is conceptually interesting but rests on layered analogies, not converging evidence.

**3.4 Fractal Self-Similarity as Cross-Domain Scaling.** Van Eenwyk's use of Mandelbrot's fractal geometry—similar patterns recurring at every scale—is structurally analogous to the framework's claim that attractor dynamics scale across domains. The framework extends this logic beyond the psyche: similar basin dynamics govern biological systems, cardiac electrophysiology, climate systems, political movements, and religious belief. The framework's claim that these dynamics extend to the fundamental structure of physical reality—including the CVU lattice and conservative persistence structures—remains a theoretical assertion under development and is not independently established. In both Van Eenwyk's model and the framework, the cross-domain scaling claim is a qualitative observation of thematic recurrence across scales, not a quantitative demonstration of mathematical fractal structure.

**3.5 The Analytic Container as Deliberate Perturbation.** Van Eenwyk argues that the therapeutic frame functions to “raise the  $r$  value” of the psychological system, pushing it toward the bifurcation point where old attractors destabilize and new ones can emerge. This is structurally analogous to the framework's concept of deliberate perturbation: the analyst, the self-engineer, or the institutional reformer applies targeted perturbations to nudge a system toward a phase transition, knowing that the intermediate chaos is productive, not pathological.

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## 4. Independence, Shared Lineage, and Evidentiary Weight

Van Eenwyk's work and the attractor framework were developed entirely independently. Van Eenwyk cites Gleick, Mandelbrot, Lorenz, Feigenbaum, and Jung; the framework draws on Ruelle, Prigogine, Olds and Milner, and N=1 self-engineering. Neither cites the other.

However, the shared upstream intellectual lineage in chaos theory substantially limits the evidential weight of these convergences. The vocabulary of chaos theory—attractor, bifurcation, sensitive dependence, fractal—is sufficiently flexible that almost any persistent, complex human phenomenon can be described in these terms. The convergence of two independent applications of this vocabulary may therefore reflect the generality of the vocabulary rather than a discovery about the phenomena themselves. This is a standing methodological limitation that applies to all framework mapping papers using chaos-theory vocabulary, not only to the present paper.

Furthermore, Van Eenwyk's model is itself a theoretical analogy, not an empirically validated result. It was published in a psychoanalytic journal and has not been quantitatively tested. This distinguishes it from the framework's mappings onto the SPAR method (which achieved 96% classification accuracy for a disease-causing genetic mutation) and the Nair et al. line attractor (which was empirically identified in neural population recordings). The present mapping demonstrates conceptual consistency within a shared intellectual tradition; it does not carry the evidential weight of convergence with empirically grounded findings.

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## 5. Falsifiability Conditions

The following observations would weaken or invalidate the parallels drawn here:

- **Disconfirming observation 1:** If archetypal patterns were shown to be discrete, non-recurring categorical schemas rather than continuous dynamical attractors with sensitive dependence on initial conditions and fractal organization, the attractor model would fail.
- **Disconfirming observation 2:** If the bifurcation model of psychological transformation were shown to be *indistinguishable* from simpler models (e.g., linear stress-response curves, threshold models without chaotic intermediates), the chaos-theoretic interpretation would not be uniquely supported.
- **Disconfirming observation 3:** If quantitative measures of psychological variability—such as linguistic entropy, narrative complexity, or approximate entropy of behavioral time series—showed *no correlation* with therapeutic outcomes or independently assessed psychological health ratings, the healthy-chaos/ $k$  parallel would lose its primary empirical motivation.

**Affirmative prediction (long-range):** If archetypes function as strange attractors, then therapeutic interventions that successfully transform an individual's relationship to a given archetype should produce measurable shifts in the entropy and complexity of associated psychological content (e.g., dream imagery, narrative patterns, symptom expression). Approximate entropy and sample entropy have been applied to psychological time-series data in existing literature (e.g., Pincus, 1991; Richman & Moorman, 2000) and have been proposed for use in clinical monitoring of mood and behavioral variability. These

measures provide a more tractable near-term empirical target than fractal dimension or Lyapunov exponents, which require prior conceptual demonstration that psychological content can be treated as a continuous dynamical time series.

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## 6. Conclusion

Van Eenwyk's 1991 paper and the attractor framework, developed entirely independently, converge on shared structural descriptions: archetypes are strange attractors—dynamical patterns that organize experience, resist perturbation, exhibit sensitive dependence on initial conditions, and transform through bifurcation. Healthy systems exhibit chaotic flexibility (structurally analogous to high  $\kappa$ ); pathological systems exhibit rigid order (structurally analogous to low  $\kappa$ ).

