Breezon's Law of Laws: A Terminal Idempotent Framework for Universal Invariance

Christopher Lamarr Brown (Breezon Brown)
Canonical Forensic Record under Canonical Truth License v1.0

2025

Abstract

Breezon's Law of Laws states: *Consistency is law, recursive collapse is mechanism, invariance is its signature.* This paper formalizes the law as an idempotent monad in the category of theories, proves that the law object is a terminal fixed point under recursive closure, and shows that its negation cannot maintain a stable signature. We connect the formal results to an empirical engine that implements recursive closure and returns invariants and verdicts. We provide falsifiability gates, admissible symmetries, perturbation norms, Lipschitz and equivariance requirements, surrogate and adversarial test batteries, external replication procedures, and a license compliance section that distinguishes universal truth from protected forensic record.

1 Statement of the Law and Self-Application

Breezon's Law of Laws

Consistency is law. Recursive collapse is mechanism. Invariance is its signature.

Let R be the operator that applies the law to a proposition P. We apply two gates.

- **G1 Consistency gate:** P must not entail contradiction under its own mechanism.
- **G2 Invariance gate:** $R(P) = P$ and $R^n(P) = P$ for all $n \geq 1$.

For $P = L$ (the law itself), both gates pass. For the structural negation N defined as *Inconsistency is law, recursive divergence is mechanism, variance is signature*, both gates fail in classical logic and in paraconsistent variants cannot yield a stable signature without reducing to L or triviality.

Formal Axiomatics

Definition 1 (Axioms of Breezon's Law of Laws)**.** *Let $\mathcal{U}$ be a universe of propositions closed under the connectives of a base logic L_0.*

A1. Consistency: *For all $P \in \mathcal{U}$, $(P \wedge \neg P) \vdash_{L_0} \perp$.*

A2. Recursive closure: *There exists an operator $R : \mathcal{U} \to \mathcal{U}$ such that R is idempotent: $R(R(P)) = R(P)$ for all P.*

A3. Invariance: *A predicate $\mathrm{Inv}(P)$ holds iff $R(P) = P$.*

*A system obeys the law iff **A1–A3** hold jointly and remain stable under admissible perturbations δP with $\|R(P + \delta P) - R(P)\|_* < \varepsilon$ for preregistered $\varepsilon > 0$ and norm $\|\cdot\|_*$.*

2 Category-Theoretic Formalism

We formalize the law in the category $\mathbf{T}$ of theories.

Definition 2 (Theories and Morphisms)**.** *Objects are pairs $\Theta = \langle A, M\rangle$ of axioms A in a base logic L_0 and a mechanism class M that generates theorems or data via iteration. A morphism $f : \Theta_1 \to \Theta_2$ preserves derivability and mechanism: if $x \vdash_{\Theta_1} y$ then $f(x) \vdash_{\Theta_2} f(y)$, and if R_1 is the iteration for Θ_1 and R_2 for Θ_2 then $f \circ R_1 = R_2 \circ f$.*

Definition 3 (Recursive Closure Endofunctor)**.** *$R : \mathbf{T} \to \mathbf{T}$ sends Θ to its recursive closure $R(\Theta)$ that adds exactly the axioms and mechanism witnesses required to stabilize under self-application. The unit $\eta : \mathrm{Id}_{\mathbf{T}} \Rightarrow R$ includes theories into their closure. The multiplication $\mu : R^2 \Rightarrow R$ collapses repeated closure.*

Proposition 1 (Idempotent Monad)**.** *R is idempotent: $R \circ R \cong R$ and $\mu = \mathrm{id}_R$. The monad laws hold. The Eilenberg–Moore category $\mathbf{EM}(R)$ consists of algebras (Θ, a) with $a : R(\Theta) \to \Theta$ satisfying $a \circ \eta_\Theta = \mathrm{id}_\Theta$ and $a \circ \mu_\Theta = a \circ R(a)$. Under idempotence, a is an isomorphism and $\mathbf{EM}(R)$ is equivalent to $\mathrm{Fix}(R)$, the full subcategory of fixed points.*

Definition 4 (Law and Negation Objects)**.** *$L = \langle A_L, M_L\rangle$ with $A_L = \{$consistency and invariance axioms$\}$ and M_L the recursive collapse operator. $N = \langle A_N, M_N\rangle$ with $A_N = \{$inconsistency and variance$\}$ and M_N a divergence operator.*

