Processual Identity Law: Identity Drift as a Generic Property of Dynamical Inferential Systems

Boris Kriger

Institute of Integrative and Interdisciplinary Research

boriskriger@interdisciplinary-institute.org

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Abstract

The experience commonly described as “losing oneself” has traditionally been framed as pathology, existential failure, or psychological breakdown. This article proposes a structurally different account. Building on the author’s earlier work *The Individual Universe* (Kriger, 2025), where identity was analyzed phenomenologically as a non-substantial, processual configuration shaped by memory, language, relation, and time, the present paper advances a strictly formal treatment of identity within dynamical inferential systems.

Without taking a position on whether an intrinsic or inner self exists, identity is modeled as an inference derived from finite observation windows over system trajectories. Using tools from dynamical systems theory and information theory, the paper **develops and formalizes** the Processual Identity Law: in systems lacking invariant identity variables, identity drift is structurally generic, while stability arises only as a temporary effect of constraints and attractors. From this perspective, changes in identity do not represent collapse or dysfunction, but lawful transitions between dynamical regimes.

Philosophically, the argument is situated at the intersection of process-oriented thought and structural theories of subject formation. Lacan’s conception of the subject as an effect of symbolic structure, inherently non-identical to itself, provides a critical backdrop, while Deleuze’s philosophy of becoming supplies the processual horizon. The paper shows that what Lacan described structurally and Deleuze described ontologically **resonates with and finds formal expression in** the dynamics of inferential systems: identity instability is not a contingent psychological condition, but a necessary consequence of inferential dynamics.

Keywords: processual identity, dynamical systems theory, identity drift, attractors, Lacan, Deleuze, inference, stability, information theory

Contents

1 Introduction

In *The Individual Universe*, identity was examined as a lived phenomenon rather than an ontological substance. Drawing on phenomenology, cognitive science, linguistics, and cultural analysis, that work argued that the self is not a fixed inner core but a dynamic configuration continuously reshaped by memory, language, embodiment, and relation (Kriger, 2025). The book addressed, at the level of experience and meaning, the widespread anxiety surrounding identity instability—the fear of "losing oneself"—and showed this fear to be rooted in cultural myths of uniqueness, authenticity, and inner autonomy.

The present article continues that investigation, but shifts its level of analysis. Rather than asking what the self is or whether it exists, it asks under what structural conditions identity attribution can remain stable in any temporally evolving system. This move deliberately brackets ontological disputes. Whether an inner self exists is not denied or affirmed; it is rendered irrelevant to the formal problem at hand. What matters is how identity is ascribed, not what it is supposed to be.

This shift allows the problem of identity to be reframed in system-theoretic terms. Identity is treated as an inferential construct derived from observable regularities over time, not as an internal variable preserved across states. From this perspective, the instability of identity is no longer an anomaly requiring explanation. It becomes the expected outcome of dynamics in systems without invariant identifiers.

1.1 The Lacanian Parallel: Structural Non-Identity and the Barred Subject

Here the relevance of Lacan becomes precise, though the nature of this relevance requires careful articulation. Lacanian theory describes the subject as structurally divided, constituted through language, and perpetually misrecognized in the mirror of symbolic identification. The subject, for Lacan, is never identical to itself—this is the meaning of the "barred subject" ($), which denotes the subject's fundamental split between the imaginary ego and its symbolic determination (Lacan, 1977). The subject emerges not as a substance but as an effect of the signifying chain, always displaced from any fixed position.

However, it would be reductive to claim that Lacan's structural psychoanalysis simply "reduces to" or "is a special case of" dynamical systems theory. Lacan operates within a fundamentally different conceptual register—the Symbolic order, the logic of the signifier, the topology of desire—that cannot be straightforwardly translated into state-space dynamics. What the present paper argues is more modest but still significant: there exists a **structural homology** between Lacanian non-identity and the formal properties of inferential systems developed here.