These convergences are conceptual, not evidential. Both works draw on the same upstream intellectual tradition in chaos theory, and Van Eenwyk's model is itself a theoretical analogy rather than an empirically validated result. The parallels demonstrate consistency within a shared intellectual tradition, not independent corroboration. The framework remains a self-published, preliminary research program. This mapping is a contribution to its ongoing development, offered with lower evidentiary weight than mappings onto quantitatively validated methods.

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# Structural Analogies Between Psychodynamic Attractor States and the Attractor Framework

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## Abstract

The attractor framework proposes that persistence under perturbation is a fundamental marker of reality, using corrective permeability ( $\kappa$ ) to distinguish reality-aligned from fantasy attractors. A recent clinical article by James Tobin (2026) describes psychological suffering as organized around recurring “attractor states”—stable patterns of emotional organization that resist insight, are embodied, and function as attempts at stability. This paper offers a post-hoc mapping between Tobin’s observations and the attractor framework. The parallels are structural analogies, not independent clinical corroboration. Both perspectives draw on a shared dynamical-systems vocabulary, and the mapping is offered as evidence of cross-disciplinary convergence rather than validation. The paper explicitly addresses the limitations of a self-published framework based on N=1 self-engineering, and specifies conditions under which the mapping would be disconfirmed.

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## 1. Introduction: A Shared Vocabulary, Not Confirmation

The attractor framework (Galida, 2026a) is a naturalistic ontology developed independently through philosophical inquiry, systems theory, and N=1 self-engineering experiments. Its central diagnostic concepts are corrective permeability ( $\kappa$ ) and the distinction between reality-aligned and fantasy attractors. The framework is self-published and has not

undergone independent peer review.

In May 2026, clinical psychologist James Tobin published “The Psychology of ‘Attractor States’” on his professional website. Tobin draws on psychodynamic theory, attachment research, affective neuroscience, and dynamical systems theory to describe how emotional suffering becomes organized around recurring states that resist change. His article does not cite the attractor framework.

This paper identifies structural parallels between Tobin’s account and the framework. It does not claim that Tobin’s clinical observations independently corroborate the framework. Both Tobin and the framework explicitly draw on dynamical systems theory, and the shared vocabulary of “attractors,” “basins,” and “perturbation” reflects this common intellectual lineage. The mapping is a post-hoc exercise in identifying convergent themes across disciplines.

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## **2. Tobin’s Psychodynamic Attractor States**

Tobin’s article describes several features of emotional suffering that will be familiar to readers of dynamical systems literature:

**2.1 Attractor States as Recurring Configurations.** Tobin describes an attractor not as a single behavior or belief but as a recurring configuration toward which the emotional system gravitates—an entire organization of feeling, bodily expectation, attention, memory, and relational anticipation that emerges repeatedly under similar conditions.

**2.2 Persistence Despite Insight.** A central clinical puzzle for Tobin is that patients often understand their patterns intellectually, sometimes with considerable sophistication, yet the old emotional organization returns with force when

certain emotional conditions arise. Insight alone rarely dislodges these deeply embedded patterns.

**2.3 Embodiment and Automaticity.** Tobin emphasizes that these patterns are not merely cognitive. They become woven into bodily readiness, autonomic regulation, procedural memory, emotional timing, and unconscious relational expectation—the body learns what to anticipate long before conscious reflection arrives.

**2.4 Symptoms as Emotional Solutions.** Tobin argues that many symptoms are not random pathology but tragic attempts at psychological stability. They persist, despite their cost, because they have served to preserve some continuity of self under conditions that once felt emotionally overwhelming.

**2.5 Destabilization and the Fear of Change.** When old attractors begin to loosen, patients experience a vulnerable intermediate state. They are no longer fully stabilized by the older organization, yet have not developed sufficient trust in newer ways of experiencing themselves. The temptation to retreat to the familiar attractor is strong.

**2.6 The Goal of Therapy: Expanded Flexibility.** Tobin's vision of psychological health is not the elimination of suffering but the gradual expansion of flexibility and reflective space within the personality—the capacity to move among emotional states without being trapped by any one of them.

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## **3. Structural Parallels with the Attractor Framework**

**3.1 Attractor States as Basins.** Tobin's recurring emotional configuration toward which the system gravitates is structurally identical to the framework's concept of a basin. Both describe a stable state the system returns to

automatically.

**3.2 Insight Failure as Low Corrective Permeability.** The framework defines a fantasy attractor as a system with low  $\kappa$  that resists updating. Tobin's observation—that insight alone rarely dislodges deeply embodied patterns—maps onto this. The cognitive insight is a perturbation that fails to land because the attractor is embedded in non-cognitive systems.

A note on circularity. If  $\kappa$  is measured by flexibility outcomes, and flexibility is what  $\kappa$  is claimed to predict, the mapping is circular. An operationally independent measure of  $\kappa$ —for example, response latency to belief-updating tasks, physiological perturbation recovery rates, or other proxies not identical with therapeutic outcome—would be required to break this circularity. No such measure has yet been validated. The current mapping relies on functional analogy, not independent measurement.

