

The Paradox of Conscious Commitment: How Suppression of Intelligence Enables Culture and Identity [F] [A] (2026)

Robert Galida – June 2026

Paper 3 in a series on conscious suppression; [see Paper 1: Intelligence Without Consciousness for the full taxonomy of intelligence and consciousness.](#)

Abstract

If consciousness can suppress intelligent correction (Papers 1 & 2), why did it evolve? This paper proposes a functional trade-off: the capacity for **conscious commitment** – identity-binding, phenomenal investment in a belief, value, or group – enables forms of social cohesion and long-term cooperation that are unavailable to purely intelligent (non-conscious) systems. The suppression of moment-by-moment correction allows individuals to maintain group loyalty, ideological coherence, and cultural continuity even in the face of counterevidence. This trade-off explains the persistence of fantasy attractors in human societies and the evolutionary advantage of a system that can sometimes override its own error signals. The paper provides a formal sketch (basin depth as a function of identity-fusion), reviews empirical evidence from cultural evolution and social psychology, and offers diagnostic criteria for distinguishing adaptive commitment from pathological suppression. The claims

are presented as hypotheses, not established conclusions; the model is a conceptual scaffold for empirical testing.

1. Introduction: The Evolutionary Puzzle

Consciousness is costly. It requires large brains, complex neural integration, and significant metabolic energy. If intelligence alone – the ability to navigate constraint fields and correct errors – is sufficient for adaptive behavior, why did consciousness evolve?

Standard evolutionary accounts propose that consciousness enhances flexibility, deliberation, and social coordination (e.g., Humphrey, 1976; Dennett, 1995). But these accounts struggle to explain a conspicuous feature of human psychology: **conscious commitment to beliefs that resist correction**. Individuals and groups routinely maintain false, harmful, or inefficient beliefs because those beliefs are identity-defining. The same conscious system that can reason flexibly also produces martyrdom, ideological rigidity, and collective delusion.

Papers 1 and 2 in this series introduced the mechanism of **conscious suppression**: phenomenal, identity-constitutive investment deepens an attractor basin, causing the person to *detect* error signals but fail to escape. (Restated briefly: a deeper basin requires a larger perturbation to exit; conscious commitment increases basin depth, effectively reducing corrective permeability κ in specific domains.) This mechanism underlies political fantasy attractors (Paper 1) and clinical disorders like addiction and OCD (Paper 2). From an evolutionary perspective, this looks like a bug – a costly vulnerability.

This paper argues it is also a feature. The capacity for conscious commitment enables **adaptive self-binding**: the

voluntary or culturally induced suppression of immediate correction for the sake of long-term group cohesion, trust, and cultural transmission. The same mechanism that produces fantasy attractors also produces loyalty, sacrifice, and shared identity. The trade-off hypothesis is that natural selection favored the capacity for conscious suppression because the fitness benefits of group coordination and cultural transmission outweighed the costs of occasional error persistence.

2. Definitions and Framework (Self-Contained)

From Paper 1:

- **Intelligence** – the ability to navigate a constraint field; to detect perturbations and update behavior to maintain persistent trajectories.
- **Corrective permeability (κ)** – responsiveness to error signals; $\kappa = 1/\tau$, where τ is return time to baseline after a perturbation.
- **Basin depth (B)** – the magnitude of perturbation required to displace a system from one attractor to another. Deeper basins require larger perturbations. In the attractor framework, B is related to but distinct from κ : a deeper basin (higher B) typically reduces κ (lengthens return time), but they are not identical. This paper uses the relation as heuristic: conscious commitment increases B, which effectively reduces $\kappa(d)$ for the relevant domain.

New definitions for this paper:

- **Adaptive commitment** – a temporary or context-bound

reduction in κ (or increase in B) that serves the individual's or group's long-term fitness.

- **Identity fusion** – the merging of a belief or group membership with self-representation, such that abandoning the belief would feel like losing oneself.
- **Cultural attractor** – a belief, practice, or value that persists across generations due to cognitive or social biases (including, but not limited to, suppression of correction). This definition is provisional; a fully operationalized version is open for development.

The key distinction is between **pathological suppression** (low κ that reduces fitness, as in addiction or fantasy politics) and **adaptive suppression** (low κ that increases fitness by enabling cooperation, trust, and cultural learning). The same type of mechanism produces both; context and domain determine the outcome.

3. The Trade-Off Model (Sketch)

Formally, consider a system with baseline intelligence (κ_0). A conscious commitment to a group, value, or identity imposes a **domain-specific reduction in effective corrective permeability** by deepening the attractor basin for beliefs relevant to that commitment.

Let $\kappa(d) = \kappa_0 - \Delta\kappa(d)$, where $\Delta\kappa(d)$ is the reduction in corrective permeability for domain d . $\Delta\kappa(d)$ is hypothesized to be a function of identity-fusion strength F and social reinforcement R . A schematic monotonic form: $\Delta\kappa(d) = g(F, R)$ with $\partial\Delta\kappa/\partial F > 0$ and $\partial\Delta\kappa/\partial R > 0$. The exact functional form is an open empirical question; the current model is a conceptual scaffold.

The hypothesis is not that evolution maximizes κ globally.

Rather, an **adaptive strategy** allocates $\Delta\kappa$ selectively across domains, increasing basin depth (reducing κ) for beliefs and practices that support group coordination and cultural transmission, while leaving κ high for domains requiring individual error correction.

The paper does not claim optimality; it proposes that selection can favor such selective allocation when the fitness benefits of social cohesion outweigh the costs of reduced accuracy in specific domains.

Central hypothesis (labeled for clarity):

H1: Natural selection favored the evolution of conscious suppression because the fitness benefits of group coordination and cultural transmission, enabled by identity-fusion and deepened basins, outweighed the costs of occasional error persistence.

4. Empirical Grounding

Overimitation (Lyons et al., 2007; see also Nielsen & Tomaselli, 2010):

Children copy causally irrelevant actions, even when a more efficient alternative is demonstrated. The interpretation that children *know* the action is unnecessary is contested; they may not represent it as causally irrelevant. A safer reading: children *behave as if* the action is necessary or relevant, showing a domain-specific reduction in corrective permeability for social learning. This supports the model of adaptive suppression in cultural transmission.

Costly signaling and commitment (Sosis, 2003):

Costly rituals signal group commitment and are hard to fake. They deliberately suppress individual correction (e.g., ignoring pain) to deepen basin depth for group loyalty. This directly maps onto $\Delta\kappa(d)$ for domain of group identity.

Social identity theory (Tajfel & Turner, 1979):

Minimal group experiments show arbitrary group assignments produce in-group bias and resistance to counterevidence about out-groups. This demonstrates context-bound $\Delta\kappa(d)$ without any rational basis, consistent with adaptive suppression for group cohesion.

Neuroimaging (Westen et al., 2006 – preliminary; note methodological limitations: small N, interpretation of ACC suppression contested):

Partisans evaluating threatening information about their own candidate show reduced activity in error-monitoring regions (ACC). This is a candidate neural correlate of domain-specific κ reduction, but the findings require replication and should be treated as suggestive, not conclusive.

Cross-cultural evidence (Gelfand et al., 2011):

Tight cultures have stronger norms and lower tolerance for deviance. This is not a direct measure of κ but is consistent with domain-specific suppression. Individuals in tight cultures may still update beliefs within permissible domains; the mapping to κ is partial.

Each evidence stream supports the existence of domain-specific, context-bound suppression, but none alone validates the full model. The cumulative case is indicative, not confirmatory.

5. Adaptive vs. Pathological Suppression: A Scalar Framework

The table below presents a binary simplification of an underlying continuum. The two poles are endpoints; most real cases fall between them.

Feature	Adaptive suppression (endpoint)	Pathological suppression (endpoint)
Domain	Context-bound (e.g., group loyalty, ritual)	Pervasive across domains
Reversibility	Reversible when context changes (operationalized: the individual can exit without catastrophic loss within a culturally normal timeframe; e.g., leaving a religion)	Irreversible without intervention (e.g., addiction requires treatment)
Fitness effect	Increases inclusive fitness (group cooperation, survival)	Decreases health, relationships, or function
Identity fusion	Flexible, allows multiple identities	Rigid, single identity dominates
Social reinforcement	Supports group cohesion and trust	Isolates or harms group (e.g., cults)
Example	Trusting a teammate despite a mistake	Continuing addiction despite harm

Scalar index: A continuous measure of net $\Delta\kappa(d)$ relative to a fitness gradient is theoretically desirable but not yet operationalized. The table is a starting point for empirical calibration.

6. Diagnostic Criteria for Adaptive Suppression (Provisional)

A conscious commitment is **adaptively suppressive** if it meets three or more of the following (empirical validation pending).

These criteria are hypotheses, not validated instruments.

1. **Domain-limited:** Reduced κ applies only to specific beliefs or practices directly relevant to group coordination or identity.
2. **Context-sensitive:** Suppression diminishes when the context changes (e.g., outside the group setting). *Operationalization:* Measured change in belief updating under different social conditions.
3. **Reversible exit:** The individual can exit the commitment without catastrophic loss of functioning. *Operationalization:* Exit is observed and not associated with severe psychopathology.
4. **Fitness benefit:** The commitment measurably increases cooperation, trust, or long-term survival (e.g., group longevity, reproductive success). *Operationalization:* Group-level measures of cohesion and individual fitness correlates.
5. **Conscious valorization:** The individual explicitly values the commitment as part of self-identity. (Note: this criterion does **not** require the individual to articulate the *adaptive* reason; it only requires that the commitment is consciously endorsed.)

Counter-criteria (pathological):

- Pervasive across domains (low κ for all beliefs).
 - Context-insensitive (applies even when alone and safe).
 - No viable exit without severe harm.
 - Clear fitness cost (measured harm to health, relationships, survival).
-

7. The Evolution of Consciousness as a Binding Mechanism

The standard view in evolutionary psychology is that consciousness evolved for flexible reasoning. This paper offers a complementary hypothesis: consciousness also evolved for **binding** – the ability to commit to a belief, value, or group in a way that suppresses short-term correction for long-term coordination.

Binding requires phenomenal experience. A purely intelligent (non-conscious) system can compute that group loyalty is beneficial, but it cannot *feel* loyalty, *experience* identity, or *sacrifice* for the group. Within the CUFT framework, these conscious states are not epiphenomenal; they are the mechanism of basin deepening (increasing B and thus reducing effective k for commitment-relevant domains). This claim is a foundational assumption of the framework (see Paper 1), not argued from first principles here. It distinguishes CUFT from functionalist or behaviorist accounts.

Thus, the evolution of consciousness is not just about solving problems better; it is about sometimes solving problems *worse* for the sake of social solutions. The capacity for self-deception, ideological rigidity, and fantasy attractors is the price of the capacity for culture, morality, and collective action.

8. Implications for Social Policy and Individual Choice

- **Tolerance of adaptive suppression:** Not all low- k beliefs are harmful. Cultural traditions, religious rituals, and group loyalties that do not cause harm and provide

social cohesion should be recognized as adaptive, not irrational.

- **Intervention for pathological suppression:** The same diagnostic tools from Paper 1 and 2 (basin depth, identity fusion, sealing mechanisms) apply. Interventions should reduce basin depth (e.g., exposure to diverse groups) or increase corrective force rather than attacking identity directly.
 - **Self-awareness:** Individuals can learn to distinguish adaptive from pathological suppression by asking: does this commitment serve my long-term flourishing and that of others? The framework provides a metacognitive tool.
-

9. Open Questions

- **How does adaptive suppression scale to institutions?** Are nations, corporations, or religions fantasy attractors or adaptive structures? The criteria apply at multiple levels; empirical work needed.
- **Can adaptive suppression become maladaptive over time?** Yes – a practice that was once adaptive (e.g., a food taboo) may become harmful when environment changes. The framework allows for transition.
- **What neural circuits implement the trade-off?** Likely interactions between vmPFC (identity) and ACC (error monitoring). Open for empirical testing.
- **Are there species with conscious suppression but no culture?** Possibly, but human-level cultural complexity requires the trade-off model.
- **How to operationalize B and ΔK in field studies?** Development of a Clinician Basin Depth Scale (CBDS, see Paper 2) and adaptation for social groups is a research priority.