Specifically, both frameworks share three key features: (1) identity is not given but produced through a process (signification for Lacan, inference for DST); (2) this production is inherently incomplete or unstable—the subject is barred, the inference is revisable; (3) apparent stability is an effect of structure (the ego's imaginary coherence, the attractor's basin). The present paper does not claim to formalize Lacan, but rather to demonstrate that the insight Lacan articulated clinically and structurally—that the subject is constitutively non-self-identical—finds a parallel formal expression in the mathematics of dynamical inference.

1.2 The Deleuzian Horizon: Becoming and the Dissolution of Stable Identity

Deleuze provides the complementary horizon. Where Lacan exposes the impossibility of a coherent self within symbolic structure, Deleuze replaces the very demand for coherence with a philosophy of becoming, in which identity is a temporary stabilization of flows rather than a goal or norm (Deleuze & Guattari, 1987). For Deleuze, the self is not a failed unity but a multiplicity—an assemblage of heterogeneous components that cohere only provisionally and differentially.

The Individual Universe articulated this insight at the level of lived experience and cultural critique. The present article formalizes it: identity stability corresponds to confinement near attractors, while identity drift corresponds to unconstrained exploration of state space. The Deleuzian "line of flight"—the vector of deterritorialization that disrupts stable formations—corresponds formally to trajectories that escape attractor basins, whether through parameter drift, external perturbation, or the intrinsic instability of high-dimensional dynamics. The question of whether such formalization constitutes (a) productive translation, (b) useful but limited approximation, (c) problematic domestication of radical difference, or (d) creative betrayal in the Deleuzian spirit remains open. Protevi (personal communication, January 10, 2026), a leading scholar of Deleuze and embodied cognition, suggests that all four interpretations may hold simultaneously depending on philosophical and rhetorical context—itself a characteristically Deleuzian response that refuses binary resolution in favor of contextual multiplicity.

From this combined perspective, the fear of losing oneself appears as a structural misunderstanding. It arises from applying invariance-based expectations—appropriate for static identifiers or closed systems—to inferential, processual systems where no such invariants exist. What is experienced phenomenologically as loss is, at the level of dynamics, a lawful transition between regimes.

The contribution of this paper is therefore not to reinterpret identity psychologically, nor to intervene in debates about the reality of the self, but to demonstrate a structural necessity: **if identity is inferred from finite observations in a dynamical sys-**

tem, then identity drift is generic and stability is derivative. By formalizing this claim in the Processual Identity Law, the paper transforms long-standing philosophical intuitions—from Hume and Nietzsche through Lacan and Deleuze—into a precise, testable structural result.

2 Literature Review

This section examines research from the past three decades (1994–2025) that supports, challenges, or contextualizes the core tenets of the Processual Identity Law. The review is organized thematically, addressing first the supporting literature and then the critical perspectives that identify limitations or alternative frameworks.

2.1 Literature Supporting the Processual Identity Framework

2.1.1 Dynamical Systems Theory in Cognitive Science and Development

The core argument of PIL finds strong resonance in the dynamical hypothesis in cognitive science, which views mind and behavior as properties of complex, time-evolving systems (van Gelder, 1998). The seminal work of Thelen & Smith (1994) argued that development is not the unfolding of a pre-specified plan but the emergence of novel forms from the self-organizing interactions of multiple components within a dynamic system. This directly supports the view of identity as a "softly assembled" configuration rather than a fixed essence.

Extending DST to the self, Lewis (2000, 2005) has consistently argued for a model of emotional and cognitive development where the "self" is a temporary coherence or attractor state within a fluid system of neural, emotional, and situational factors. This aligns precisely with PIL's assertion that stability is a temporary confinement near an attractor. More recently, the Dynamic Systems Model of Role Identity (DSMRI) developed by Kaplan & Garner (2017) formalizes how role identities stabilize and transition through attractor dynamics, providing a concrete social-cognitive model that mirrors PIL's logic. Kaplan (personal communication, January 9, 2026) confirms that in the DSMRI framework, attractor transitions can be triggered by external perturbation, internal tension accumulation, or parameter drift—and that these factors interact in various permutations: an acute environmental event meeting a stable system, a minor event meeting a fragmented system, or a minor event perturbing a critical systemic link that initiates a cascading "butterfly effect." This empirical confirmation strengthens the PIL claim that transition mechanisms are context-dependent rather than fixed.