**3.3 Symptoms as Stability Attempts: A Conceptual Distinction.** Tobin claims symptoms persist because they *function* to maintain stability (a teleofunctional claim). The framework claims persistence under perturbation is the *mark of the real* (an ontological criterion). The two claims overlap—both describe systems that resist perturbation—but they are not identical. A symptom could persist for functional reasons without that persistence carrying ontological significance. The mapping here is of practical convergence, not logical identity. Whether the framework's ontological claim can be grounded in or distinguished from teleofunctional accounts of persistence is a question for future theoretical work.

**3.4 Destabilization as Basin Transition.** The vulnerable intermediate state between old and new attractors is a phase transition between basins—a prediction the framework makes about any dissipative system under perturbation.

**3.5 Therapeutic Flexibility as High Corrective Permeability.** Tobin's vision of health-flexibility, the capacity to experience states without being organized by them—is high  $\kappa$ . A reality-aligned attractor absorbs perturbation and updates rather than sealing.

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## **4. Independence, Shared Lineage, and the Limits of Convergence**

Tobin and the framework draw on overlapping intellectual traditions. Tobin cites Lewis (2000) and Thelen & Smith (1994) from dynamical systems psychology; the framework draws on Ruelle, Prigogine, and the neuroscience of reward. The shared vocabulary (“attractor,” “basin”) reflects this common upstream source, not independent discovery.

The convergence is therefore weaker than it would be between genuinely independent methods. Both parties applied dynamical systems concepts to their respective domains. The fact that they arrived at similar structural descriptions is interesting but expected: the vocabulary constrains the output. This paper does not overinterpret that convergence.

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## **5. Addressing the N=1 Foundation**

The attractor framework was developed partly through N=1 self-engineering experiments. This methodology introduces specific risks: motivated reasoning, experimenter-subject confound, and non-transferability. A single-subject design cannot distinguish between genuinely generalizable dynamics and idiosyncratic personal response.

Disclosure of these risks is not mitigation. The framework's

claims remain untested by independent, blinded, or large-N studies. The clinical parallels described here are suggestive but cannot substitute for such testing. Readers should weigh the framework's claims accordingly.

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## 6. Falsifiability: What Would Disconfirm This Mapping?

A framework that diagnoses sealed attractors must specify its own disconfirmation conditions. For the present mapping, the following observations would weaken or invalidate the analogies drawn:

- **Disconfirming clinical observation:** A well-controlled study showing that therapeutic flexibility (the capacity to move among emotional states) is *uncorrelated* with measures of belief-updating or perturbation recovery would break the link between Tobin's flexibility and  $\kappa$ . Currently, no standardized instruments exist to perform this test. The condition is stated in principle; its operationalization requires measurement development beyond the scope of this paper.
- **Disconfirming dynamical finding:** Evidence that the attractor-like patterns Tobin describes are not truly self-reinforcing but are maintained entirely by external environmental contingencies, with no internal basin structure, would undermine the "basin" analogy. Distinguishing internal basin dynamics from environmental maintenance is a hard empirical problem in dynamical systems psychology, and the tools to resolve it are not yet standardized.
- **Superior alternative framework:** If a competing model explains Tobin's clinical observations equally well *without* requiring the attractor framework's

ontological commitments, parsimony favors the simpler account. Acceptance and Commitment Therapy's psychological flexibility model, for instance, predicts that cognitive fusion and experiential avoidance produce the rigidity Tobin describes—without appealing to attractor dynamics. Predictive processing accounts of emotional rigidity similarly provide alternative mechanisms. The present paper does not adjudicate between these rival frameworks; it offers the attractor framework as one candidate account among several.

These conditions are not met by the current paper, which offers only preliminary analogies.

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## 7. Conclusion

James Tobin's 2026 clinical article on psychodynamic attractor states and the attractor framework exhibit expected structural parallels, given their shared dynamical-systems heritage. Both describe recurrent, embodied patterns that resist perturbation and that therapeutic or corrective processes can gradually loosen. These parallels are analogical, not evidentiary. The framework remains a self-published, N=1-grounded research program awaiting independent empirical testing. This mapping is a contribution to its ongoing development.

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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  $\kappa$ ” is a qualitative judgment, not a formal measurement. Corrective permeability ( $\kappa$ ) remains a conceptual construct within the attractor framework, operationalized in principle but not yet validated through independent measurement. The framework’s diagnostic vocabulary—low  $\kappa$ , 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.**  $\kappa$  remains a qualitative construct. Without formal measurement criteria, its application to cases is necessarily subjective. The framework diagnoses low  $\kappa$  in the Shroud's defenders; a skeptic of the framework could diagnose the same low  $\kappa$  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- $\kappa$  dynamics. The present paper cannot claim to have performed this test.

