

# The Hidden Regression of Formal Thought

## Structural Substitution and the Illusion of Progress

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### Abstract

Modern scientific research increasingly equates formalization with epistemic progress. Mathematical density, symbolic abstraction, and theoretical unification are widely treated as indicators of rigor and advancement. This paper demonstrates that this assumption is structurally false.

We show that whenever essential structural conditions remain open—specifically invariance, recurrence definition, admissible structure, measurable rule change, falsifiability boundaries, and law-level closure—formal systems do not stabilize under recurrence. Instead, they regress. Missing structural definitions are systematically replaced by semantic constructs such as identity invariants, selection principles, resonance anchors, numerical fixations, or totalizing unification claims. This substitution produces the subjective impression of theoretical progress while inducing objective structural drift.

The phenomenon is not psychological, sociological, or disciplinary. It is deterministic under recurrence. Meaning does not appear accidentally; it is inserted as a compensatory response to unresolved structural incompleteness. Formal coherence, mathematical elegance, and conceptual sophistication therefore cannot be treated as evidence of admissibility.

This paper formalizes the hidden regression of formal thought as a structural substitution mechanism: where structure is undefined, meaning is injected; where admissibility is absent, assertion takes its place. The analysis is domain-general and applies across physics, systems theory, cognitive science, artificial intelligence, philosophy, and adjacent formal disciplines.

No new operators, domains, or interpretations are introduced. The contribution is negative but necessary. It explains why highly formal theories repeatedly fail at the point where further precision would require accepting structural limits rather than compensating them with meaning. Formal thought does not collapse from lack of intelligence, but from refusal of closure.

## **Status Declaration**

### **1) Law assumption.**

This paper treats the operator law  $\Psi = \partial S / \partial R$  as law-grade within its stated scope. It does not re-justify the law.

### **2) RSSA admissibility gate.**

All structural statements in this paper are admissible only under Rule–State Separation (RSSA). Where RSSA cannot be applied, structural classification is undefined for the corresponding claim.

### **3) $\Psi$ -regime declaration.**

This paper operates in a purely classificatory and diagnostic regime. It introduces no  $\Psi_{\text{eff}}$ , no measurement proxy, and no empirical instantiation.

### **4) Separation of law and proxy.**

The law is  $\Psi$ . Any operational metric, indicator, or formal score is a proxy and cannot redefine structure, recurrence, or admissibility. Proxy failure is not law failure.

### **5) Local falsifiability.**

No global validation claim is made. The paper makes a local formal claim about a recurrent failure mode: where essential structural conditions remain open, semantic substitution becomes admissible only in appearance and regression becomes structurally expected.

## 6) Consequence framing.

This paper is written as a consequence of the law and its admissibility discipline. It does not persuade, rescue, or reinterpret. It delimits a failure mode.

Note:

Where invariance, recurrence, admissible structure, or rule–state separation cannot be re-established, the correct result is undefined. No structural continuation is admissible from that point.

## Canonical Attribution and Scope

This paper is downstream of the KOGNETIK Operator Law and presupposes its formal status, admissibility conditions, and regime definitions. The operator relation  $\Psi = \partial S / \partial R$ , the Rule–State Separation Axiom (RSSA), and the classification of null, negative, and undefined regimes are treated as canonically defined and are not reintroduced here.

All structural claims in this paper are constrained by the admissibility conditions specified in the KOGNETIK Operator Law and its associated integrity protocol. No external theoretical frameworks, ontologies, or representational models are invoked.

## 1. Status Declaration

This paper operates under the assumption that the operator relation  $\Psi = \partial S / \partial R$  is law-grade and canonically defined. Its scope, admissibility conditions, falsifiability boundaries, and regime classifications are not re-argued here.

Recurrence is treated as structurally expected under minimal conditions and does not require an external motor, teleology, or causal narrative. Structure is treated as a non-semantic, admissible object defined via invariance, rule–state separation, and decidable modification under recurrence.

This paper is strictly downstream of these commitments. Its function is not to extend the law, but to diagnose a systematic failure mode that arises when law-level closure is avoided.

## 2. The Problem of Formal Progress

Across contemporary research, formalization is widely assumed to be monotonic: more equations, deeper abstraction, and broader unification are taken to indicate theoretical improvement.