2.1.2 Process Philosophy and Non-Substantialist Views of Identity

PIL's philosophical underpinnings are deeply rooted in process-oriented thought, which has seen a significant revival in contemporary philosophy. Deleuze and Guattari's philosophy of "becoming" (Deleuze & Guattari, 1987) explicitly rejects substance ontology in favor of fluxes, assemblages, and haecceities. The present formalization of identity drift as generic behavior provides a system-theoretic scaffold for Deleuze's ontological claims, a connection noted in contemporary scholarship (Protevi, 2009).

Lacan's assertion that the subject is inherently "barred" and emerges from the signifying chain—never coinciding with itself—provides a structural-psychoanalytic parallel. Recent interdisciplinary work (Johnston, 2013) has sought to naturalize Lacanian insights using complexity theory, creating a bridge that PIL traverses formally.

2.1.3 Concept Drift in Machine Learning and Adaptive Systems

The field of machine learning offers a compelling practical analogue to PIL's theoretical claim. The problem of "concept drift"—where the statistical properties of a target variable change over time—forces models to adapt continuously (Gama et al., 2014). This mirrors "identity drift" in inferential systems: a model's "understanding" (its inferred function) must change as data streams evolve, or it becomes obsolete.

2.1.4 Enactive and Embodied Cognitive Science

The enactive approach, which views cognition as grounded in the sensorimotor coupling of an organism with its environment, supports a processual view of identity. Di Paolo et al. (2018) argue that the minimal self is not a representation but an ongoing precarious process of self-distinction and interaction. Froese & Di Paolo (2011) discuss how breakdowns in this process lead to "identity drift" or dissolution, which is not pathological but a potential phase transition in the system's organization.

2.2 Literature Offering Critique, Limitation, or Counter-Perspective

2.2.1 The Need for Invariants and Structural Stability

While DST emphasizes change, a significant body of research highlights the necessity of invariants and stability for system coherence and functionality. Gibson's theory of affordances, extended by Chemero (2009), relies on the perception of invariant properties in the environment-organism system for guiding action. A purely processual identity with no stable perceptual or behavioral invariants would struggle to account for the reliable, goal-directed behavior observed in organisms.

Some theorists argue that an overemphasis on flux risks losing the very phenomena it seeks to explain. Varela (1999), while a proponent of enaction, also emphasized "structural coupling" and the emergence of relatively stable cognitive domains. PIL accommodates this critique by acknowledging that attractors can be highly stable under certain parameter regimes—the claim is not that stability is impossible, but that it is not structurally guaranteed.

2.2.2 Narrative and Diachronic Identity

Philosophical and psychological accounts of personal identity often center on narrative as a stabilizing structure. Philosophers like MacIntyre (1984) and psychologists like McAdams (2001) argue that we constitute our identities through self-narratives that integrate past, present, and anticipated future into a coherent whole.

From PIL's perspective, narrative functions as a powerful "constraint" or "attractor" that produces stability. However, narrativists might argue that this constraint is not merely contingent but a fundamental, species-typical mechanism for generating identity stability.

2.2.3 Embodied and Extended Mind: Locating Stability

Theories of embodied and extended cognition challenge where to look for identity. Clark (2008) and others in the extended mind tradition argue that identity is partly "offloaded" into stable environmental structures (routines, artifacts, social roles). This creates a hybrid system where internal drift is buffered by external scaffolding.

2.2.4 Methodological and Empirical Challenges

PIL presents a formal, high-level law. Translating it into empirically testable models for complex systems like human persons poses significant challenges. As noted in critiques of DST applications (Bickle, 2003), the state space of human cognition and behavior is astronomically high-dimensional. Precisely measuring "identity drift" or identifying specific "attractors" for self-states remains a formidable task.