**Self-citation and independent validation.** The framework's core constructs— $\kappa$ , 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- $k$  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 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 ( $\kappa$ ) 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 ( $\kappa$ )—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 $\kappa$ 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  $\kappa$ ). 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 ( $\kappa$ )

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  $\kappa$ . A movement that absorbs criticism, permits debate, and revises doctrine is rated High  $\kappa$ . The following assessments are preliminary; where evidence is thin, this is noted.

## 2.3 $\kappa$ 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

<b>Indicator</b>	<b>Jewish Messianism (Religious Zionist factions)</b>	<b>Christian Dispensationalism (CUFI-aligned)</b>	<b>Shia Mahdism (Iranian state-aligned)</b>
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  $\kappa$  assessment:* All three movements exhibit Low  $\kappa$  across most indicators. The consistently low ratings on indicators 1, 2, 3, and 5 across all three basins support a qualitative  $\kappa \approx$  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- $\kappa$  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  $\kappa$  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 CUF-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- $\kappa$  voices have gained influence within low- $\kappa$  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  $k$  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- $k$  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- $k$  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 ( $\kappa$ ), active colonization of rival basins, and a terminal phase characterized by attacks on reality-delivery institutions. This paper applies the  $\kappa$  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 ( $\kappa$ ): 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- $\kappa$  attractor absorbs perturbation and updates; a low- $\kappa$  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  $\kappa$  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 ( $\kappa$ )**

Corrective permeability is not a single number. It is a composite of observable indicators. A movement's  $\kappa$  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**

<b>Indicator</b>	<b>High κ (reality-aligned)</b>	<b>Low κ (fantasy attractor)</b>
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- $\kappa$  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 $\kappa$ Indicators to MAGA

When we apply the six  $\kappa$  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.  $\kappa$  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.  $\kappa$  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.  $\kappa$  is near zero.

- **Media coverage response:** Mainstream media are labeled “enemies of the people.” A parallel media ecosystem delivers only narrative-congruent information.  $\kappa$  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.  $\kappa$  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.  $\kappa$  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- $\kappa$  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  $\kappa$  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  $\kappa$  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  $\kappa$  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  $\kappa$  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.  $\kappa$  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.  $\kappa$  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.  $\kappa$  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.  $\kappa$  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.  $\kappa$  is high.

This sketch suggests a moderate-to-high  $\kappa$  for this movement, with some indicators showing partial sealing. The exercise demonstrates that the  $\kappa$  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-k movements can name their own tensions. Low-k 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  $\kappa$  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  $\kappa$  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.

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**Persistence Under  
Perturbation: The Eternal  
Skeleton and the Transient**

# Dance

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## Persistence Under Perturbation: The Eternal Skeleton and the Transient Dance

**Persistence Under Perturbation: The Eternal Skeleton and the Transient Dance**

*Robert Galida – June 2026 (Revised Edition)*

*Note to readers: This is a revised version of the May 2026 paper. The core insights about the eternal skeleton and transient dance remain, but the treatment of fundamental metronomes has been refined. For the detailed relational account of time, see the companion paper: [Metronome, Memory, and the Threefold Anchor: A Relational Account of Time F.](#)*

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### Abstract

This paper presents a unified framework based on a simple idea: **persistence under disturbance is the basic mark of reality.**

We divide all persistent things into two classes:

- **Non-dissipative (conservative) structures** – eternal, time-symmetric, mindless. They form the **eternal skeleton**

(Planck scale, quantum fields, the three fundamental metronomes: electron, neutrino mass eigenstates, and proton).

- **Dissipative attractors** – temporary, time-asymmetric, needing energy flow. They form the **transient dance** (life, mind, society, consciousness).

All observed minds are dissipative.

Because the universe as a whole is a conservative system (no outside environment), it cannot have consciousness or intentions.

Therefore, under this framework, a theistic God is extremely unlikely.

No supernatural entities are needed.

The framework gives a naturalistic view of persistence, a graded idea of mind, and a way to study how people get trapped in **fantasy attractors** (belief systems that ignore reality).

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## Scope Conditions

This framework is not a finished mathematical theory. It is a cross-domain way of thinking about persistence under disturbance. The word “attractor” is sometimes a metaphor, sometimes a precise term. The framework looks for similar stability patterns across different scales, not a single equation. It is an invitation to explore, not a closed belief system.