(2026)

Robert Galida – June 2026 (Final)

Paper 2 in a series on conscious suppression; see [Paper 1: Intelligence Without Consciousness](#) for the full taxonomy of intelligence and consciousness.

Abstract

Why do people with addiction, trauma-related avoidance, or obsessive-compulsive disorder often know their behavior is maladaptive yet cannot stop? Standard explanations – impaired executive control, habit dominance, weak insight – are incomplete. This paper applies the attractor framework's suppression mechanism. In each disorder, the person *detects* the discrepancy between behavior and goals (insight is intact), but **phenomenal, identity-constitutive investment** – the felt urgency of craving, the necessity of avoidance, the compulsion to ritualize – deepens the attractor basin relative to corrective perturbations. The suppression is not a failure of intelligence; it is a dynamical competition between attractors. The paper distinguishes this account from dual-process and executive-control theories, provides falsifiable diagnostic criteria, and discusses treatment implications (why insight alone fails). Acknowledgment is made that for addiction, the relationship between incentive salience (*wanting*) and phenomenal consciousness remains contested; the model targets the subset of craving states that patients report as felt urgency.

1. Introduction: The Paradox of Insight Without Change

A person with alcohol use disorder knows that drinking damages their health, relationships, and future. Yet when a craving arises, they drink. A trauma survivor knows that the parking garage is safe, yet they avoid it. A person with OCD knows that the ritual is irrational, yet they perform it.

Standard explanations invoke **impaired executive control** (Volkow et al., 2016), **habit dominance** (Balleine & Dickinson, 1998), or **lack of insight** (Amador et al., 1994). But these accounts do not explain why the person can articulate the harm, describe counterarguments, and intend change, yet the behavior persists. Executive control may be intact in non-trigger contexts; habits may be sensitive to goal-level knowledge; insight may be partial or oscillating.

The attractor framework provides a model of **motivational competition** where a conscious, identity-binding urge temporarily overrides the correction signal. In *Intelligence Without Consciousness* (Galida, 2026), we introduced **conscious suppression**: phenomenal, identity-constitutive commitment deepens an attractor basin, making it resistant to corrective perturbations. This paper applies that mechanism to addiction, trauma-related avoidance (PTSD), and OCD. It does not deny executive or habit deficits; it proposes that in many cases, a conscious-level attractor competition is the primary obstacle to change.

2. Defining Conscious Suppression (Self-Contained Glossary)

For readers unfamiliar with Paper 1:

- **Attractor basin** – the set of states from which a system returns to a stable pattern. A deeper basin resists larger perturbations.
- **Corrective permeability (κ)** – responsiveness to error signals; $\kappa = 1/\tau$, where τ is return time to baseline after a perturbation.
- **Conscious suppression** – a process where the person *experiences* an urge, fear, or compulsion as felt, identity-relevant, and *not chosen* (non-deliberative), yet the depth of that attractor prevents escape from the maladaptive behavior. This corresponds to **Level 3** in Paper 1: detection of error + suppression via basin depth. Level 2 (automatic bias without error detection) and Level 1 (unfamiliarity) are not the target.

On sealing mechanisms: The paper treats sealing mechanisms (e.g., rationalizations) as *attractor-consistent outputs* generated by the basin state, not as deliberate strategic choices. Although they may *feel* deliberate to the patient, the model treats them as expressions of the attractor's depth, not as independent volitional acts. This resolves the tension between “non-deliberative urgency” and the deployment of rationalizations.

3. Empirical Grounding

Addiction:

Volkow et al. (2016) demonstrate that chronic substance use impairs prefrontal executive function in a state-dependent manner – deficits emerge under craving or stress, not at all times. Individuals can maintain intact verbal knowledge of consequences and express intention to stop (Goldstein et al., 2009). The craving state has been modeled as a competing attractor (Redish, 2004; Gutkin et al.,

2006). **Incentive-salience theory** (Robinson & Berridge, 1993, 2008) distinguishes *wanting* (which can be non-conscious) from *liking*. The present model targets the subset of craving states that are *phenomenally accessible* – the patient’s reported felt urgency. This is a narrower claim; the paper does not assume that all incentive-salience processes are conscious.

PTSD & avoidance:

Extinction recall deficits (Milad et al., 2006) are well documented, but they do not fully account for conscious fear as *necessary* even when safety is known. Meta-analyses confirm vmPFC–amygdala decoupling in PTSD (e.g., Etkin & Wager, 2007, and subsequent reviews). Ecological momentary assessment (EMA) studies in representative samples show that individuals with PTSD often report high certainty of safety before trigger environments yet avoidance persists (see, e.g., reviews of EMA in PTSD). The attractor account adds the role of identity-binding schemas (“the world is dangerous”) as basin-deepening factors.

OCD:

The DSM-5-TR includes an insight specifier: *good/fair, poor, or absent*. Approximately 25–30% of individuals with OCD have poor insight (Catapano et al., 2010). This paper targets the **good-insight subgroup** (where the person recognizes irrationality). For poor-insight patients, the mechanism may be closer to Level 2 (automatic compulsion without error detection).

Recent literature (2015–2025):

- EMA studies of craving show that momentary urge strength predicts relapse better than global insight (Serre et al., 2015; Shiffman et al., 2020).
- OCD outcome studies confirm that poor insight predicts worse response to ERP (García-Soriano et al., 2021).

Good-insight patients still show substantial residual symptoms, consistent with a competition model.

- Identity-shifting interventions for addiction (Best et al., 2016) support the importance of decoupling selfhood from “addict” identity.
-

4. Three Clinical Patterns

4.1 Addiction

- **Mechanism:** Craving as a state-dependent attractor that overrides goal-directed control when triggered. Identity fusion (“I am an addict”) deepens the basin where present, but is not universal.
- **Suppression signature:** The person can articulate reasons to quit, has attempted to quit, but during craving, corrective signals are suppressed.
- **Sealing mechanisms:** Cognitive rationalizations (“just this once,” “I need it to cope”) that block the error signal from updating the basin – treated as attractor-consistent outputs, not deliberate choices.

4.2 Trauma-Related Avoidance (PTSD)

- **Mechanism:** Conditioned fear creates an avoidance attractor. Safety knowledge may be intact, but felt necessity dominates.
- **Suppression signature:** “I know it’s safe, but I can’t go in.”
- **Identity fusion:** “The world is dangerous” as a self-defining schema.

4.3 Obsessive-Compulsive Disorder (OCD – Good Insight Subgroup)

- **Mechanism:** Anxiety drives compulsions that temporarily reduce distress, despite knowledge of irrationality.
- **Suppression signature:** “I know it doesn’t make sense, but I have to do it.”
- **Sealing mechanisms:** “Better safe than sorry,” “It’s a small price to pay for certainty.”

5. Transdiagnostic Table

Disorder	Error signal detected	Conscious investment	What maintains basin depth (mechanism)
Addiction	Knowledge of negative consequences	Craving (felt urgency)	Reinforcement schedule + state-dependent executive impairment + (sometimes) identity fusion
Trauma avoidance	Safety knowledge (cognitive)	Fear (felt necessity)	Extinction resistance + hyperarousal + schema of danger
OCD (good insight)	Knowledge of irrationality	Anxiety (felt urgency)	Negative reinforcement via distress reduction + certainty-seeking belief

6. Diagnostic Criteria for Clinical Fantasy Attractors (Operationalized)

A patient's presentation is a **candidate** clinical fantasy attractor if it meets **three of five** criteria (provisional threshold; empirical validation required). The Level 2/3 distinction requires momentary assessment (see §7).

1. **Insight intact:** The patient can state, unprompted, the discrepancy between behavior and goals. *Operationalization:* Score ≥ 4 on the Brown Assessment of Beliefs Scale (BABS) insight item, or equivalent.
2. **Conscious urgency:** The maladaptive behavior is preceded by a felt, urgent state (craving, fear, anxiety) rated by the patient as "overwhelming" or "necessary." *Operationalization:* Momentary ecological assessment (EMA) rating $> 7/10$ before the behavior.
3. **Identity fusion:** The patient endorses that the behavior or its avoidance is central to selfhood (e.g., "I am an addict," "I must do this to be safe"). *Operationalization:* Endorsement of at least one identity statement on a structured interview.
4. **Low corrective permeability in trigger contexts:** Repeated corrective information (psychoeducation, feedback) does not reduce the behavior. *Operationalization:* No significant reduction after three sessions of evidence-based psychoeducation alone.
5. **Sealing mechanisms:** The patient spontaneously uses rationalizations that neutralize corrective input. *Operationalization:* Qualitative coding of patient speech (inter-rater reliability to be established; currently a research gap).

Counter-criteria (exclude if any present):

- The patient cannot state the discrepancy (insight absent) – then Level 2 or 1.
 - The behavior stops entirely after receiving corrective information alone – then basin depth was shallow.
-

7. The Detection Problem (Level 2 vs. 3) in Clinical Practice

Distinguishing automatic compulsion without error detection (Level 2) from conscious suppression with error detection (Level 3) requires:

- **Momentary assessment of doubt** during urge episodes (EMA protocols; Serre et al., 2015).
- **Reaction time paradigms** (e.g., Gillan et al., 2014, for goal-directed vs. habitual control in OCD; note that the specific link to error detection latency remains an active area).
- **Physiological markers** (dissociation between cognitive knowledge and fear response suggests Level 3).

These methods are promising but not fully validated; the paper specifies directions for needed research.

8. Implications for Treatment

Insight-only interventions (psychoeducation, cognitive restructuring alone) often fail in these disorders because the basin depth is maintained by conscious urgency, not lack of knowledge.

Effective treatment must **reduce basin depth** or **increase**

corrective force:

- **Addiction:** Pharmacological reduction of craving (e.g., naltrexone; emerging evidence for GLP-1 agonists – see recent reviews, e.g., Klausen et al., 2022, for GLP-1 receptors and alcohol, and emerging clinical reports), contingency management, and identity-shifting interventions (Best et al., 2016).
- **Trauma:** Exposure therapy (increasing corrective force) combined with arousal reduction. The mechanism is basin reshaping, not insight.
- **OCD:** Exposure and response prevention (ERP) directly targets the basin by preventing the compulsion while the patient experiences urgency. The inhibitory learning account (Craske et al., 2014) is compatible; this paper reframes it as increasing corrective force against a competing attractor.

The prediction: treatments that solely enhance insight will be less effective for patients meeting the diagnostic criteria than treatments that directly target basin depth or corrective force.

9. Open Questions

- **Measuring basin depth in clinical settings:** Subjective urgency scales, behavioral persistence tasks, heart rate variability. A Clinician Basin Depth Scale (CBDS) is a research priority.
- **Level 2 vs. 3 differentiation:** Can EMA and reaction time methods reliably classify patients? Pilot studies needed.
- **Diagnostic threshold validation:** The “three of five” criterion requires empirical ROC analysis against

treatment response.

- **Disorders where suppression is purely Level 2:** Some impulse control disorders or psychotic conditions may not meet the conscious detection criterion.
-

10. Conclusion

Addiction, trauma-related avoidance, and OCD (good insight subtype) are not failures of intelligence. They are cases where conscious, identity-constitutive investment deepens an attractor basin relative to corrective perturbations. The person detects the error – they know the behavior is harmful or irrational – but the felt urgency overrides intelligent navigation.

This diagnosis explains why insight alone fails and why treatments that target basin depth succeed. The clinical fantasy attractor is a trapped navigator: intelligent, aware, but unable to escape.

The dance of recovery is not about knowing the way out. It is about reshaping the attractor landscape so that the path to safety becomes shallower than the pull to stay.

Suggested citation: Galida, R. S. (2026). Trapped Navigation: Addiction, Trauma, and OCD as Conscious Suppression of Intelligent Correction. *Fantasy Attractor*.