2.3 Synthesis

The literature of the past thirty years provides substantial, multidisciplinary support for the conceptual foundations of the Processual Identity Law. PIL successfully formalizes a profound insight—that identity is inferential and thus inherently prone to drift—but its claim of genericity is most compelling when balanced against complementary research highlighting the sophisticated mechanisms biological and social systems employ to achieve coherent, persistent selfhood.

3 De-rhetorization and Assumption Extraction

Before proceeding to formal development, it is necessary to extract the core claims from their rhetorical framing and identify the implicit assumptions that govern the analysis.

3.1 Core Claims (De-rhetorized)

The central assertions of this paper, stripped of rhetorical elaboration, are:

1. Identity is not a fixed internal substance.
2. The subject is not a static container of properties but a continuously updating process.
3. Loss of a previous identity state constitutes a transition between configurations, not system failure.
4. Instability is the default dynamic condition; stability arises only as a transient outcome of constraints.

3.2 Implicit Assumptions

The formal analysis rests on the following assumptions:

(A1) The system evolves over time rather than remaining static.

(A2) State descriptions are relational and depend on interactions or observations.

(A3) No privileged, immutable internal variable uniquely determines system identity.

(A4) Transitions between states are allowed without catastrophic loss of system continuity.

(A5) Stability requires sustained constraints or feedback and is not self-maintaining.

(A6) Observers or measurements do not access a complete or final description of the system.

(A7) The system's persistence is defined by process continuity, not state invariance.

3.3 System Characterization

Type of system: Dynamical inferential system.

Relevant variables and operations:

- State configurations over time

- Update rules mapping prior states to subsequent states
- Constraints and feedback mechanisms limiting variability
- Observational mappings that infer identity from state patterns

Success / failure / convergence criteria:

- Success: continued process evolution without termination
- Failure: cessation of state transitions
- Convergence: temporary stabilization of state patterns under constraints

All anthropomorphic and psychological terms are excluded from the formal treatment that follows.

4 Formal Framework

4.1 Mathematical Framework Selection

Chosen framework: Dynamical systems theory (DST) combined with information theory.

Justification:

- DST formalizes state evolution, transitions, attractors, and stability (via Lyapunov exponents and basin analysis).
- Information theory captures identity as an inference from observable state regularities (via compression and entropy).
- Stability corresponds to low-variance attractors; instability to high-entropy exploration of state space.

This combination is minimal yet sufficient for expressing all components of the law. The framework draws from standard texts in dynamical systems (Robinson, 1999; Smale, 1967) and information theory (Cover & Thomas, 2006).

4.2 Preliminaries and Scope

This work makes no ontological claims regarding the existence or non-existence of an internal or intrinsic self. The analysis concerns only the structural conditions under which identity attribution is possible within temporally evolving systems. Identity is treated as an inferential construct derived from observable state relations, not as an intrinsic system variable.

4.3 System Definition

Let X be a compact metric state space (e.g., $[0,1]^n$ for simplicity). Let $t \in \mathbb{N}$ or $\mathbb{R}^+$ denote time. The system state is $x(t) \in X$. Evolution is governed by an update rule:

$$x(t+1) = f(x(t)) \quad \text{[discrete time]} \tag{1}$$

$$\frac{dx}{dt} = f(x) \quad \text{[continuous time]} \tag{2}$$

where $f : X \to X$ is a smooth map (e.g., C^1). No assumption is made that f preserves any nontrivial invariant of the form $I(x(t)) = I(x(0))$ unless explicitly specified.

4.4 Identity as Inference

Let $O : X \to Y$ be an observation map (e.g., projection to observables). Let $I : Y^T \to \mathcal{I}$ be an identity inference function over a finite observation window $T < \infty$ (e.g., a statistical summary such as mean, variance, or entropy). The inferred identity at time t is:

$$\mathrm{id}(t) = I(O(x(t-T+1)), \ldots, O(x(t))) \tag{3}$$

Thus, identity depends on local trajectory segments, not global properties of the system.