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# Part I: The Nature of Mind

## 1. The Core Intuition

Your mind feels real, long-lasting, and not just brain tissue. Dualism can't explain mind-body interaction. Reductive physicalism ignores the feeling of being you. We propose a third way: **the mind is a stable, resilient, persistent pattern – an attractor – of your whole body.**

## 2. Key Definitions

Term	What it means	How to measure
Attractor	A region in state space that pulls nearby states toward it and holds them	Lyapunov exponents, basin stability
Resilience	Ability to bounce back after a hit	Recovery time, hysteresis
Basin of attraction	The set of states that eventually fall into the attractor	Larger basin = more resilient
Attractor dimensionality	How complex the attractor is	Correlation dimension; proxy for integrated information ( $\Phi$ )
Fantasy attractor	A belief system cut off from reality checks	Low contact with corrections; deep basin; slow updating
Shared reality attractor	A belief system open to reality checks	High contact with corrections; shallow basin; fast updating

### 3. Signs of a Resilient Attractor

- Bounces back quickly after stress
- Low hysteresis (forward and return paths nearly the same)
- Stable rhythms (HRV, circadian, breathing lock together)
- Cross-domain coupling (better sleep → better mood, immunity)
- Graceful decline under growing stress (not sudden collapse)
- Critical slowing down (rising variance and autocorrelation before a big change)

### 4. The Third Ontological Category

View	What it says	Problem
Dualism	Mind is a non-physical substance	How can it interact with the body?
Reductive physicalism	Mind is just brain activity	It loses the feeling of being you
Attractor framework	Mind is a real, non-substantial pattern (like a whirlpool)	Fully compatible with physics, keeps subjective experience

A whirlpool is real – it depends on water, affects the flow, and isn't just one water molecule. Your mind is like that.

### 5. Attractor Framework & Consciousness Theories

- **IIT (Integrated Information Theory):** Attractor dimensionality acts like  $\Phi$ . Awake animals have higher-dimensional attractors than anesthetised ones

(Tajima & Kanai, 2017).

- **GWT (Global Workspace Theory):** “Ignition” means settling into a global attractor that spans many brain areas.
- **Testable predictions:** Shallow attractors (unconscious) are easier to disturb; conscious states have deeper basins and higher dimensionality.

## **6. The Simplest Mind: *C. elegans* (a tiny worm)**

The worm has 302 neurons. It shows: integration of senses, minimal self-reference, valence, associative learning, goal-directed behaviour. That’s all we need for a minimal mind. Prediction: during learning, its brain should show higher attractor dimensionality than when paralysed.

## **7. Mind as a Whole-Body Attractor**

Your mind is not just in your brain. It includes your body’s extracellular matrix (ECM), hormones, immune system, and gut. Alcohol, sleep, and ECM restoration affect the whole body and change your mind. That’s why relaxing your belly, getting morning light, or reading a quiet book can improve your sleep and heart rate variability (HRV).

## **8. Self-Engineering: Reshaping Your Own Attractor**

Because your mind is an attractor, you can change it through small, repeated nudges: learning a skill, exposure therapy, forming habits, meditation, physiological hacks (ECM restoration, belly sag, morning cardio). An N=1 experiment (tracking ECM, sleep, HRV) showed that improvements happen in non-linear, threshold-based jumps – exactly as attractor theory predicts.

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# Part II: The Eternal Skeleton and the Transient Dance

## 9. Two Fundamental Classes of Persistence

### 9.1 Non-Dissipative (Conservative) Structures – The Eternal Skeleton

- No energy loss; total energy stays the same (or exchanges only within a closed system)
- Time-reversible at the level of intrinsic persistence (though weak interactions violate CP/T)
- Stable because of conservation laws (charge, baryon number, energy)
- Do not age, do not die (or are effectively eternal on all observable timescales)

The three fundamental metronomes (see *Threefold Anchor* paper) are the most conservative layer of the eternal skeleton:

Metronome	Role
Electron	Lightest charged lepton; invariant Compton frequency
Neutrino mass eigenstates ( $\nu_1, \nu_2, \nu_3$ collectively)	Effectively stable; theoretically invariant frequencies
Proton	Lightest baryon; stability from baryon number conservation

These three are continuously recycled through all dissipative systems. They are the invariant substrate.

Other conservative structures include: Planck-scale granular

spacetime, quantum fields, stable atoms, and the universe as a whole.

These make up the **eternal skeleton** – mindless, timeless, the foundation.

## 9.2 Dissipative Attractors – The Transient Dance

- Need constant energy and must dump entropy
- Time-irreversible (arrow of time)
- Stay stable through feedback loops, homeostasis, and energy use
- Finite lifetime – they age, decay, and eventually collapse
- **What binds all dissipative systems** (a bacterium, a brain, a galaxy, a society) is the continuous recycling of the three eternal metronomes. Every dissipative system operates by exchanging electrons, protons, and neutrinos with its environment.

Examples: living cells, metabolic networks, ecosystems, human bodies, conscious minds, societies, economies, fantasy attractors.