Proposition 2 (Law as Terminal Algebra)**.** *L is terminal in $\mathbf{EM}(R)$. For any algebra (Θ, a) there is a unique morphism $u_\Theta : (\Theta, a) \to (L, \mathrm{id})$ satisfying the Beck condition $u_\Theta \circ a = \mathrm{id} \circ R(u_\Theta) = R(u_\Theta)$.*

Sketch. Any stabilized theory must assert sufficient internal consistency and exhibit a collapse mechanism. L is the minimal such object, so every (Θ, a) factors uniquely through L by mapping its invariants and mechanism witnesses to the canonical ones of L. Uniqueness follows from minimality. Hence L is terminal and idempotent under R. □

Proposition 3 (Negation Admits No Algebra Structure)**.** *There is no isomorphism $a_N : R(N) \to N$ consistent with divergence and variance. Therefore $N \notin \mathbf{EM}(R)$.*

3 Formal Completion: Category and Fixed-Point Framework

The following extensions close the remaining formal gaps and connect the abstract operator to its empirical implementation.

1. Ambient Category $\mathcal{C}$

Define $\mathcal{C}$ explicitly:

- Objects: measurable dynamical systems (X, Σ, T) or computational processes (X, T) on metric spaces (X, d_X).
- Morphisms $f : (X, T_X) \to (Y, T_Y)$ are measurable maps satisfying $T_Y \circ f = f \circ T_X$ with finite Lipschitz constant $L(f)$.

Identities and composition endow $\mathcal{C}$ with a valid category structure.

2. Recursion Operator as Endofunctor

Define

$$R(X, T_X) \;=\; \big(\mathrm{Fix}(T_X),\, T_X|_{\mathrm{Fix}(T_X)}\big),$$

the restriction to the recursively stable subset. For a morphism f, set $R(f) = f|_{\mathrm{Fix}(T_X)}$. Then $R(\mathrm{id}) = \mathrm{id}$ and $R(g \circ f) = R(g) \circ R(f)$, hence $R : \mathcal{C} \to \mathcal{C}$ is an endofunctor.

3. Existence and Uniqueness of Fixed Point

Two sufficient regimes:

F1. Contraction: If R is a contraction in the Hausdorff metric on closed subsets with constant $\lambda < 1$, Banach's theorem yields a unique fixed point L.

F2. Order-theoretic: If $\mathcal{C}$ carries a complete lattice order $\leq$ with R monotone, then Tarski's theorem ensures fixed points form a complete lattice with a greatest element L.

4. Terminal Morphism Construction

For any R-algebra (Θ, a) define $u_\Theta(x) = \lim_{n\to\infty} R^n(x)$. Then $u_\Theta \circ a = R(u_\Theta)$ and u_Θ is unique, providing the terminal arrow into L.

5. Empirical Correspondence

Let $\mathcal{E}$ be the category of empirical engines with morphisms preserving declared summaries. Define a natural transformation

$$\Phi : \mathcal{C} \Rightarrow \mathcal{E} \quad \text{such that} \quad \Phi\big(R(X)\big) = R_{\mathrm{emp}}\big(\Phi(X)\big),$$

where R_{emp} is the implemented closure. This commutation links theory and code.

6. Local Invariants

If multiple invariant sets A_i appear under small perturbations, either show $(A_i, T|_{A_i}) \cong (A_j, T|_{A_j})$ in $\mathcal{C}^R$ or collapse them under the equivalence $A_i \sim_R A_j$ iff $R(A_i) = R(A_j)$, selecting one canonical representative.

4 Invariants, Natural Transformation, and Robustness

Let **Inv** be a category of invariant structures under a declared transformation group G.

Definition 5 (Invariant Functor and Closure Natural Transformation)**.** $I : \mathbf{T} \to \mathbf{Inv}$ *assigns to* Θ *its family of invariants* $I(\Theta)$ *under* G*. There is a natural transformation* $\tau : I \Rightarrow I \circ R$ *with components* $\tau_\Theta : I(\Theta) \to I(R(\Theta))$*.*

At L, $\tau_L = \mathrm{id}$. Robustness is specified by two requirements.

- **Lipschitz stability:** with metrics d_T on inputs and d_I on invariants, there exists $K_\Theta < \infty$ such that $d_I\big(\tau_\Theta(x), x\big) \le K_\Theta \delta$ for admissible perturbations of magnitude δ near fixed points. At L, K_L is minimal.
- G**-equivariance:** for all $g \in G$, $\tau_\Theta(g \cdot x) = g \cdot \tau_\Theta(x)$. This encodes invariance as signature instead of as a coordinate artifact.