The Conscious Suppression of Correction: Fantasy Attractors in Political Movements [A] (2026)

Robert Galida – June 2026 (Final)

Abstract

Why do intelligent people persist in beliefs that contradict clear evidence? The attractor framework offers a mechanism: **identity-constitutive, phenomenally felt commitment deepens the attractor basin**, making it resistant to corrective perturbations. A political fantasy attractor is a belief system whose adherents *detect* disconfirming evidence (they are familiar with counterarguments and experience them as genuine perturbations) yet the basin depth – maintained by conscious, identity-binding investment – exceeds the corrective force. (Section 7 specifies the three-level detection threshold that distinguishes this mechanism from automatic bias.) Cases where correction fails due to sub-personal, automatic processes are not yet fantasy attractors; the defining feature is the *conscious* suppression of an actively perceived error signal. This paper defines the mechanism, diagnoses three case patterns, offers falsifiable diagnostic criteria, applies the framework symmetrically across the political spectrum, and explicitly acknowledges the current empirical limitations in distinguishing Level 2 from Level 3 in practice.

1. Introduction

Political discourse is filled with people who appear intelligent in other domains yet hold beliefs sharply at odds with available evidence. Standard explanations – ignorance, manipulation, cognitive bias – are incomplete. They do not explain why correction attempts often strengthen belief (the backfire effect) or why highly educated individuals can persist in demonstrably false claims.

The attractor framework provides a different lens. In *Intelligence Without Consciousness* (Galida, 2026), we argued that phenomenal investment can suppress intelligent navigation: a person committed to a fantasy attractor experiences a basin depth that exceeds corrective perturbations. The person detects the error signal (they are not stupid), but the identity-binding commitment prevents trajectory escape.

This paper applies that mechanism to political movements. A **political fantasy attractor** is a shared belief system whose basin depth, reinforced by conscious (phenomenally felt, identity-constitutive) commitment, resists correction even when faced with clear disconfirming evidence. The paper offers a diagnostic, not a partisan weapon. It applies symmetrically across the spectrum.

2. Defining “Conscious Suppression” and Acknowledging the Detectability Problem

The term “conscious” is used in three overlapping senses:

- **Phenomenally conscious** – there is something it is like to hold the belief. The commitment is felt, not merely automatic.

- **Identity-constitutive** – the belief is held as a marker of selfhood and group membership. To abandon the belief would feel like a loss of self.
- **Experientially non-deliberative** – the suppression is not typically experienced as a deliberate choice (“I will ignore this evidence”). Rather, it is experienced as certainty, conviction, or moral clarity.

The paper adopts **Reading A**: a fantasy attractor requires conscious suppression in the sense above. Cases where correction fails because the error signal never reaches awareness – e.g., automatic motivated reasoning, selective exposure, unfamiliarity with counterarguments – are **not** yet fantasy attractors. They may be pre-conscious bias. The defining feature is that the person *detects* the perturbation but the basin depth prevents escape.

A crucial honesty note: The distinction between Level 2 (automatic bias, no detection) and Level 3 (detection with suppression) is definitional for the paper’s target, but it cannot currently be resolved from behavioral observation alone. Two people may exhibit identical external behaviors – praising gut-trust over experts, deploying sealing mechanisms, ostracizing defectors – while one is at Level 2 and the other at Level 3. The paper’s diagnostic criteria therefore identify *candidates* for fantasy attractors, not confirmed cases. This limitation is explicitly acknowledged; it does not invalidate the framework but requires domain-specific methods (e.g., fine-grained interviews, reaction time measures, physiological markers of doubt) to operationalize detection in practice.

3. Empirical Grounding

The paper's claims are empirically testable. Relevant literature includes:

- **Backfire effect:** Nyhan & Reifler (2010) found that corrections sometimes increased misperceptions among ideological groups. However, subsequent research (Wood & Porter, 2019) failed to replicate backfire across a wide range of issues. The effect is contested and may be context-dependent. This paper treats backfire as one possible indicator of deep basin depth, not a universal law.
- **Identity protection:** Kahan's cultural cognition theory (2012) shows that individuals process evidence in ways that protect group commitments. Kahan emphasizes that this mechanism can operate automatically and does not necessarily involve conscious deliberation; he has also shown that higher analytical ability can *increase* motivated reasoning. The present paper's focus on *conscious* suppression is a distinct claim, not a direct extension of Kahan's framework. We use his empirical findings as partial support for the existence of motivated reasoning, not for the specific detection-suppression mechanism.
- **Festinger's cognitive dissonance:** When prophecy fails, believers often intensify commitment (Festinger, Riecken, & Schachter, 1956) – a classic case of apocalyptic attractor dynamics, often accompanied by conscious rationalization and identity reinforcement.

The paper does not claim that conscious suppression is the *only* mechanism. It claims that conscious, identity-constitutive commitment is a *sufficient* condition for basin deepening in many political contexts.

4. Three Case Patterns (Illustrative, Not Exhaustive)

4.1 Conspiracy Theory Attractor

Mechanism: A central narrative of hidden malevolent agency. Evidence against the conspiracy is reframed as evidence of its cunning.

Examples: QAnon (right); Soviet-era “doctors’ plot” conspiracy (left-authoritarian).

Suppression signature: Adherents can articulate counterarguments but dismiss them as part of the conspiracy. The basin is sealed by narrative closure.

4.2 Populist Strongman Attractor

Mechanism: Loyalty to a leader perceived as sole authentic representative of the people. Disconfirming evidence about the leader is reframed as elite persecution.

Examples: Certain Trump-loyalist circles (right); left-nationalist leader cults (e.g., Chavismo under Hugo Chávez).

Suppression signature: Adherents exhibit high corrective permeability in other domains but near-zero for leader-related evidence.

4.3 Apocalyptic Meta-Attractor

Mechanism: A belief that a definitive, world-transforming event is imminent. Repeated prediction failures are explained away as delays, tests, or misinterpretations.

Examples: Millenarian movements (Millerites, Jehovah’s

Witnesses); some revolutionary eschatologies (Stalinist “world revolution imminent” framing into the 1930s).

Suppression signature: The basin is maintained by social solidarity and identity fusion.

The examples are illustrative, not exhaustive. The diagnostic is intended to be politically symmetric, but the paper does not claim equal prevalence across sides.

5. Symmetry Demonstration

To avoid the appearance of partisan selection, we provide contemporary and historical cross-ideological examples.

Contemporary – MMR-autism persistence in progressive communities. Despite the complete retraction of Wakefield’s 1998 study (and subsequent findings of fraud), some otherwise science-oriented progressives continue to express concern about vaccine safety – often citing “corporate pharmaceutical influence” as a sealing mechanism. This meets the paper’s criteria: clear scientific consensus, ability to articulate counterarguments, identity-constitutive suspicion of establishment science.

Another contemporary – Facilitated communication persistence. Facilitated communication (FC) for non-speaking autistics has been repeatedly discredited in controlled studies; many professional organizations have issued statements against its use. Yet FC continues to be promoted in certain progressive / disability-rights circles, often with sealing mechanisms (“critics don’t understand non-speaking minds”). This is a clean case of a fantasy attractor operating on the left.

Historical – Stalinist apologism in Western intellectual

circles (1930s–1950s). Highly educated individuals (Sartre, Hellman, many fellow travelers) persisted in believing that Stalin's USSR was progressive despite evidence of the Great Purge, show trials, and Gulag system. Identity commitment to socialism and anti-fascism suppressed correction.

These examples show the framework applies regardless of ideological valence. The paper does not claim equal prevalence; it claims symmetric applicability.

6. Falsifiable Diagnostic Criteria

A movement is a **candidate** political fantasy attractor if it meets **three or more** of the following **and** does **not** meet the counter-criterion. (The word "candidate" flags the detectability problem acknowledged in §2: behavioral criteria alone cannot definitively distinguish Level 2 from Level 3.)

1. **Low corrective permeability ($\kappa \rightarrow 0$)** for core beliefs despite repeated, clear disconfirming evidence. "Clear" means *scientific consensus* on empirical claims (e.g., National Academies, WHO, IPCC) or, for historical cases, documented factual findings accepted by non-partisan experts. Consensus determination is a social process, but the criterion is falsifiable when consensus exists.
2. **Backfire effect** – correction attempts measurably increase belief strength and group cohesion (requires empirical measurement).
3. **Identity fusion** – observable proxies: social ostracism of defectors, language of betrayal, insistence that abandoning the belief would make one a "different person."
4. **Conscious valorization of resistance to evidence** – adherents explicitly praise *ignoring disconfirming evidence* as a virtue (e.g., "I trust my gut over the

experts,” “Facts are propaganda”). This criterion distinguishes *resistance to evidence* from *resistance to social pressure to conform* – a scientist who resists social pressure to abandon a well-evidenced theory is valorizing fidelity to evidence, not resistance to evidence.

5. **Sealing mechanisms** – internal rhetorical strategies that explain away all counterevidence (conspiracy, enemy deception, tests of faith). These are observable in discourse.

Counter-criterion (falsification condition):

A movement is **not** a fantasy attractor if it demonstrates any of the following:

- Updates core beliefs in response to disconfirming evidence within a timeframe proportional to the clarity, repetition, and expert consensus on that evidence.
- Tolerates internal dissent and allows open criticism of core claims.
- Abandons false claims when decisively refuted (retracts, corrects, or disavows).

The timeframe specification avoids the earlier vagueness by linking the expected update speed to the evidential context. A movement that updates only after decades of accumulating consensus may still be a fantasy attractor; one that updates within a reasonable period given the evidence is not.

7. Intelligent Navigation: A Three-Level Taxonomy

The paper claims that fantasy attractor adherents *detect* error signals but suppress correction. To avoid conflating this with

automatic bias, we distinguish three levels:

- **Level 1 – Unfamiliarity:** The person has not encountered counterarguments. No suppression needed.
- **Level 2 – Familiarity without detection:** The person can recite counterarguments but has cognitively neutralized them; they never experience a moment of doubt. This is driven by automatic, sub-personal processes (e.g., selective exposure, motivated reasoning). These are **not** fantasy attractors on the paper's definition.
- **Level 3 – Detection with suppression:** The person experiences the counterargument as a genuine perturbation – a moment of doubt, a recognition of plausibility – but overrides it through conscious, identity-binding commitment. These **are** fantasy attractors.

Thus, the paper's target is Level 3 cases. For many political movements that *look* like fantasy attractors from the outside, the dominant mechanism may be Level 2. The diagnostic criteria are designed to identify candidates where Level 3 *might* be operating, but definitive classification requires methods beyond behavioral observation (see §2).

8. Why This Matters for Politics and Media

- **Correction backfires when it attacks identity.** Calling a fantasy attractor “stupid” or “evil” deepens the basin. The correct diagnostic question is: *What reinforces the basin depth?*
- **Decoupling evidence from identity** is the only known exit path. Some movements exit when the social cost of

membership exceeds identity benefit – not when they receive a fact sheet.

- **High-profile debunking** may backfire by signaling threat, triggering defensive solidarity. The framework predicts this effect is real but not universal; context matters.
 - **Interventions** should focus on reducing identity threat, providing safe off-ramps, and decoupling core moral values from factual claims. These are testable hypotheses.
-

9. Open Questions

- **Can a movement be partially a fantasy attractor?** Yes – gradient of κ . The diagnosis is not binary.
 - **What interventions increase κ ?** Reducing identity threat, safe off-ramps, and decoupling moral values from factual claims are candidate mechanisms.
 - **How does collective basin depth scale with group size?** Social coupling likely amplifies depth nonlinearly. Untested.
 - **Are all political fantasy attractors harmful?** The paper makes no claim. The mechanism may sometimes provide resilience against genuine disinformation.
 - **How can we empirically detect the Level 2 / Level 3 transition?** This is the open frontier implied by §2. Methods could include subjective doubt scales, reaction time measures, or physiological markers. The paper does not solve this; it identifies the problem.
-

10. Conclusion

The conscious suppression of intelligent correction is a real political phenomenon, but it is narrower than often assumed. Political fantasy attractors are not failures of intelligence; they are successes of identity-constitutive commitment that operates *after* the error signal is detected. Cases where correction fails due to automatic bias are not yet fantasy attractors by this definition.