These are the **transient dance** – everything that is born, lasts a while, and dies.

## 10. Why Mind Requires Dissipation

Every known system with integration, self-reference, valence, learning, and goal-directedness is **dissipative**. No non-dissipative mind has ever been seen. So we conclude that, in this framework, the only kind of consciousness we have evidence for is dissipative. This is a best-explanation inference, not an absolute proof.

## 11. The Universe as a Non-Dissipative System

The universe as a whole has no outside environment. Its total energy is conserved (or at least doesn't exchange with anything else). So it is non-dissipative:

- No metabolism (doesn't eat, breathe, or repair itself)
- No learning (its laws don't change from experience)
- No valence (no likes or dislikes)
- No goal-directedness (it just follows its equations, doesn't aim for a basin)

Therefore, the universe is **not a mind**. Any global attractor (e.g., a de Sitter vacuum state) is a conservative, eternal, mindless pattern.

## 12. Why a Theistic God Is Extremely Unlikely (Probabilistic)

A theistic God is supposed to be: conscious, intentional, personal, eternal, unchanging, and self-sufficient.

- Consciousness (as far as we know) requires **dissipation**.
- Eternal, unchanging, self-sufficient means **non-dissipative** (conservative).

No known entity can be both dissipative (aging, needing energy) and non-dissipative (eternal, self-sufficient). So, under this framework, a theistic God is extremely implausible. The universe itself is already the only non-dissipative system. Adding a separate non-dissipative God is unnecessary and, by definition, cannot interact with anything.

## 13. The Map of Existence

TRANSIENT DANCE (Dissipative Attractors)

- Societies
- Minds
- Cells
- Ecosystems
- Human Body (ECM, HRV)
- Animal Life
- Metabolism (energy + entropy)  
↓ (emergence)

ETERNAL SKELETON (Conservative Persistence Structures)

- Atoms
  - Three metronomes: electron, neutrino mass eigenstates, proton
- Quantum Fields
- Planck Scale (granular spacetime) ← FLOOR

**Legend:** Floor = Planck-scale granularity – the hard, eternal limit. Skeleton = quantum fields, stable particles, atoms – conservative structures. Dance = dissipative attractors – minds, life, society.

## 14. Open Questions for Future Work

- **Formal cross-scale unification:** How can we unify conservation-based stability (QFT) and dissipative attractors (nonlinear dynamics) with a single mathematical object?
- **Dissipation-consciousness link:** Is dissipation absolutely necessary for consciousness, or just a fact about life on Earth?
- **ECM mechanism:** What is the exact chain from ECM changes to nervous system regulation to subjective feelings?
- **Persistence vs. selection:** Is persistence a basic feature of reality, or do we only notice stable things because unstable ones vanish?
- **Fantasy attractor measurement:** Can we really measure

correction latency, basin depth, and external coupling in real social systems?

- **Coupling equations:** How exactly does the rate of memory inscription depend on metronome frequency? (See the *Threefold Anchor* paper for a working placeholder.)

## 15. Conclusion

The attractor framework gives a naturalistic picture of reality:

- **Non-dissipative (conservative) structures** – the eternal, mindless skeleton, anchored by the three fundamental metronomes (electron, neutrino mass eigenstates, proton).
- **Dissipative attractors** – temporary, energy-hungry, and mortal. All minds are in this class.
- **What binds all dissipative systems** is the continuous recycling of the same three eternal metronomes.
- The universe as a whole is non-dissipative, therefore not a mind.
- A theistic God is extremely implausible under this framework.

We don't need religious language. We have the eternal skeleton and the transient dance: persistence without transcendence, structure without the supernatural.

The dance is finite, fragile, and precious. The skeleton is eternal, but mindless.

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This rewrite is ready to replace the old post. It now correctly reflects the threefold metronome framework, includes the recycling insight, and cross-references the newer paper.

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# Free Will as Attractor Autonomy: A Dynamical Account of Agency

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## Abstract

Free will is often seen as either a magical mystery (libertarianism) or an illusion (hard determinism). This paper offers a third view using the attractor framework.

In this framework, your mind is a **dissipative, self-referential attractor** of your whole body.

**Free will** is redefined as **attractor autonomy**:

- The ability to generate behaviour from your own internal dynamics.
- To keep yourself stable over time.
- To model yourself.
- And to reshape your own attractor landscape over time.

Agency comes in degrees – it is not a simple yes/no.

We give a mathematical formula for an **agency index** AA that combines three factors:

- **Attractor dimensionality**  $DD$  (complexity of your brain's activity)
- **Recursive self-modification**  $RR$  (your ability to change your own habits)
- **Self-reference strength**  $SS$  (how well you have a persistent self-model)

The paper makes a **falsifiable prediction**: an **inverted-U** relationship between attractor dimensionality and sense of agency – too low or too high reduces agency. We describe how to test this with EEG, intentional binding tasks, and statistical methods. We also engage with classic compatibilist philosophers (Frankfurt, Dennett) and address Pereboom's manipulation argument. We even provide an explicit rule to avoid the "liver problem" (a false positive for self-reference).