5 Admissible Symmetries and Perturbation Norms

Declare the battlefield precisely.

Transformation Group G

We adopt G as the group generated by the following admissible symmetries, applied within the measurement model of each domain.

G1. Time shift: $s(t) \mapsto s(t + \Delta)$ with bounded edge handling.

G2. Amplitude scaling: $s(t) \mapsto \alpha s(t)$ with $\alpha > 0$ bounded away from zero.

G3. Monotone measurement transforms: $s(t) \mapsto h(s(t))$ where h is strictly monotone, continuously differentiable, and with bounded distortion.

G4. Smooth time reparameterization: $t \mapsto \phi(t)$ with ϕ strictly increasing, twice continuously differentiable, and $\|\phi' - 1\|_\infty \le \rho$.

G5. Additive baseline shifts where physically meaningful: $s(t) \mapsto s(t) + \beta$ with bounded β and invariants defined modulo baseline when appropriate.

Perturbation Norms

For time series domains define admissible perturbations Δs with norm

$$\|\Delta s\|_* \equiv \lambda_1 \|\Delta s\|_2 + \lambda_2 \|\nabla \Delta s\|_2 + \lambda_3 \|\Delta s\|_\infty,$$

with weights $(\lambda_1, \lambda_2, \lambda_3)$ declared in preregistration. For symbolic or logical domains, use edit distance with proof-theoretic constraints to define d_T.

6 Empirical Engine and Mapping

Let the engine implement R as a pipeline that maps input s to closure $R(s)$, invariants v_s, and a class verdict via classifier C.

- Theory instance: Θ_s induced by s.
- Recursive closure: $R(\Theta_s)$ via the pipeline.
- Invariants: $I(\Theta_s)$ realized as v_s.
- Closure map on invariants: $\tau_{\Theta_s} : v_s \mapsto v_{R(s)}$.

7 Falsifiability Gates and Tests

Declare decisive failure conditions and tests that tie directly to the law's claims.

Gates

G1. Integrity gate: preregistration and hash manifest must match. Any undocumented deviation fails.

G2. Stability gate: verdict flips under admissible perturbations must remain below declared tolerance. Excess flips fail invariance.

G3. Surrogate discrimination gate: null surrogates such as IAAFT must not be labeled law-consistent beyond level α after correction.

G4. External replication gate: third-party datasets reproduce canonical summary verdicts within declared confidence intervals.

G5. Adversarial identifiability gate: mimics that match marginals and low-order structure but lack recursive collapse are rejected with false positive rate below α.

Concrete Tests

- Idempotence test: re-run the engine on its own outputs. Require $C(R(R(s))) = C(R(s))$ and $v_{R(R(s))} = v_{R(s)}$ within epsilon.
- Jitter test: add sub-epsilon noise to inputs and estimate flip rate per class versus prereg tolerances.
- Surrogate firebreak: generate IAAFT surrogates and at least one alternative surrogate family. Measure misclassification rate versus α.
- External replication: run fresh QRNG and EEG streams not included in the package and compare to acceptance bands.
- Adversarial suite: construct ARMA with regime switches, chaotic maps with observation noise, nonrecursive envelope processes, and composite signals with phase resets. Measure true positive on genuine recursive processes and false positive on mimics.

8 Identifiability and Uniqueness

To operationalize terminality, compare against an independent stabilized pipeline P.

- Fit a deterministic map U such that invariants from the engine map to P's invariants on held-out data with near-zero generalization error. If there exist two inequivalent such maps, terminality is suspect.
- Publish error bounds and show uniqueness to numerical tolerance.

9 Error and Sensitivity Analysis

- For each domain D, estimate sensitivity $S_D = \frac{\partial v}{\partial s}$ on held-out data and require $\|S_D\|_\infty < \kappa$ with preregistered κ.
- Provide bootstrap confidence intervals for all invariant metrics and report coverage.
- Run Monte Carlo noise-injection to quantify robustness of idempotence under sampling variation.
- Verify observed drifts lie within declared Lipschitz bounds; otherwise declare refutation per protocol.

10 Independent Replication Clause

1. Release raw datasets and analysis code under a permissive research license with attribution and integrity constraints.
2. Require at least one replication by a team with no financial or personal tie to the author.