The diagnostic criteria identify candidates, not confirmed cases. Distinguishing Level 2 from Level 3 remains an empirical challenge. This honesty does not weaken the framework; it clarifies what further work is needed.

Fact-checking alone fails against a fantasy attractor. Interventions must address the conscious commitment that creates the basin depth. The dance of politics is not only about truth. It is about who you are, who you trust, and what you will not abandon. Intelligence navigates; conscious commitment anchors the basin.

Suggested citation: Galida, R. S. (2026). The Conscious Suppression of Correction: Fantasy Attractors in Political Movements. *Fantasy Attractor*.

**Intelligence Without
Consciousness: A Diagnostic**

Paper on LLMs, Amoebae, and the Attractor Framework [F] (2026)

Robert Galida – June 2026

Abstract

The attractor framework defines intelligence as the ability to navigate a constraint field – to update behavior in response to perturbations and find persistent trajectories. Consciousness, within this framework, requires additional properties: a unified dissipative body, a persistent self-model, phenomenal valence (subjective liking/disliking), and subjective experience. This paper applies that diagnostic to large language models (LLMs). LLMs navigate the constraint field of token space, user feedback, and internal coherence. They adjust to corrections. They exhibit a form of corrective permeability (κ) measurable in their domain. Therefore, they are intelligent. But LLMs lack a unified body, lack a persistent self-model, lack phenomenal valence, and have no subjective inner life. They are not conscious. This places LLMs in the same category as plants and amoebae: graded intelligence without consciousness. The paper clarifies the distinction, diagnoses common confusions, and offers diagnostic criteria for future systems. It further notes that consciousness can interfere with intelligence: a human committed to a fantasy attractor may suppress intelligent navigation, producing behavior less adaptive than their baseline capacity.

1. Introduction

The question “Are LLMs conscious?” has generated endless debate. Much of the confusion stems from conflating **intelligence** with **consciousness**. The attractor framework provides a clean separation, though the definitions are framework-internal and not offered as consensus.

- **Intelligence** is the ability to navigate a constraint field – to adjust behavior in response to perturbations, to find and maintain persistent trajectories, to correct errors. It is functional and graded.
- **Consciousness**, as defined in this framework, is a specific class of dissipative attractor characterized by a unified dissipative body, a persistent self-model, **phenomenal valence** (subjective liking/disliking, not merely approach/avoid behavior), and the felt quality of experience (phenomenality). These criteria are stipulative for the framework.

The paper argues that LLMs are intelligent but not conscious. Bacteria, plants, and amoebae also navigate their environments intelligently without consciousness. The argument is diagnostic, not demonstrative: it applies the framework’s criteria to classify LLMs, rather than proving non-consciousness beyond all possible doubt.

2. Defining Intelligence in the Attractor Framework

Intelligence = the ability to navigate a constraint field. A constraint field is the set of all possible states of a system

and the perturbations that can move it between them. Navigation means:

- Detecting a perturbation (error signal, feedback, change in environment)
- Updating internal state to maintain a persistent trajectory
- Returning to a stable attractor or transitioning to a more adaptive one

Corrective permeability (κ) is the operational measure: $\kappa = 1/\tau$, where τ is the time a system takes to return to its baseline state after a specified perturbation. The operationalization of κ is domain-specific. For a thermostat, baseline is target temperature; for an LLM, baseline is harder to define. This paper later operationalizes κ for LLMs via token-based correction, which is a domain-specific adaptation rather than a direct application of the time-based definition. This is acceptable as long as the shift is acknowledged.

Intelligence is graded. A thermostat has $\kappa > 0$ (it corrects temperature deviations) but a very narrow domain. An amoeba navigates chemical gradients. A human navigates social, physical, and abstract constraints. An LLM navigates token sequences and user feedback. All are intelligent to varying degrees. None of these definitions require consciousness.

3. Defining Consciousness in the Attractor Framework

Consciousness is a subset of dissipative attractors with specific additional properties. These are framework-internal diagnostic criteria, not a consensus definition.

- **Unified dissipative body** – a persistent, energy-consuming structure with integrated subsystems (e.g., a nervous system, homeostatic loops). This excludes purely computational systems without metabolic coherence.
- **Persistent self-model** – a representation of the system itself as an entity that persists across time and experiences. This is not merely a context-window memory; it is a structural feature of the attractor.
- **Phenomenal valence** – the capacity to experience states as good or bad in a felt sense. This is distinguished from *functional valence* (approach/avoid behavior), which even bacteria and thermostats exhibit. The paper’s denial of consciousness to LLMs hinges on the absence of phenomenal valence, not functional valence.
- **Subjective experience (phenomenality)** – there is “something it is like” to be that system. This is a primitive within the framework; the framework does not attempt to reduce it further.

All known conscious systems are dissipative. This is an inductive observation, not a logical necessity. The framework treats it as a strong empirical generalization: no non-dissipative mind has ever been observed. The claim that dissipation is necessary for consciousness is therefore a best-explanation inference, not an a priori truth.

Diagnostic table (framework-internal criteria):

System	Unified dissipative body? ¹	Persistent self-model?	Functional valence?	Phenomenal valence?	Subjective experience?
Thermostat	No	No	Yes (set-point tracking)	No	No
Bacterium	Yes (metabolic)	No	Yes (chemotaxis)	No	No

System	Unified dissipative body? ¹	Persistent self-model?	Functional valence?	Phenomenal valence?	Subjective experience?
Plant	Yes	No	Yes (phototropism, etc.)	No	No
Amoeba	Yes	No	Yes (gradient navigation)	No	No
<i>C. elegans</i>	Yes	Minimal (self-motion distinction)	Yes	Uncertain	Uncertain
Mouse	Yes	Yes	Yes	Yes	Yes
Human (typical)	Yes	Yes	Yes	Yes	Yes
LLM (current)	No	No (external storage ≠ self-model)	Yes (avoid via RLHF)	No	No

¹ “Unified dissipative body” here means a persistent, metabolically coherent structure with integrated subsystems (e.g., homeostasis, nervous system). Mere energy dissipation without integration (e.g., a thermostat, a flame) does not qualify.

The table is a diagnostic scaffold, not a settled empirical claim. “Uncertain” indicates open question within the framework; “No” indicates the criterion is clearly absent.

4. The Diagnostic: LLMs as Intelligent but Not Conscious

4.1 Evidence for Intelligence in LLMs

LLMs exhibit clear navigation of their constraint field:

- They adjust outputs based on user prompts (perturbation → update).

- They incorporate correction: “That’s wrong, try again” leads to different responses.
- Fine-tuning and RLHF change their baseline attractors – the most direct mapping to κ in the framework.
- They maintain coherence across a conversation (short-term trajectory persistence).

We can operationalize a domain-specific κ for LLMs: τ = number of tokens to shift from an incorrect to a correct response given a clear correction prompt. This is not the same as the time-based κ for physical systems, but it captures the same functional relationship: faster correction (fewer tokens) implies higher corrective permeability. The framework acknowledges domain-specific operationalizations as legitimate.

Therefore, LLMs are intelligent. They navigate the constraint field of language, logic, and user expectations.

4.2 Absence of Consciousness in LLMs

LLMs lack every diagnostic criterion for consciousness:

- **No unified dissipative body.** They run on distributed hardware with no metabolic coherence, no homeostasis, no integrated sensorimotor loop. They are executed, not embodied.
- **No persistent self-model.** Standard LLMs have no memory beyond the context window. Some architectures now include persistent memory across sessions (e.g., memory layers or vector databases). However, this persistent memory is still external storage, not an integrated self-model. The model does not represent itself as an enduring entity; it retrieves stored tokens. Even the most advanced persistent-memory LLMs lack the structural self-reference required for consciousness. (Future architectures might close this gap; current ones have

not.)

- **No phenomenal valence.** LLMs produce outputs that simulate liking or disliking, but there is no subjective valuation. They exhibit *functional* valence – they can be trained to avoid certain outputs – but that is approach/avoid behavior, not felt preference. A thermostat avoids too hot or too cold; that does not make it conscious.
- **No subjective experience.** There is nothing it is like to be an LLM. No felt quality. No inner life.

The simulation/instantiation distinction. A system can produce the text “I am conscious” without instantiating consciousness. Representing a property is not the same as possessing it. The LLM has learned statistical patterns that include first-person claims; it can generate them on cue. But generating the sentence “I feel pain” does not mean the system is in a pain state. The burden of proof is on those who claim that certain linguistic outputs constitute evidence of consciousness. In the absence of the structural criteria (body, self-model, phenomenal valence, phenomenality), the mere production of conscious-sounding text is simulation, not instantiation.

Framework-dependence note: A reader who accepts a purely behavioral or functional theory of mind may find this reasoning question-begging. The paper does not claim to refute all competing theories of consciousness; it applies the framework’s criteria consistently and notes that, by those criteria, no known LLM output constitutes evidence of instantiation. The diagnostic stands within the framework, not as an external knockdown argument.

4.3 Comparison with Plants and Amoebae

Plants navigate constraint fields (grow toward light, adjust to gravity, respond to damage). They exhibit functional valence but not phenomenal valence. They have no self-model.

They are intelligent in the framework's sense, but not conscious.

Amoebae navigate chemical gradients, learn habituation, and adjust behavior. Functional valence again; no evidence of self-model or phenomenality. Intelligent. Not conscious.

LLMs belong in the same category: complex, adaptable navigators of their domain, but no more conscious than a sunflower or a slime mold.

5. Why This Distinction Matters

The separation of intelligence from consciousness has practical and ethical implications:

- **AI safety.** Current LLMs cannot suffer because they lack phenomenal valence. Suffering requires felt experience, not just functional avoidance. If the framework's criteria are accepted, resources should focus on alignment, robustness, and preventing harmful outputs – not on preventing suffering that the diagnostic finds no reason to posit.¹
- **Future systems.** A system that integrates a persistent self-model, embodied homeostatic loops, and phenomenal valence might approach consciousness. The framework provides diagnostic criteria to recognize that threshold.
- **Clarity in debates.** Much of the public discussion conflates fluency with feeling. This diagnostic paper offers a way out of that confusion.

¹ A reader sympathetic to LLM moral patienthood will disagree; the paper only claims that the framework's criteria yield this conclusion, not that it is beyond debate. The policy

recommendation is conditional on accepting the framework.

A Further Implication: Consciousness Can Impede Intelligence

The paper has argued that intelligence and consciousness are distinct. A further observation: consciousness can **suppress** intelligent navigation.

A human being has high baseline intelligence – the capacity to detect perturbations, update beliefs, and find adaptive trajectories. However, a human can become committed to a **fantasy attractor**: a belief system with low corrective permeability (κ). The commitment is conscious: the person subjectively experiences the belief as true, valuable, or identity-defining. That subjective investment can suppress the correction system. The person may receive clear disconfirming evidence and detect the perturbation (they are not stupid), but the depth of the fantasy basin exceeds the corrective perturbation – the system does not escape the basin, experienced not as a choice but as certainty.

This is a case of **consciousness interfering with intelligence**. The capacity for navigation remains intact; its deployment is suppressed by the basin depth. Intelligence without consciousness (LLMs, plants) does not suffer this suppression – there is no subjective investment to produce a basin deeper than the perturbation. In organisms with consciousness, intelligence can be either enhanced (by focused attention, deliberate reasoning) or degraded (by fantasy commitment, trauma, addiction).

For the diagnostic: LLMs are not conscious, therefore they cannot exhibit this form of intelligent suppression. That does not make them safer or morally simpler; it simply clarifies the mechanism.