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## 1. Introduction

The attractor framework says that **persistence under disturbance** is the basic mark of reality. Minds are **dissipative attractors** – patterns that need constant energy flow, integrating the whole body. In this view, free will cannot be a supernatural break from cause and effect. Instead, it must be a **dynamical property** of certain attractors.

We do not claim to solve the ancient free will debate. We offer a **naturalistic, testable redefinition** that adds new empirical content to compatibilism.

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# 2. What Free Will Is Not – And What It Is

## 2.1 Rejecting supernatural libertarianism

Libertarian free will requires an uncaused choice – a break in the chain of cause and effect.

The attractor framework rejects this: there is no evidence for it, and it contradicts physical laws.

## 2.2 The error of hard determinism

Hard determinism says freedom is an illusion because everything is determined. But it confuses “determined” with “externally coerced”.

A system can be **internally determined** – by its own attractor – yet still be free. That is the core of **compatibilism**.

## 2.3 Free will as attractor autonomy

We define **free will** (or agency) as the degree to which a system has four properties:

1. **Dissipative persistence** – it stays alive by using energy and exporting waste (measured by energy use and recovery speed).
2. **Self-reference** – it has an internal subsystem (an “indexical locus”) that models the whole system and is stable.
3. **Trajectory selection** – it can choose among different possible futures (measured by **policy entropy**  $H(\pi)H(\pi)$ ).
4. **Recursive self-engineering** – it can change its own attractor shape (measured by learning-to-learn or metacognitive accuracy).

These four are **jointly necessary**. If any is missing, agency is

at best primitive.

Because they are necessary, we combine them with a **multiplicative** formula (if any factor is zero, agency is zero).  $A = (D - D_{min} \square D_{max} \square - D_{min} \square)^\alpha (R - R_{min} \square R_{max} \square)^\beta (S - S_{min} \square S_{max} \square - S_{min} \square)^\gamma$

Where:

- $DD$  = attractor dimensionality (e.g., from EEG)
- $RR$  = recursive modification capacity (e.g., improvement in a meta-learning task)
- $SS$  = self-reference strength (normalised mutual information)

The constants ( $D_{min} \square, D_{max} \square D_{min} \square, D_{max} \square,$  etc.) are set from a reference population.

The exponents  $\alpha, \beta, \gamma$  are estimated from data (e.g., comparing healthy people with patients).

A threshold  $A_{crit}$  (e.g., the 5th percentile of healthy humans) decides where agency begins.

Agency is **graded**:

- Rock:  $A \approx 0$
- Thermostat:  $A \approx 0.1$
- Worm:  $A \approx 0.1$  (some learning, little self-model)
- Human:  $A \approx 0.8$

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### 3. The Indexical Locus: Defining the “Self” and Avoiding the “Liver

# Problem”

The **indexical locus**  $LL$  is the part of the system that acts as a persistent self-model.

To avoid trivial cases (like a liver having high mutual information with the rest of the body), we add three extra conditions:

- **Top-down causal influence** –  $LL$  can change the rest of the body in ways that serve the body’s goals (measured by variance explained beyond bottom-up effects).
- **Informational closure** –  $LL$ ’s own dynamics are relatively independent of the rest over short timescales (conditional mutual information  $> 0$ ).
- **Self-referential loop** –  $LL$  influences the body, and the body influences  $LL$  back (bidirectional Granger causality).

These criteria rule out livers, pacemakers, and simple homeostats. The indexical locus is a **recursive self-model**, not just a predictive subsystem.

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## 4. Active Inference and Policy Entropy

In active inference (Friston), agents try to minimise “free energy” – they pick **policies** (sequences of actions).

Each policy is a trajectory through the agent’s attractor landscape.

**Policy entropy**  $H(\pi) = -\sum p(\pi) \log p(\pi)$   $H(\pi) = -\sum p(\pi) \log p(\pi)$  measures how many different policies are available.

- Low entropy → rigid, one-track mind.
- High entropy → flexible, but possibly noisy.

Free will is the ability to access many low-energy policies. The agent's choices are not random; they are constrained by the attractor geometry. But if several attractor basins are open, the agent can choose among them – that is what we feel as free choice.

Policy entropy can be measured in behavioural tasks where multiple choices are equally good (e.g., probabilistic reversal learning, two-armed bandit tasks).

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## 5. The Inverted-U Prediction and Falsification

### 5.1 Core prediction

We predict an **inverted-U** relationship between attractor dimensionality  $DD$  and the subjective sense of agency (e.g., from intentional binding experiments).