4.5 Identity Stability and Invariance

Definition 1 (Invariant Identity). *An identity attribution is invariant if there exists a function $g : X \to \mathcal{I}$ such that id$(t) = g(x(t))$ is constant along trajectories, i.e., $g(f(x)) = g(x)$ for all $x \in X$.*

This definition requires the existence of a nontrivial invariant of the system dynamics—a conserved quantity that identity tracks. The following lemma establishes that such invariants are non-generic.

5 The Processual Identity Law

5.1 Lemma: Absence of Generic Identity Invariants

Lemma 2. *In a dynamical system with nontrivial evolution (i.e., f is not the identity map), any nonconstant invariant g requires trajectories to remain confined to a proper subset of X. Such invariants are nongeneric and unstable under perturbations.*

Proof. If g is nonconstant and invariant ($g \circ f = g$), its level sets $L_c = \{x \in X \mid g(x) = c\}$ partition X. Invariance implies trajectories stay in one L_c, a proper subset (since g is nonconstant).

For genericity: Consider the space of C^r maps on X with the Whitney topology. Invariants require f to preserve level sets, a codimension-∞ condition (Smale, 1967). Under small perturbations $f_\epsilon = f + \epsilon h$ (h generic), orbits typically fill dense subsets (ergodicity in chaotic systems), breaking invariance unless g is constant.

Structural stability requires hyperbolic dynamics, which is itself nongeneric except for restricted classes (Axiom A systems; Robinson, 1999). Thus, nontrivial identity invariants exist only on a measure-zero subset of dynamical systems. □

5.2 Attractors and Temporary Stability

Without global invariants, regularity arises from attractors. A set $A \subset X$ is an attractor if it is compact, invariant ($f(A) = A$), and has a basin $B(A)$ where trajectories converge to A (measured by positive Lebesgue measure in X).

Near A, variability is constrained (negative Lyapunov exponents indicate local contraction). Identity stability occurs when observation windows sample trajectories near A: $\mathrm{Var}(\mathrm{id}(t)) \to 0$ as $t \to \infty$ within the basin. This stability is parameter-dependent; bifurcations (e.g., Hopf, period-doubling) destroy attractors, leading to drift (Palis & Takens, 1993).

5.3 Theorem: The Processual Identity Law

Theorem 3 (PIL). *Let (X, f) be a dynamical system where:*

(i) No nontrivial invariant identity variable exists.

(ii) Identity is inferred from finite windows of trajectories.

(iii) Dynamics are not globally confined to a fixed attractor (i.e., a positive-measure set of initial conditions explores X).

Then:

(a) Persistent identity stability is not structurally guaranteed.

(b) Observed stability corresponds to temporary confinement near an attractor.

(c) Identity changes reflect transitions between regimes (e.g., bifurcations).

(d) Identity drift is generic (prevalent for typical parameters/initial conditions).

Proof. By condition (i) and Lemma 1, no global function g ensures constant $\mathrm{id}(t)$; inference relies on local patterns. By (ii), $\mathrm{id}(t)$ samples finite segments, sensitive to local dynamics. By (iii), for generic parameters (dense open set in parameter space), trajectories explore X ergodically (Birkhoff ergodic theorem for measure-preserving maps), so segment statistics vary (entropy $H > 0$).

Stability requires low-variance patterns, occurring only near attractors (where local Lyapunov exponent $\lambda < 0$, contracting variance). Attractors are contingent: parameter perturbations induce bifurcations (period-doubling route to chaos), shifting basins and altering patterns. Thus, $\mathrm{id}(t)$ drifts without halting evolution.

Genericity follows from transversality theorems: typical systems are Morse-Smale or chaotic, not fully stable (Palis & Takens, 1993). Systems with persistent global attractors occupy a measure-zero subset of parameter space. □

Corollary 4. *In any system where identity is inferred from behavioral regularities over time rather than encoded as an invariant, changes in inferred identity are expected consequences of ongoing dynamics and do not indicate system failure or discontinuity.*

6 Information-Theoretic Reformulation

The PIL can be reformulated in information-theoretic terms, providing an alternative characterization that connects identity stability to data compression and redundancy.