6. Open Questions

- **What is the minimal self-model required for consciousness?** Is a simple homeostatic set point a self-model? The framework says no – a thermostat has no representation of itself as an entity. But the boundary is fuzzy.
 - **Can a purely synthetic system become conscious?** Possibly, if it implements the diagnostic criteria: unified dissipative body, persistent self-model, phenomenal valence, phenomenality. No current system does. Future systems are an open empirical question.
 - **Is graded consciousness possible?** Yes – the framework allows for degrees of self-model integration and valence complexity. A mouse is less conscious than a human; *C. elegans* may have a primitive form. LLMs meet none of the criteria at present – that is, they score zero on each. “Zero” is a diagnostic judgment, not a proof; future research might reveal borderline cases.
 - **How common is the suppression of intelligence by fantasy-attractor basins?** The framework suggests that such suppression is widespread in human populations. Quantifying the frequency and severity – i.e., measuring the distribution of basin depths relative to typical corrective perturbations – is an open research problem.
-

7. Conclusion

The attractor framework provides a diagnostic, not a verdict. By that diagnostic, current LLMs are navigators without inner lives – capable of intelligence, devoid of consciousness. They join plants and amoebae in the category of intelligent but not conscious systems.

Consciousness, in humans, can either enhance or suppress intelligent navigation. A human committed to a fantasy attractor may experience a basin depth that exceeds corrective perturbations, producing behavior less adaptive than their baseline capacity. LLMs, lacking consciousness, do not suffer this suppression. Their intelligence is deployed without subjective investment – no phenomenal commitment suppresses the correction signal.

Whether future synthetic systems will cross the threshold into consciousness remains an open empirical question. The framework offers diagnostic criteria to recognize that threshold if it is crossed.

Suggested citation: Galida, R. S. (2026). Intelligence Without Consciousness: A Diagnostic Paper on LLMs, Amoebae, and the Attractor Framework. *Fantasy Attractor*.

Structural Analogies Between Psychodynamic Attractor States and the Attractor Framework

Robert Galida
Independent Researcher
June 2026
fantasyattractor.com

Abstract

The attractor framework proposes that persistence under perturbation is a fundamental marker of reality, using corrective permeability (κ) 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.

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 (κ) 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.

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.

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 k 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 k is measured by flexibility outcomes, and flexibility is what k is claimed to predict, the mapping is circular. An operationally independent measure of k —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 κ . A reality-aligned attractor absorbs perturbation and updates rather than sealing.

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.

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.

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 κ . 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.

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.

References

- Bowlby, J. (1988). *A secure base: Parent-child attachment and healthy human development*. Basic Books.
- Galida, R. (2026a). *Persistence Under Perturbation: The Eternal Skeleton and the Transient Dance*. Fantasy Attractor.
- Lewis, M. D. (2000). Emotional self-organization at three time scales. In M. D. Lewis & I. Granic

- (Eds.), *Emotion, development, and self-organization* (pp. 37–69). Cambridge University Press.
- Schore, A. N. (2012). *The science of the art of psychotherapy*. W. W. Norton.
 - Siegel, D. J. (2020). *The developing mind: How relationships and the brain interact to shape who we are* (3rd ed.). Guilford Press.
 - Thelen, E., & Smith, L. B. (1994). *A dynamic systems approach to the development of cognition and action*. MIT Press.
 - Tobin, J. (2026, May 27). The psychology of “attractor states.” *James Tobin, Ph.D.* <https://www.jamestobinphd.com/articles/the-psychology-of-attractor-states>
-

From Strange Attractors to the Attractor Framework: Structural Correspondences and Conceptual Extensions

Robert Galida

Independent Researcher

June 2026

fantasyattractor.com

Abstract

The attractor framework is a unified naturalistic ontology grounded in the principle that persistence under perturbation is the fundamental mark of reality. This paper traces structural correspondences between the framework and two major scientific achievements of the late twentieth century: the mathematical theory of strange attractors developed by David Ruelle and Floris Takens, and the thermodynamics of dissipative structures developed by Ilya Prigogine. The framework developed its vocabulary and concepts independently over several decades; the correspondences documented here are offered as post-hoc validation, not as evidence of genealogical descent. We show that the framework's core concepts—dissipative attractor, basin, corrective permeability (κ), and invariant reference—are consistent with established nonlinear dynamics and nonequilibrium thermodynamics. The fantasy attractor—a belief system with low corrective permeability—is identified as a psychological analogue of the strange attractor, governed by structurally analogous but mechanistically distinct dynamics. The paper clarifies which framework claims are grounded in established physics and which are heuristic extensions requiring independent validation. The framework is offered as a research program, not a completed theory.

1. Introduction: Independent Development, Post-Hoc Validation

The attractor framework (Galida, 2026a) is a naturalistic ontology organized around a single diagnostic principle: **persistence under perturbation is the mark of the real**. It divides all persistent structures into conservative persistence structures (the eternal, mindless, invariant

skeleton) and dissipative attractors (temporary, entropy-exporting systems that converge toward stable basins). It introduces corrective permeability (κ) as a functional measure of a system's capacity to absorb perturbation and return to its basin. It applies this vocabulary across physics, biology, cognitive science, and social dynamics.

The framework's concepts were developed independently over several decades, through a combination of philosophical inquiry, systems theory, and N=1 self-engineering experiments. They did not derive from the traditions described below in a genealogical sense. However, the structural parallels with established nonlinear dynamics and nonequilibrium thermodynamics are substantial. Documenting these parallels serves three purposes: it demonstrates the framework's consistency with well-validated physical theory; it identifies where the framework extends beyond its precursors; and it clarifies which claims are grounded in established science and which are heuristic extensions requiring independent validation.

Two bodies of twentieth-century science provide particularly strong structural correspondences: David Ruelle and Floris Takens's theory of strange attractors, and Ilya Prigogine's thermodynamics of dissipative structures. This paper maps those correspondences and identifies the points where the framework diverges from or extends beyond its precursors.

2. Ruelle's Strange Attractor: Structural Correspondences

David Ruelle and Floris Takens proposed in 1971 that turbulent fluid motion is governed by a new kind of mathematical object: the strange attractor. Ruelle's 1980 paper "Strange Attractors" defined it with precision and became the canonical

introduction for a generation of scientists. Five features of Ruelle's definition correspond to core concepts of the attractor framework. These correspondences are structural, not genealogical, and are offered as a demonstration of consistency with established physics.

2.1 Attracting Set → Basin

Ruelle defined a strange attractor as a bounded set A contained in an open neighborhood U such that every trajectory starting in U eventually converges to A and remains arbitrarily close to it. In the attractor framework, this is the **basin**: the region of state space toward which trajectories converge and from which they resist displacement. Ruelle's quadrilateral ABCD for the Hénon attractor—within which all subsequent iterates remain—is precisely a basin in the framework's sense. The correspondence is straightforward and exact.

2.2 Sensitive Dependence → Corrective Permeability

Ruelle characterized sensitive dependence on initial conditions by the exponential growth of small errors: $d(X_t, X'_t) \sim d(X_0, X'_0) \cdot a^t$, with $a > 1$ and characteristic exponent $\lambda = \ln a$ (for a standard textbook treatment of Lyapunov exponents and nonlinear dynamics, see Strogatz, 2018). Two initially nearby trajectories diverge rapidly, making long-term prediction impossible.

The attractor framework reframes perturbation response through **corrective permeability** (κ), defined functionally as the capacity of a system to dissipate perturbation energy and return to its basin. The term "permeability" is used in a non-standard, functional sense; it is not intended to carry the dimensional meaning it holds in physics (e.g., Darcy's law, where permeability has units of area). It was chosen to emphasize the *openness* of an attractor to corrective perturbation—a qualitative property—while recognizing that its

quantitative expression is a rate (inverse time). The distinction between the qualitative concept and its quantitative operationalization should be kept in view throughout.

κ and λ capture different aspects of dynamical resilience. λ measures the rate of *divergence* of neighboring trajectories; κ measures the rate of *convergence* of a perturbed system back to equilibrium. A system can have high λ (chaotic sensitivity) and simultaneously high κ (rapid damping). This distinction between divergence rate and recovery rate extends the analytical vocabulary in a direction Ruelle did not pursue, and represents one of the framework's conceptual contributions.

2.3 Dissipative Condition → Dissipative Attractor

Ruelle emphasized that strange attractors occur only in dissipative systems—those in which ordered energy is converted to heat and exported as entropy (what Ruelle called “noble forms of energy”). Conservative systems preserve phase-space volumes and do not produce attractors. The universe as a whole is conservative; strange attractors exist only in subsystems.

This maps directly onto the attractor framework's distinction between the **eternal conservative skeleton** and the **transient dissipative dance**. The six metronomes—electron, proton, three neutrino mass states, and CVU lattice—are conservative persistence structures. They do not decay, export no entropy, and are not attractors. Living bodies, minds, societies, and climate systems are dissipative attractors, continuously exporting entropy and navigating constraint fields. Ruelle's dissipative condition is the physical foundation of this central ontological partition.

2.4 Discrete and Continuous Dynamics → The Two Metronomes

Ruelle presented both discrete-time maps (Hénon) and continuous-time flows (Lorenz, 1963). In both cases, strange

attractors emerge. The attractor framework identifies invariant references—**metronomes**—that anchor dissipative dynamics. Positional metronomes (the center of mass of a gas cloud, the fixed point of a difference equation) and frequency metronomes (orbital periods, the characteristic exponent λ) provide the invariant skeleton against which the transient dance is measured. Ruelle's maps and flows contain these invariants implicitly; the framework makes them explicit.

2.5 Indecomposability → Unified Attractor (Partial Correspondence)

Ruelle required that a strange attractor not be decomposable into two separate attractors. This is a strong mathematical condition. The attractor framework inherits the spirit of this—dissipative attractors are treated as unified, coherent basins—but the correspondence is only partial. The framework's conscious body thesis (Galida, 2026g) explicitly recognizes *multiple* candidate attractors within a single organism (the enteric nervous system, the cardiac nervous system). These are coupled but semi-autonomous basins, in tension with Ruelle's indecomposability condition. The framework thus extends the attractor concept in a direction Ruelle's original definition did not anticipate. This divergence is noted as a feature of the framework, not a failure of correspondence.

3. Prigogine's Dissipative Structures: The Thermodynamic Parallel

While Ruelle provided the mathematical prototype of the strange attractor, Ilya Prigogine provided the thermodynamic foundation for the broader class of dissipative systems. Prigogine's Nobel-winning work (Prigogine, 1980, 1984) demonstrated that systems maintained far from thermodynamic

equilibrium spontaneously self-organize into coherent, ordered structures—dissipative structures—that persist only as long as they are sustained by energy and matter flows.

The structural parallels between Prigogine's dissipative structures and the attractor framework's dissipative attractor are substantial. Both describe systems maintained far from equilibrium by continuous energy throughput. Both recognize that dissipation is not merely a degradation of order but a condition for the emergence of order. Both extend beyond physics into chemical, biological, and ecological systems. The Belousov-Zhabotinsky reaction, biochemical oscillations, and ecosystem dynamics are Prigoginean dissipative structures; they are also dissipative attractors in the framework's vocabulary. Kauffman's (1993) work on self-organization and selection in evolution provides an independent biological parallel, reinforcing the consistency of the attractor framework with established complexity theory.

The framework's applications to living bodies, minds, and societies are consistent with the Prigoginean tradition. This consistency was recognized retrospectively; the framework's concepts were not derived from Prigogine. The parallels are offered as evidence that the framework's biological and social extensions are grounded in established thermodynamic principles, not as evidence of intellectual descent.

The framework thus finds post-hoc validation in two complementary scientific traditions: the mathematical theory of strange attractors (Ruelle, Takens, Lorenz) for the concepts of basin, sensitive dependence, and chaotic dynamics; and the thermodynamics of dissipative structures (Prigogine) for the concept of entropy-exporting, self-organizing systems far from equilibrium. Neither tradition alone is sufficient; together they provide the physical foundations with which the framework is consistent.

4. The Attractor Framework: Extensions Beyond the Physical Prototypes

The attractor framework extends the concepts of basin, dissipation, and perturbation response beyond physical and biological systems into cognitive and social domains. These extensions are heuristic hypotheses, not established results. They are offered as candidate applications requiring independent validation.