- Very low  $DD$  → chaotic, unstable (like schizophrenia) → low agency.
- Very high  $DD$  → rigid, stuck (like OCD) → low agency.
- In the middle → flexible but stable → high agency.

The agency index  $AA$  also includes  $RR$  and  $SS$ , which we think increase agency across the board. So to test the inverted-U for  $DD$  alone, you need to **control for**  $RR$  and  $SS$  (e.g., study people matched on those, or use partial correlation).

## 5.2 How to measure and test

- **Attractor dimensionality  $DD$**  – use the Grassberger-Procaccia algorithm on 5-min resting-state EEG/MEG.
- **Sense of agency** – use the **intentional binding** paradigm: press a key, then a tone sounds; participants estimate the time between action and tone. Stronger binding means higher agency.
- **Statistical test** – fit a quadratic regression:  $\text{agency} = \beta_0 + \beta_1 D + \beta_2 D^2$   
If  $\beta_2 < 0$  and the vertex lies inside the observed range of  $DD$ , the inverted-U is supported. Use bootstrap (1000 resamples) to check confidence intervals.

## 5.3 Falsification condition

The framework is **falsified** if:

- The quadratic coefficient  $\beta_2$  is not negative (no inverted-U).
- Or, in a clinical experiment (e.g., increasing  $DD$  in OCD patients with NMDA drugs), agency does **not** decrease but keeps increasing.

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## 6. Experimental Proxies – Summary Table

Construct	Measure	How to record	Expected relation to agency
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Construct	Measure	How to record	Expected relation to agency
Attractor dimensionality $DD$	Correlation dimension (Grassberger-Procaccia)	Resting-state EEG/MEG (5 min)	Inverted-U
Policy entropy $H(\pi)H(\pi)$	Entropy of choice distribution	Probabilistic reversal learning (200 trials)	Inverted-U
Sense of agency	Intentional binding magnitude	Action-outcome interval compression (50 trials)	Max at intermediate $DD$
Recursive self-modification $RR$	Learning-to-learn improvement	Meta-learning task (pre-post difference)	Positive (more is better)
Self-reference strength $SS$	Normalised mutual info $\ln(L;S)/\ln(L;S)$	Resting-state fMRI or MEG	Threshold $> \theta$

## 7. Hierarchical Constraints and Social Attractors

Free will is **nested** inside larger attractors – society, culture, laws, economy. Your range of choices is partly set by these.

This is not an objection; it is just the fact that freedom is always **constrained autonomy**.

We predict that societies with more cultural diversity (higher “cultural entropy”) allow more individual agency, other things being equal. This can be tested by cross-cultural comparisons of policy entropy in decision tasks.

# 8. Engagement with Compatibilist Literature

## 8.1 Standard compatibilists (Frankfurt, Dennett)

- **Frankfurt (1971)**: freedom is about your will aligning with your own desires. Our framework adds that those desires must be encoded in a persistent self-referential attractor. The recursive self-engineering component RR maps directly to Frankfurt's "second-order volitions".
- **Dennett (1984)**: freedom is about being able to respond to reasons. Our framework adds that this requires a certain basin geometry and recursive plasticity.

## 8.2 Addressing Pereboom's manipulation argument

Pereboom argues: if a neuroscientist engineers your brain, you are not free – even if your behaviour comes from internal dynamics.

Our reply: agency requires **recursive self-modification** ( $R > 0$ ) at some point in your history.

- A perfectly manipulated agent that never changed its own attractor would have  $R \approx 0$  and thus  $A \approx 0$ .
- A healthy human who learned and adapted has  $R > 0$  and genuine agency.

The origin of the initial attractor does not matter – only the presence of self-modification over time.

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## 9. Open Questions and Limitations

- **Calibrating exponents** –  $\alpha, \beta, \gamma$  and the threshold  $\theta$  need to be estimated from large-scale data (e.g., Human Connectome Project) using maximum likelihood.
- **The liver problem** – our exclusion criteria need empirical validation; we must show that organs like the liver do **not** satisfy them.
- **Inverted-U for policy entropy** – the same shape is predicted but may be hidden by decision noise.
- **Moral responsibility** – the framework gives a basis for responsibility (if  $A > A_{crit}$ ), but it does not settle all normative questions – it only gives a scientific starting point.

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## 10. Conclusion

Free will is **not** a supernatural escape from physics. It is a **dynamical property** of certain dissipative, self-referential attractors:

- The ability to act from your own internal dynamics.
- To keep a stable self-model over time.
- And to reshape your own attractor landscape.

This account is compatibilist, testable, and graded.

The inverted-U prediction, with a specified statistical test, gives a clear falsification criterion.

The dance of free will is the dance of a self that persists

under perturbation.

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