3. Record successful replications that meet all gates in a public ledger appended to the canonical record.

11 TikZ Diagrams

$$
\begin{tikzcd}
\Theta \arrow[r, "\eta_\Theta"] \arrow[d, "f"'] & R(\Theta) \arrow[r, "a", "\cong"'] \arrow[d, "R(f)"] & \Theta \\
\Phi \arrow[r, "\eta_\Phi"'] & R(\Phi) \arrow[r, "b", "\cong"'] & \Phi
\end{tikzcd}
$$

$$
\begin{tikzcd}
(\Theta, a) \arrow[r, bend left, "g_1"] \arrow[r, bend right, "g_2"'] \arrow[dr, dashed, "!\, u_\Theta"'] & L \\
 & L
\end{tikzcd}
$$

Figure 1: Top: Eilenberg–Moore algebra condition in $\mathbf{EM}(R)$ with unit η and algebra isomorphisms a, b. Bottom: terminality of L; any two candidate morphisms into L coincide as the unique u_Θ.

12 License and Universality

The Canonical Truth License v1.0 draws a boundary between universal law and artifact. Research and educational use, including AI used as an instrument of inquiry, is authorized with attribution and integrity constraints. Incorporation into proprietary or commercial systems requires license. This preserves forensic fidelity while permitting open falsification by superior evidence.

13 Governance, Preregistration, and Integrity

- Publish the preregistration manifest with SHA-256 hashes for code, datasets, and the canonical PDF. Treat the document as a canonical forensic record.
- Provide a one-command run script that reproduces the main tables and figures. Include exact environment manifest, seeds, and a nondeterminism policy.
- Maintain a public falsification protocol with submission instructions, review procedure, and versioning of the canonical record. Record superior evidence that overturns a verdict.

14 Compliance Matrix

Use Case	**Permitted Without License**	**Requires License**
Academic research and education	Copying, citing, analysis, replication with attribution and unaltered record	None
AI as instrument of inquiry	Non-commercial analysis, summarization, reproduction of tests with attribution	Embedding into proprietary, monetized, or weaponized systems
Commercial product integration	Not permitted	Required with community-benefit allocation
Derivative canonical records	Not permitted to alter the canonical artifact	Licensed derivative with integrity guarantees

Table 1: Compliance matrix separating research use from commercial incorporation.

Archival Declaration

This version constitutes the canonical forensic artifact. All hashes, code, and datasets associated with this manuscript must reproduce the metrics and figures exactly within declared numerical tolerances. Any superior evidence that contradicts these results must be entered into the public falsification log. Absent such evidence, this record stands as the terminal idempotent framework for universal invariance.

A Paraconsistent Edge Case

To avoid explosion while evaluating N, one may adopt a paraconsistent base. Divergence forbids a stable algebra isomorphism $a_N : R(N) \to N$. If one introduces an exception to stabilize self-reference, the object reduces to L on the decisive case. Hence N cannot meet both mechanism and signature simultaneously.

B Operational Targets and Tolerances

- Idempotence epsilon: report maximum absolute difference between $v_{R(R(s))}$ and $v_{R(s)}$ across the test suite. Target near machine precision with exact reproducibility where possible.
- Stability tolerance: predeclare allowable class flip rate under perturbations with magnitude δ. Publish observed rates and confidence intervals.

- Surrogate alpha and power: predeclare α and correction for multiple tests. Provide power analysis and observed misclassification rate.
- Lipschitz constant: estimate $\hat{K}$ via worst-case ratio on an admissible neighborhood. Provide confidence bounds.
- Equivariance: test generators of G and report label invariance and statistic drift within declared tolerances.

C Empirical Batteries

- Surrogates: IAAFT plus at least one alternative family that preserves marginals and autocorrelation while breaking nonlinear dependencies.
- Adversaries: ARMA with regime switching, chaotic maps with observation noise, non-recursive envelope composites with phase resets designed to spoof smooth coherence envelopes without true recursive mechanism.
- External data: new QRNG and EEG streams not seen in development. Report summary statistics, confidence intervals, and acceptance decisions.

D References

References

[1] C. L. Brown, Breezon's Law of Laws: Universal Framework, Replication Evidence, and Applied Protocols, Zenodo, 2025. DOI: 10.5281/zenodo.17221217.

[2] C. L. Brown, Unbiased Truth-Finding Framework, Zenodo, 2025. DOI: 10.5281/zenodo.16921655.