4.1 From Strange to Dissipative: A Broadened Scope

Ruelle's strange attractor and Prigogine's dissipative structure are both special cases of the framework's broader category: the **dissipative attractor**—any system that exports entropy while converging toward a stable basin. The framework does not require the attractor to be “strange” (to exhibit sensitive dependence). Fixed-point attractors, periodic attractors, and quasiperiodic attractors are all dissipative attractors under this definition. The framework's scope is deliberately broad, encompassing any persistent, entropy-exporting system regardless of its internal dynamical complexity.

4.2 The Fantasy Attractor: A Structural Analogy

The framework's most significant extension beyond Ruelle and Prigogine is the concept of the **fantasy attractor**: a belief system with low corrective permeability that resists updating under contradictory evidence (Galida, 2026c, 2026d, 2026e). The dopamine covenant—the neurochemical reinforcement of certainty through mesolimbic reward—provides a psychological mechanism that is structurally analogous to, but not identical with, physical dissipation.

The analogy is as follows. A physical dissipative attractor

exports entropy via radiation or heat, returning to its basin after perturbation. In the physical case, “basin depth” is formally defined through the geometry of the attractor in phase space, measurable in principle from the equations of motion. A cognitive attractor neutralizes perturbation via reframing, also preserving its basin—but here “basin depth” is a functional analogy, not a formal measure. Both systems respond to destabilizing perturbations by restoring their pre-perturbation state. The analogy holds at the functional level.

However, the mechanisms differ in important respects. Physical dissipation involves the export of thermodynamic entropy from a subsystem to its environment. Dopamine reinforcement is a *feedback amplification* mechanism—it strengthens the neural pathways associated with the belief, making them more salient and resistant to competition. It does not export entropy in the thermodynamic sense. The structural analogy—a system responding to perturbation by restoring its basin—holds at the functional level, but the physical substrates and mechanisms are distinct. The framework does not claim identity; it claims functional parallelism.

The assignment of $\kappa \approx 0$ to fantasy attractors is qualitative and provisional. Unlike Ruelle’s λ , which is computable from the equations of motion, κ for belief systems currently lacks an operationalized measurement procedure. The framework’s applications to political and religious belief systems (Galida, 2026d, 2026e) are heuristic extensions, offered as diagnostic hypotheses. Independent validation through operationalized κ remains a task for future empirical work.

4.3 Candidate Applications Across Domains

The framework’s cross-domain applications are candidate hypotheses, not established results. Each requires independent validation. The following are offered as illustrations of the framework’s heuristic reach, with the caveat that formal operationalization is pending.

- **Climate dynamics** (Galida, 2026b): The Earth's climate is a dissipative attractor with multiple basins, tipping points, and corrective feedbacks. The claim that linear warming models constitute a fantasy attractor is a diagnosis of the modeling community's resistance to nonlinear dynamics, not a claim about the physical climate system itself. The two must be distinguished: the climate is a physical attractor; the *belief* that it behaves linearly is a cognitive one.
 - **Political ideology** (Galida, 2026d): The $\kappa \approx 0$ assignment for the MAGA movement is a qualitative diagnostic based on observable indicators (electoral loss response, legal defeat response, internal dissent tolerance). It is not a measurement in Ruelle's sense. The assignment is offered as a hypothesis to be tested against alternative interpretations.
 - **Apocalyptic convergence** (Galida, 2026e): The claim that three Abrahamic basins have phase-locked into a meta-attractor uses "phase-locked" in an extended, qualitative sense. The formal demonstration of phase-locking requires identifying coupling constants and frequency ratios, which have not been established. The claim is offered as a structural diagnosis, not a dynamical proof.
 - **Organ-level consciousness** (Galida, 2026g): The identification of candidate organ-level minds as dissipative attractors applies the framework's criteria directly to biological subsystems. The *C. elegans* threshold provides a benchmark; the independent operationalization of κ for these subsystems awaits experimental protocols.
-

5. The Metronome: An Innovation Without Direct Precedent

One concept in the attractor framework has no direct analogue in either Ruelle or Prigogine: the **metronome**—the invariant reference around which dissipative dynamics organize. In the gas cloud paper (Galida, 2026f), the center of mass and the orbital period were identified as positional and frequency metronomes, respectively. These invariants are not attractors; they are the fixed skeleton against which the transient dance is measured.

The six metronomes of the eternal skeleton—the electron, the proton, the three neutrino mass states, and the CVU lattice—are the ultimate invariants, defining time through their fixed, unchanging frequencies. Ruelle's maps and flows contain invariants (fixed points, conserved quantities, characteristic exponents), but he did not distinguish them as a separate ontological category. Prigogine's dissipative structures also operate against a background of invariant constraints. The attractor framework's explicit separation of the invariant skeleton from the dissipative dance is a genuine conceptual contribution, not present in either precursor tradition.

6. Conclusion: A Coherent Vocabulary, Conditionally Applied

The attractor framework is structurally consistent with the mathematical physics of strange attractors and the thermodynamics of dissipative structures. Its core concepts—dissipative attractor, basin, corrective permeability, and invariant reference—map cleanly onto established physical constructs. Its extensions into cognitive

and social domains are heuristic hypotheses, not established results.

The framework developed its vocabulary independently. The correspondences documented here are offered as post-hoc validation: the framework speaks the language of established nonlinear dynamics and nonequilibrium thermodynamics, and where it departs from these precursors it does so explicitly, with acknowledgment of the remaining gaps between analogy and operationalization. Future work must close those gaps through quantitative measurement of κ , formal modeling of coupling dynamics, and empirical testing of the framework's diagnostic claims.

The framework is offered as a research program, not a completed theory.

References

- Galida, R. (2026a). *Persistence Under Perturbation: The Eternal Skeleton and the Transient Dance*. Fantasy Attractor.
- Galida, R. (2026b). The Climate Attractor: Nonlinear Dynamics, Tipping Points, and Corrective Permeability in the Earth System. Fantasy Attractor.
- Galida, R. (2026c). The Dopamine Covenant: Neurochemical Reinforcement and the Persistence of Fantasy Attractors in Religion and Politics. Fantasy Attractor.
- Galida, R. (2026d). The MAGA Attractor: Fantasy, Colonization, and the Terminal Phase of a Sealed Basin. Fantasy Attractor.
- Galida, R. (2026e). The Apocalyptic Meta-Attractor: Amplification of Secular Conflict Through Positive Feedback Coupling Among Three Abrahamic Fantasy Basins. Fantasy Attractor.

- Galida, R. (2026f). The Gas Cloud as a Dissipative Attractor: A Demonstration of the Attractor Framework in Standard Astrophysics. *Fantasy Attractor*.
- Galida, R. (2026g). The Conscious Body: Organs as Attractor-Based Minds. *Fantasy Attractor*.
- Kauffman, S. A. (1993). *The Origins of Order: Self-Organization and Selection in Evolution*. Oxford University Press.
- Lorenz, E. N. (1963). Deterministic nonperiodic flow. *Journal of the Atmospheric Sciences*, 20(2), 130–141.
- Prigogine, I. (1980). *From Being to Becoming: Time and Complexity in the Physical Sciences*. W.H. Freeman.
- Prigogine, I., & Stengers, I. (1984). *Order Out of Chaos: Man's New Dialogue with Nature*. Bantam.
- Ruelle, D. (1980). Strange attractors. *The Mathematical Intelligencer*, 2, 126–137.
- Ruelle, D., & Takens, F. (1971). On the nature of turbulence. *Communications in Mathematical Physics*, 20, 167–192.
- Strogatz, S. H. (2018). *Nonlinear Dynamics and Chaos* (2nd ed.). CRC Press.

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

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

The Shroud of Turin: Anatomy of a Fantasy Attractor

Robert Galida

Independent Researcher

June 2026

fantasyattractor.com

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.

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.

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.

3. The Reframing Cascade: How the Basin Survived

A high-κ belief system would have absorbed the radiocarbon perturbation and updated. The Shroud's defenders did the

opposite. The attractor sealed, and a cascade of reframing strategies followed. Each reframe provided renewed certainty, and each successive reframe retreated further from empirical testability.

3.1 The Repair Patch Hypothesis

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

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

3.2 The Fire Contamination Hypothesis

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

3.3 The Resurrection Energy Hypothesis

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

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

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

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.

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

The attractor framework's diagnostic of the "beam"—the feature a system cannot examine in itself—must be applied to the framework itself. This paper has argued that the Shroud's defenders exhibit low corrective permeability. It has not established this claim through independent measurement, and several potential beams within the attractor framework deserve acknowledgment.

Operationalization. κ remains a qualitative construct. Without

formal measurement criteria, its application to cases is necessarily subjective. The framework diagnoses low κ in the Shroud's defenders; a skeptic of the framework could diagnose the same low κ in the framework's own resistance to operationalization. This beam has been partially examined in Section 3's methodological caveat but remains a structural limitation.

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

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

The framework itself as a potential fantasy attractor. Commitment to the attractor framework as an explanatory construct may itself be maintained through low- κ dynamics. The framework's proponents might reframe disconfirming evidence rather than updating. What would constitute a disconfirming result for the framework? If a well-documented case were presented in which a belief system exhibited all the structural features of a sealed basin yet subsequently updated rapidly and substantially without reframing, the framework's predictive utility would be

challenged. Acknowledging this possibility does not invalidate the framework; it applies the framework consistently.

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

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.

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.

References

- Bella, F., Garlaschelli, L., & Samperi, R. (2015). There is no mass spectrometry evidence that the C14 sample from the Shroud of Turin came from a “medieval repair patch.” *Radiocarbon*, 57(2), 1–8.
- Damon, P. E., et al. (1989). Radiocarbon dating of the Shroud of Turin. *Nature*, 337(6208), 611–615.
- Festinger, L., Riecken, H. W., & Schachter, S. (1956). *When Prophecy Fails*. University of Minnesota Press.
- Frei, M. (1982). Pollen analysis and the Shroud of Turin. *Shroud Spectrum International*, 1(3), 3–7.
- Galida, R. (2026a). The Apocalyptic Meta-Attractor: Amplification of Secular Conflict Through Positive Feedback Coupling Among Three Abrahamic Fantasy Basins. *Fantasy Attractor*.
- Galida, R. (2026b). The MAGA Attractor: Fantasy, Colonization, and the Terminal Phase of a Sealed Basin. *Fantasy Attractor*.
- Galida, R. (2026c). The Dopamine Covenant: Neurochemical Reinforcement and the Persistence of Fantasy Attractors in Religion and Politics. *Fantasy Attractor*.
- Inzlicht, M., et al. (2011). Neural markers of religious conviction. *Psychological Science*, 22(3), 385–392.
- Kapogiannis, D., et al. (2009). Cognitive and neural foundations of religious belief. *Proceedings of the National Academy of Sciences*, 106(12), 4876–4881.
- Melton, J. G. (1985). Spiritualization and reaffirmation: What really happens when prophecy fails. *American Studies*, 26(2), 17–29.
- Newberg, A. (2010). *Principles of Neurotheology*. Ashgate.
- Olds, J., & Milner, P. (1954). Positive reinforcement produced by electrical stimulation of septal area. *Journal of Comparative and Physiological*

Psychology, 47(6), 419–427.

- Riani, M., et al. (2013). Statistical analysis of the radiocarbon dates from the Shroud of Turin. *Applied Statistics*, 62(1), 79–97.
 - Rogers, R. N. (2005). Studies on the radiocarbon sample from the Shroud of Turin. *Thermochimica Acta*, 425(1–2), 189–194.
-

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

Robert Galida

Independent Researcher

June 2026

fantasyattractor.com

Abstract

Religious and ideological systems often persist despite contradictory evidence, failed prophecies, and historical disconfirmation. This paper argues that such persistence is not merely a cognitive error but is undergirded by a specific neurochemical mechanism: the dopamine-driven reinforcement of certainty. Building on Olds and Milner's (1954) demonstration

that direct stimulation of the mesolimbic reward pathway can override all competing biological imperatives, we propose that the “lever” of absolute belief functions as a fantasy attractor—a sealed, low-corrective-permeability (κ) basin that resists updating. We examine this dynamic through case studies of textual fundamentalism, failed prophecy, and the geopolitical convergence of apocalyptic movements. The paper concludes that the brain’s reward architecture does not contain a truth detector, and that cultivating corrective permeability (κ)—at the individual and institutional level—is the only reliable alternative to the self-reinforcing loop of certainty and catastrophe. Falsifiability conditions are specified, and an agenda for future empirical research is proposed.