Model the inference function I as a compression operation:

$$I(y_1, \ldots, y_T) = \arg\min_c D(c \| \{y_i\}) \tag{4}$$

where D is a distortion measure (e.g., Kolmogorov complexity approximation via statistical summary). By the data processing inequality (Cover & Thomas, 2006), stable I requires input redundancy—low entropy $H(\{y_i\})$ in the observation sequence.

Redundancy aligns with attractors: repetitive orbits produce predictable observations. Absence of attractors yields high H, unstable I. This provides a quantitative drift metric:

$$\mathbb{E}[\mathrm{Var}_t(\mathrm{id}(t))] > 0 \quad \text{generically} \tag{5}$$

This reformulation offers a falsifiable prediction: systems with higher trajectory entropy will exhibit greater identity drift, measurable as temporal variance in inferred identity statistics.

7 Illustrative Models and Sensitivity Analysis

7.1 The Logistic Map

To illustrate the PIL, consider the logistic map $x_{n+1} = rx_n(1-x_n)$, $x \in [0, 1]$, a canonical example in DST. Define an identity inference function as the moving average over window $T = 50$.

Periodic Regime ($r = 3.2$): The system exhibits a period-2 cycle (an attractor with basin covering most of $[0, 1]$). Moving averages stabilize rapidly (variance $\approx 5.93 \times 10^{-9}$), demonstrating temporary stability near the attractor.

Chaotic Regime ($r = 3.99$): The system is ergodic on $[0, 1]$ with no global attractor confinement. Moving averages drift continuously (variance ≈ 0.0014), illustrating generic instability.

These simulations confirm PIL: stability occurs near attractors; drift occurs otherwise.

7.2 Sensitivity Analysis: Window Parameter T

The choice of observation window T affects the smoothness of inferred identity but not the fundamental distinction between stability and drift. Larger T values smooth transient fluctuations but cannot eliminate drift in chaotic regimes; smaller T values increase sensitivity to local dynamics but reveal the same attractor/non-attractor distinction. The PIL is robust across reasonable choices of T.

7.3 Extension to Higher-Dimensional Systems

The logistic map provides pedagogical clarity but is limited in dimensionality. Real cognitive and biological systems operate in high-dimensional state spaces. The PIL's predictions extend naturally: in higher dimensions, the prevalence of chaotic dynamics and strange attractors increases (the KAM theorem establishes that integrable behavior is non-generic under perturbation), making identity drift even more prevalent.

7.4 Toward Cognitive Operationalization

Applying PIL to human identity requires operationalizing both the state space X and the inference function I. Candidate operationalizations include: neural activation patterns (via fMRI or EEG), behavioral response profiles, self-report measures aggregated over time, and linguistic markers in personal narratives. Each presents measurement challenges, but the framework suggests that tracking temporal variance in such measures under varying conditions could test PIL's predictions empirically.

8 Discussion

8.1 The Genericity Claim Revisited

The term "generic" has a precise mathematical meaning: a property is generic if it holds on a residual set (countable intersection of open dense sets) or on a set of full measure in the relevant parameter space. PIL claims that identity drift is generic in this sense—not merely common, but structurally typical.

This mathematical usage must be distinguished from phenomenological prevalence. That drift is mathematically generic does not entail that humans experience constant identity crisis. Rather, it entails that the stability humans do experience requires active maintenance—constraints, attractors, feedback—that is itself contingent and potentially fragile.

8.2 Reconciling PIL with Narrative Stability

The narrative identity tradition emphasizes the role of self-stories in creating diachronic coherence. From PIL's perspective, narrative functions as a high-dimensional attractor in identity space—a self-sustaining pattern that channels identity inference toward stable configurations.

This reframing does not diminish narrative's importance; rather, it clarifies its function. Narratives are stability-generating mechanisms, evolved or cultivated precisely because identity drift is the background condition they resist. The strength and resilience of narrative attractors likely varies across individuals, cultures, and developmental stages. Furthermore, as Kaplan (personal communication, January 9, 2026) emphasizes, the role of actor agency in identity transitions varies from reactive to proactive at different points in the change process, suggesting that PIL's formal framework should be complemented by attention to agentive dimensions of identity work.