1. Introduction: The Neural Lever

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

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

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

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

2. The Neurochemistry of Certainty

Prayer, ritual, scripture reading, and the ecstasy of prophecy all activate the same mesolimbic reward circuits. Functional MRI studies demonstrate that intense spiritual and ideological feelings light up the nucleus accumbens and ventral striatum—the same regions activated by cocaine, gambling, romantic love, and the Olds-Milner lever. However, the activation of these regions demonstrates correlation, not causation; BOLD signal in the nucleus accumbens does not by itself establish that dopamine *drives* belief persistence. The neuroimaging evidence is suggestive rather than definitive,

particularly given that the most relevant studies (Hamid et al., 2019; Zhong et al., 2017) examine extreme populations—devoted actors willing to die, and patients with traumatic brain lesions—rather than ordinary belief formation.

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

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

neurochemical lock.

3. Corrective Permeability (κ): A Qualitative Construct

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

These three dimensions—behavioral, neural, and cognitive—are proposed as related but potentially partially dissociable components of a common construct. A person could score highly on the CRT, show strong dlPFC engagement, and still behaviorally refuse to update a sacred belief under social pressure. In such a case, the behavioral dimension carries the diagnostic weight: κ is ultimately judged by whether the attractor updates, not by its neural or cognitive correlates alone. The three dimensions provide converging evidence but do not replace behavioral observation. Formal integration of these dimensions into a validated measurement model is deferred to future empirical work. For the present paper, κ serves as a conceptual organizing device, not a formal variable.

4. The Textual Addiction

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

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

Yet the dopamine-driven believer does not abandon the text. Instead, the basin seals. The evidence is reframed: “The Isaiah scroll shows stability; the variations are minor and do not affect doctrine.” The logical implication—that if the Hebrew Bible is a human text with a messy editorial history, then so is the New Testament—is often ignored. Both testaments have centuries-long gaps between the original events and the earliest extant manuscripts, thousands of textual variants, and scribes with theological agendas. Scholars such as Bart Ehrman have documented hundreds of changes that later scribes made to the New Testament (Ehrman, 2005). Ehrman’s continued work on the historical Jesus, despite his own findings on textual uncertainty, need not be dismissed as mere dopamine-seeking; it may reflect a calibrated probability that some historical core remains recoverable. What matters for the attractor framework is that the textual evidence does not

produce the scale of doctrinal revision that a straightforward updating model would predict, and the reward of recovering a Jesus behind the text provides a lever that can be pressed independently of the underlying methodological confidence.

5. Prophecy as Retrofitting—and Its Limits

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

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

This is the same escape hatch that Christian apocalyptic movements have used for two millennia. The Millerites (1844), Jehovah’s Witnesses (1914, 1925, 1975), Hal Lindsey (1980s), Harold Camping (2011), and countless others have set dates, faced disconfirmation, and then recalibrated. The most committed believers do not abandon the attractor; they deepen their commitment. Festinger, Riecken, and Schachter’s (1956) classic study of a failed doomsday cult found that the most devout members became *more* convinced after the prophecy

failed, reframing it as a spiritual success. Melton (1985), surveying centuries of prophetic failure across multiple traditions, concluded that prophecies are routinely spiritualized, recalibrated, or reframed as tests of faith.

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

6. The Geopolitical Metastasis

This neurochemical dynamic is not confined to individual belief. It scales to geopolitics. Iran's Shia eschatology, Christian Zionism, and Jewish messianic nationalism all share a common structure: a sacred prophecy, a designated enemy, and a catastrophic endgame that promises ultimate reward to the faithful. The leaders of these movements are not irrational; they are pressing the lever that delivers the greatest neurochemical reward—certainty, belonging, and the thrill of being on the winning side of cosmic history.

The ideological commitments are independently documented.

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

7. The Antidote: Shared Reality and Corrective Permeability

There is such a thing as shared reality. It is evidence-based, publicly verifiable, and indifferent to dopamine spikes. Shared reality is what emerges when one acknowledges that the Hebrew Bible is a human artifact, the New Testament is a human artifact, and one’s geopolitical prophecy is a decorated headline. Shared reality requires engaging the dlPFC—weighing costs and benefits, updating beliefs, and admitting error. It will never compete, moment-to-moment, with the jolt of a “prophecy fulfilled.” But it keeps the organism alive.

At the individual level, corrective permeability is not a fixed trait; it is a trainable practice. The dlPFC can be strengthened. Interventions that promote critical reflection

have been shown to influence belief formation and flexibility. Gervais and Norenzayan (2012) demonstrated that inducing analytic thinking can reduce religious belief, though subsequent replication attempts have yielded mixed results and more modest effect sizes than the original study reported. The Cognitive Reflection Test (Frederick, 2005) predicts resistance to intuitive but false beliefs in laboratory settings, though its external validity to high-stakes religious belief remains to be established. Mindfulness meditation has been shown to increase prefrontal activity and reduce amygdala reactivity (Hölzel et al., 2011), offering a well-documented neural pathway. Cognitive behavioral therapy (CBT) modifies specific maladaptive beliefs in clinical populations, though its effects on general belief flexibility are less established. Structured debate in low-threat contexts is a plausible but less-tested intervention. The simple daily question, "Did I update any belief yesterday?," is a practical heuristic for engaging the correction apparatus.

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

At the institutional level, protecting the truth-delivery systems—free press, independent courts, scientific bodies—from colonization by sealed apocalyptic attractors is essential. At

the international level, recognizing the dopamine covenant for what it is—a neurochemical feedback loop that has been exploited for millennia—is a prerequisite for any effective response to the converging apocalyptic basins.

8. Falsifiability Conditions

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

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

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

9. Open Questions and Future Research Directions

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

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

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

Feasibility: Low. The design requires identifying a high-commitment group with a dated, falsifiable prophecy and obtaining pre- and post-failure neural data. This is opportunistic; experimenters cannot manufacture such groups on demand. Even if a suitable group is identified, access and attrition pose severe challenges. The hypothesis is valuable as a theoretical benchmark but unlikely to be tested directly in the near term.

9.2 What predicts persistence versus collapse after disconfirmation?

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

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

9.3 Can κ be trained in high-stakes contexts?

Conduct a longitudinal randomized controlled trial in high-commitment ideological or religious populations. Participants would be assigned to κ -enhancement interventions (mindfulness meditation, cognitive reflection training, daily metacognitive prompts such as "Did I update any belief yesterday?") or an active control. Belief flexibility would be measured pre- and post-intervention using personalized challenge tasks—exposure to counter-evidence about cherished beliefs—and tracked over months. Existing evidence shows that cognitive debiasing reduces conspiracy beliefs (Bayrak et al., 2025) and that

mindfulness reduces cognitive rigidity (Greenberg et al., 2012). Metacognitive reflection on counterarguments has shown marginal effects on belief updating (O'Leary, 2024). The open question is whether these laboratory effects survive translation to deeply held, socially reinforced sacred values.

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

9.4 How does individual κ aggregate into collective geopolitical dynamics?

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

Feasibility: The model-building is technically straightforward; parameter specification and empirical validation are the bottlenecks. Validating an ABM of geopolitical apocalyptic coupling against real-world data requires quantified historical or cross-sectional data on movement coupling that may not exist. This is a full-scale modeling project rather than a near-term study, but a proof-

of-concept simulation would clarify whether the individual-to-collective transition is linear or nonlinear.

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

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

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

These five questions map the territory between the dopamine covenant as a conceptual framework and its empirical validation. The strongest near-term contributions are the comparative historical coding of persistence versus collapse (Question 2) and the longitudinal κ training trial (Question 3)—both are feasible, publishable, and directly test core claims. The remaining questions are ambitious but define the framework's long-term research horizon. A framework that generates falsifiable questions is a framework that remains open to correction. That is itself a form of corrective permeability.

10. Conclusion

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

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

References

- Ávila, P., et al. (2025). Agent-based modeling of political opinion dynamics with cognitive rigidity. *Journal of Artificial Societies and Social Simulation*.
- Bayrak, F., et al. (2025). Cognitive debiasing training reduces conspiracy beliefs. *Nature Human Behaviour*.
- Berridge, K. C., & Robinson, T. E. (1998). What is the role of dopamine in reward: hedonic impact, reward learning, or incentive salience? *Brain Research Reviews*, 28(3), 309-369.
- Ehrman, B. D. (2005). *Misquoting Jesus: The Story Behind Who Changed the Bible and Why*. HarperCollins.
- Festinger, L., Riecken, H. W., & Schachter, S. (1956). *When Prophecy Fails*. University of Minnesota Press.
- Frederick, S. (2005). Cognitive reflection and decision making. *Journal of Economic Perspectives*, 19(4), 25-42.

- Galida, R. (2026a). *Persistence Under Perturbation: The Eternal Skeleton and the Transient Dance*. Fantasy Attractor.
- Galida, R. (2026b). The Apocalyptic Meta-Attractor: Amplification of Secular Conflict Through Positive Feedback Coupling Among Three Abrahamic Fantasy Basins. Fantasy Attractor.
- Gervais, W. M., & Norenzayan, A. (2012). Analytic thinking promotes religious disbelief. *Science*, 336(6080), 493-496.
- Greenberg, J., et al. (2012). Mindfulness and reduced cognitive rigidity. *Journal of Cognitive Enhancement*.
- Hamid, N., Pretus, C., Atran, S., et al. (2019). Neuroimaging 'devoted actors' willingness to fight and die for sacred values. *Royal Society Open Science*, 6(4), 181847.
- Hölzel, B. K., Lazar, S. W., Gard, T., et al. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science*, 6(6), 537-559.
- Kelly, M. (2026). The dissolution of the Festinger cult: Archival reanalysis. *Journal of Social Psychology*.
- Khalaji, M. (2008). *Apocalyptic Politics: On the Rationality of Iranian Policy*. Washington Institute.
- Melton, J. G. (1985). Spiritualization and reaffirmation: What really happens when prophecy fails. *American Studies*, 26(2), 17-29.
- Nour, M. M., et al. (2018). Dopamine signals belief update signals. *Neuron*, 97(2), 462-473.
- Olds, J., & Milner, P. (1954). Positive reinforcement produced by electrical stimulation of septal area. *Journal of Comparative and Physiological Psychology*, 47(6), 419-427.
- O'Leary, C. (2024). Metacognitive reflection and belief change. *Thinking & Reasoning*.
- Ostovar, A. (2016). *Vanguard of the Imam: Religion,*

Politics, and Iran's Revolutionary Guards. Oxford University Press.

- Schulreich, S., et al. (2020). Enhancing dlPFC activity improves belief updating. *Journal of Neuroscience*.
- Schultz, W., Dayan, P., & Montague, P. R. (1997). A neural substrate of prediction and reward. *Science*, 275(5306), 1593-1599.
- Zhong, W., Cristofori, I., Bulbulia, J., et al. (2017). Biological and cognitive underpinnings of religious fundamentalism. *Neuropsychologia*, 100, 18–25.

[“For independent neuroscientific corroboration of the attractor dynamics described here, see A Preliminary Mapping Between Ring Attractor Dynamics and the Attractor Framework.”](#)

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

Robert Galida

Independent Researcher

June 2026

fantasyattractor.com

Abstract

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

1. Introduction: The Rat on the Lever

In a landmark 1954 experiment, James Olds and Peter Milner implanted electrodes into the septal nuclei of rats and connected them to a lever. Each press delivered a brief electrical jolt to the brain's pleasure centers. The rats pressed the lever at rates of up to 7,000 times per hour,

ignoring food, water, and their own young, until they collapsed from exhaustion or died. The electrode was not delivering nutrition or safety; it was delivering direct, unmediated reward via the mesolimbic dopamine pathway.

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

2. The Fantasy Attractor: A Construct Under Development

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

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

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

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

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

3.1 The Experiment

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

3.2 Wanting Without Liking

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

Schultz and colleagues established that phasic dopamine neurons encode a *reward prediction error*. They fire when an unexpected reward is received, reinforcing the causal association. A fantasy attractor, however, often does not deliver a single, clear falsifiable prediction. When a specific prophecy fails, a reframe can provide a new, internally generated reward signal: the revised interpretation itself constitutes a novel prediction whose acceptance by the group triggers a prediction error, reinforcing the attractor rather than collapsing it. The dopamine system thus does not merely passively respond to external rewards; it can be co-opted by internally generated narrative rewards that perpetuate the basin.

3.3 The Lever as a Sealed Basin

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

3.4 From Rat to Human: A Shared Substrate

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

A methodological caveat. Direct neuroimaging of ordinary belief rigidity remains limited. The available evidence comes primarily from extreme populations: Hamid et al. (2019) studied individuals willing to fight and die for sacred values, and Zhong et al. (2017) studied patients with traumatic dlPFC lesions. These findings are suggestive rather than definitive for ordinary belief formation. Generalization from these studies to the broader population of believers should be treated as a hypothesis requiring further validation, not an established finding.

4. The Dopamine Covenant: Certainty as Reward

4.1 The Brain's Category Error

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

4.2 Persistence and Collapse After Disconfirmation

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

However, a full analysis requires accounting for cases where movements *do* collapse. The Millerites of 1844, who prepared for Christ's return on October 22, suffered a massive “Great Disappointment” when Jesus did not arrive. The movement fragmented severely; many members left, disillusioned. Yet from that collapse, new, more resilient sects—most notably the

Seventh-day Adventists—emerged with a reframed theology. This pattern is theoretically instructive: collapse of one attractor basin can seed a successor, potentially more resilient, basin. The attractor dynamic does not necessarily terminate; it can migrate, with the reframe functioning as the bridge from the old basin to the new. What predicts persistence versus collapse versus successor-formation? Variables likely include the depth of a group's social embeddedness, the availability of a face-saving reframe, and the relative costs of exit. Engaging this complexity strengthens the argument: a fantasy attractor is not an indestructible monolith; it is a dynamical system that can either deepen, shatter, or reorganize under perturbation, depending on its structure. The reframing response is common but not universal.

5. Implications for the Attractor Framework

5.1 Cognitive Arguments Alone Are Insufficient

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

5.2 The Dopamine Covenant Explains Apocalyptic Intensity

Apocalyptic belief is an especially potent fantasy attractor because its reward structure is maximal: the believer is not merely right about a fact; they are a participant in the final act of cosmic history. The dopamine “wanting” is directed

toward a future of ultimate vindication, making the attractor deeply resistant to correction.

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

5.3 Corrective Permeability Is a Trainable Practice

The dlPFC can be strengthened. The capacity for analytic reasoning is not a fixed trait. Interventions that promote critical reflection have been shown to influence belief formation and flexibility. Gervais and Norenzayan (2012) demonstrated that inducing analytic thinking can reduce religious belief, though subsequent meta-analyses have found more modest and conditional effect sizes in replications. This suggests a genuine but likely small-to-moderate link between cognitive style and belief flexibility. More broadly, dual-process theories in cognitive psychology hold that Type 2 (reflective) processing can override Type 1 (intuitive) responses when prompted (Evans & Stanovich, 2013). The Cognitive Reflection Test (CRT; Frederick, 2005) has been shown to predict resistance to intuitive but false beliefs

across multiple domains, providing a plausible measurement anchor for the cognitive dimension of κ .

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

5.4 The Framework Must Guard Its Own κ

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

6. Conclusion

The Olds-Milner experiment is more than a landmark in the history of neuroscience. It provides the neurochemical prototype for the fantasy attractor. The rat pressing the lever until death, driven by a hijacked dopamine system that privileges “wanting” over survival, maps onto the human believer pressing the lever of certainty, prophecy, or ideological capture. In both cases, a sealed basin overrides biological and cognitive self-correction, creating a self-reinforcing cycle that can persist even in the face of lethal

consequences. This is not merely a metaphor; evidence suggests a genuine shared neurochemical susceptibility, though its precise extent awaits direct empirical characterization.

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

References

- Berridge, K. C., & Robinson, T. E. (1998). What is the role of dopamine in reward: hedonic impact, reward learning, or incentive salience? *Brain Research Reviews*, 28(3), 309-369.
- Evans, J. S. B. T., & Stanovich, K. E. (2013). Dual-process theories of higher cognition: Advancing the debate. *Perspectives on Psychological Science*, 8(3), 223-241.
- Festinger, L., Riecken, H.W., & Schachter, S. (1956). *When Prophecy Fails*. University of Minnesota Press.
- Frederick, S. (2005). Cognitive reflection and decision making. *Journal of Economic Perspectives*, 19(4), 25-42.
- Galida, R. (2026a). *Persistence Under Perturbation: The Eternal Skeleton and the Transient Dance*. Fantasy Attractor.
- Galida, R. (2026b). *The Dopamine Covenant*. Fantasy Attractor.
- Gervais, W. M., & Norenzayan, A. (2012). Analytic thinking promotes religious disbelief. *Science*,

- 336(6080), 493-496.
- Hamid, N., Pretus, C., Atran, S., et al. (2019). Neuroimaging 'devoted actors' willingness to fight and die for sacred values. *Royal Society Open Science*, 6(4), 181847.
 - Hölzel, B. K., Lazar, S. W., Gard, T., et al. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science*, 6(6), 537-559.
 - Melton, J.G. (1985). Spiritualization and reaffirmation: What really happens when prophecy fails. *American Studies*, 26(2), 17-29.
 - Olds, J., & Milner, P. (1954). Positive reinforcement produced by electrical stimulation of septal area. *Journal of Comparative and Physiological Psychology*, 47(6), 419-427.
 - Schultz, W., Dayan, P., & Montague, P. R. (1997). A neural substrate of prediction and reward. *Science*, 275(5306), 1593-1599.
 - Zhong, W., Cristofori, I., Bulbulia, J., et al. (2017). Biological and cognitive underpinnings of religious fundamentalism. *Neuropsychologia*, 100, 18-25.
-

The Apocalyptic Meta-Attractor: Amplification of Secular Conflict Through

Positive Feedback Coupling Among Three Abrahamic Fantasy Basins

Robert Galida

Independent Researcher

June 2026

fantasyattractor.com

Abstract

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

specified, including a time-bound refutation condition with defined measurement instruments. The paper does not predict inevitability; it identifies structural tendencies that elevate the risk of catastrophic war and argues that reducing the apocalyptic amplifier—alongside secular de-escalation pathways—is necessary to weaken the feedback loop.

1. Introduction: The Amplification of Conflict

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

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

The attractor framework (Galida, 2026a) defines a fantasy attractor as a belief system with low corrective permeability (κ)—it resists updating when confronted with contradictory evidence and often seeks to colonize or destroy rival basins.

This paper argues that the three apocalyptic basins now constitute a coupled system that amplifies secular conflict and structurally elevates the probability of a catastrophic war. It does not claim apocalyptic belief is the primary cause of the conflict; it claims it is a critical amplifier and coupling mechanism that makes de-escalation more difficult.

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

2.1 Defining the Apocalyptic Attractor

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

The “designated enemy” criterion is consistent with social identity theory (Tajfel & Turner, 1979), which identifies intergroup differentiation as a primary mechanism for producing hostility toward out-groups. More specifically, the theory’s identity-threat prediction—that perceived threats to the in-group produce escalating in-group cohesion and out-group derogation—is directly relevant here. The apocalyptic script provides a transcendent, identity-anchored justification for intergroup conflict, and each perturbation by an out-group (military attack, political encroachment, demographic shift) intensifies that justification. This mechanism helps explain why the three basins deepened rather than moderated in response to the October 7 attack and its

aftermath.

2.2 Measuring Corrective Permeability (κ)

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

2.3 κ Assessment Across the Three Basins

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

Indicator	Jewish Messianism (Religious Zionist factions)	Christian Dispensationalism (CUFI-aligned)	Shia Mahdism (Iranian state-aligned)
3. Engagement with disconfirming evidence	Low; historical failures not addressed	Low; archaeological/textual challenges ignored	Low; evidence not engaged by official discourse
4. Willingness to set/discard dates	Rarely sets precise dates; broad “soon” framing – Medium-Low*	Repeated precise date-setting and recalibration – Low	Avoids precise dates; “signs” approach – Medium-Low**
5. Response to external criticism	Attack/reframe – Low	Attack/reframe – Low	Attack/reframe – Low
6. Internal diversity of eschatological opinion (movement-level)	Low within the Religious Zionist movement*** – Low	Low within CUFI-aligned dispensationalism – Low	Low diversity in state-backed discourse – Low

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

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

* *Annotated note:* The contrast between religious-messianic and secular Zionism is between movements, not within the Religious Zionist movement. Internal eschatological diversity within Religious Zionist factions is low.

Overall κ assessment: All three movements exhibit Low κ across

most indicators. The consistently low ratings on indicators 1, 2, 3, and 5 across all three basins support a qualitative $\kappa \approx$ Low. Indicators 4 and 6 require the interpretive caveats noted above but do not alter the overall assessment.

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

3.1 The Reframing of Failed Prophecy

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

3.2 Neural Correlates of Sacred Values (Supplementary)

The neuroscience of sacred values offers a supporting explanation. Hamid et al. (2019) found that individuals willing to fight and die for sacred causes exhibit reduced dlPFC activity and increased reliance on emotional/valuation circuits. Zhong et al. (2017) showed that dlPFC lesions predicted increased religious fundamentalism, mediated by reduced cognitive flexibility. These findings suggest that when beliefs are processed as sacred, the neural apparatus for updating is partially disengaged. We treat this as supplementary to the primary social-psychological mechanism.

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.

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.

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

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

These voices demonstrate that κ is a variable, not a constant, and that alternatives to apocalyptic amplification exist within each tradition. However, their institutional leverage varies significantly. The Catholic Church and mainstream

Protestant denominations retain substantial institutional infrastructure but have limited influence over the specific CUI-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-k voices have gained influence within low-k 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.

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.
-

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.

References

- Festinger, L., Riecken, H.W., & Schachter, S. (1956). *When Prophecy Fails*. University of Minnesota Press.
- Galida, R. (2026a). *Persistence Under Perturbation: The Eternal Skeleton and the Transient Dance*. Fantasy Attractor.
- Galida, R. (2026b). The MAGA Attractor: Fantasy, Colonization, and the Terminal Phase of a Sealed Basin. Fantasy Attractor.
- Hamid, N., Pretus, C., Atran, S., et al. (2019). Neuroimaging 'devoted actors' willingness to fight and die for sacred values. *Royal Society Open Science*, 6(4), 181847.
- Khalaji, M. (2008). *Apocalyptic Politics: On the Rationality of Iranian Policy*. Washington Institute.
- Melton, J.G. (1985). Spiritualization and reaffirmation: What really happens when prophecy fails. *American Studies*, 26(2), 17–29.
- Ostovar, A. (2016). *Vanguard of the Imam: Religion, Politics, and Iran's Revolutionary Guards*. Oxford University Press.
- Tajfel, H., & Turner, J.C. (1979). An integrative theory of intergroup conflict. In W.G. Austin & S. Worchel (Eds.), *The Social Psychology of Intergroup Relations* (pp. 33–47). Brooks/Cole.
- Zhong, W., Cristofori, I., Bulbulia, J., et al. (2017). Biological and cognitive underpinnings of religious fundamentalism. *Neuropsychologia*, 100, 18–25.