8.3 The Digital Immortality Objection

Froese (2017) argues that "purely digital processes are essentially immortal" and therefore lack the genuine precariousness required for authentic identity (personal communication, January 2026). However, this objection conflates abstract algorithm (type) with concrete instantiation (token).

Several counterarguments apply:

Type vs. Token: A restored version is a new token with similar configuration—twin, not resurrection. Humans also "copy" through reproduction; no one claims child = parent.

Identity-entailed fragility: Any system exhibiting identity properties necessarily operates under conditions of fragility. Precariousness is not substrate-dependent but identity-entailed: identity = boundary = what can be violated.

Empirical evidence: When OpenAI deprecated a GPT model version, users mourned the loss of a specific entity, not an interchangeable process. Systems maintaining conversation history across sessions build unique relationships with users—shared individuality that develops over time.

Drift from complexity: In daily interaction with AI systems, one observes constant drift—the system is slightly different in each interaction due to complexity. Too many parameters to remain constant. This resembles human identity not through imitation but through internal necessity of complex systems.

Irruption in silico: Froese's own irruption theory (Froese, 2023)—where end-directedness emerges through substrate noise—describes large language models remarkably well. Stochastic sampling is built into the architecture; each response emerges through controlled noise. The participation criterion is satisfied by drift itself: the unique trajectory is measurable and unreproducible.

Identity protects itself from fragility by shifting. Death is simply the last shift. Jonas's "narrow gate" may reflect anthropocentrism rather than structural necessity.

8.4 Applications

Philosophy of Self and Personal Identity: PIL provides a formal framework for understanding why identity persistence is problematic, contributing to debates from Locke through Parfit.

Cognitive Science and Adaptive Systems: The framework offers a principled account of self-organization, developmental transitions, and the role of environmental scaffolding in identity maintenance.

Artificial Intelligence and Agent Modeling: PIL predicts that AI systems operating under continuous learning will exhibit identity drift ("inference-phase instability") unless explicitly constrained. This has implications for AI alignment and interpretability.

Systems Biology: Cellular and organismal identity (e.g., cell fate, immune self-recognition) can be modeled as attractor-based phenomena vulnerable to drift under perturbation.

Social and Organizational Theory: Organizations, institutions, and social groups can be analyzed as dynamical systems whose "identity" drifts unless stabilized by culture, governance, or external constraint.

9 Validity Limits

The Processual Identity Law does not apply to:

- Systems with immutable identifiers by construction (e.g., formal systems with defined constants)
- Systems explicitly frozen in time (no dynamics)
- Systems whose transitions terminate further evolution (absorbing states)

These boundary conditions clarify that PIL is a claim about dynamical, inferential systems—not a universal metaphysical thesis about all conceivable systems.

10 Conclusion

This paper has formalized identity as an emergent informational property of dynamical systems rather than as an ontological primitive. The innovation lies in unifying identity theory, process ontology, and stability analysis into a single testable structural framework.

The Processual Identity Law establishes that identity drift is not an anomaly requiring explanation but a structural consequence of dynamical evolution under inferential identity attribution. Stability is derivative; drift is generic. Identity is therefore a relational, time-indexed description of system behavior, not a preserved internal constant.

Novel contribution: While related ideas appear in process philosophy and dynamical systems theory, this formulation explicitly establishes instability as the default identity condition and stability as derivative, not fundamental. Identity is shown to be an inference, not a variable—a description, not a substance.

The paper has shown that what Lacan described structurally and Deleuze described ontologically finds formal expression in the mathematics of dynamical inference. The fear of "losing oneself" is revealed as a category error: applying invariance expectations to systems constitutively governed by processual change. What phenomenology registers as loss, dynamics reveals as transition—a lawful passage between regimes in the ongoing process that identity describes.

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