This assumption fails under recurrence.

Formal systems that do not explicitly close their structural conditions do not converge. They accumulate symbolic mass while losing structural clarity. Precision increases locally, while admissibility degrades globally. The failure is subtle. It does not appear as contradiction, inconsistency, or empirical error. On the contrary, it often appears as conceptual depth, mathematical beauty, or explanatory reach.

This paper addresses that failure mode directly.

## 3. Structural Incompleteness and Substitution

A formal theory is structurally incomplete if one or more of the following conditions are left open or implicit:

- invariance relations defining what counts as the same structure,
- a non-mythological specification of recurrence,
- an admissible definition of structure distinct from states or measurements,
- a decidable criterion for rule change ( $\Delta S$ ) under recurrence,
- explicit null and undefined regimes,
- law-level closure separating operators from interpretations.

When such incompleteness persists under recurrence, a deterministic substitution occurs. Missing structural elements are replaced by semantic constructs that simulate closure without providing it. This substitution is not arbitrary. It follows a stable pattern:

- missing invariance is replaced by identity claims,
- missing recurrence definition is replaced by selection or optimization narratives,
- missing measurability is replaced by numerical density or coordinate fixation,
- missing falsifiability is replaced by anchors, constants, or privileged reference points,
- missing law-closure is replaced by totalizing unification claims.

This mechanism is invariant across domains.

## 4. The Hidden Regression Mechanism

The substitution described above produces a characteristic regression:

- structure is replaced by meaning,
- admissibility is replaced by assertion,
- closure is replaced by coherence.

The theory appears to advance because semantic load increases. Explanations feel deeper, narratives feel complete, and formal surfaces become more elaborate.

Structurally, however, the system moves away from decidability. Rule change becomes inseparable from state behavior. Measurements become indistinguishable from definitions. Critique becomes semantic rather than structural.

This regression is hidden because it preserves formal appearance. It is therefore not detected by traditional markers of rigor.

### 4.1 Structural Substitution Map

#### Semantic Compensation under Open Structural Conditions

When essential structural questions remain open, avoided, or implicitly assumed, formal systems do not remain neutral. They compensate. The compensation follows a stable and repeatable substitution pattern:

Open Structural Condition	Semantic Substitution
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Undefined invariance	Identity, essence, core property
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Undefined recurrence	Selection, optimization, preference
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Undefined structure	Representation, encoding, information
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Undecidable rule change	Learning, adaptation, emergence
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Missing admissibility model	Metrics, scores, coordinates
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Missing falsifiability boundary	Anchors, constants, privileged reference points
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Missing null regime	Continuous improvement narratives
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Missing undefined regime	Interpretive expansion
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Missing law-level closure	Unified theories, totalizing explanations
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These substitutions are not errors of reasoning. They are **functional replacements**. Each semantic construct fills a specific structural void while preserving the appearance of formal completeness.

The resulting theories often exhibit high internal coherence, mathematical sophistication, and explanatory confidence. None of these properties constitute evidence of structural admissibility.

The substitution mechanism is deterministic under recurrence. Wherever structural closure is deferred, semantic load increases. Meaning stabilizes what structure fails to define.

## **5. Determinism Under Recurrence**

The regression mechanism is not optional.

Under recurrence, any system that avoids explicit closure must compensate. Semantic substitution is the only available stabilizer once structural definition is deferred.

Intelligence does not prevent this process. On the contrary, high cognitive and mathematical capacity accelerates it by enabling more sophisticated substitutions.

The regression of formal thought is therefore most pronounced in advanced theories, not naive ones.

## **6. Non-Claims**

This paper does not claim that:

- meaning is illegitimate in all contexts,
- formalization is inherently flawed,
- scientific progress is impossible,
- existing theories are false.

It claims only this:

Formal thought regresses whenever structural incompleteness is compensated with meaning rather than resolved by closure or declared as undefined.

## 7. Admissibility and Undefined Regimes

Undefined regimes are not failures of theory. They are correct structural classifications.

When invariance cannot be declared, when recurrence cannot be specified, or when rule change cannot be decided, the correct response is not interpretation but suspension.

Semantic compensation converts undefined regimes into pseudo-defined ones. This conversion is the core mechanism of regression identified here.

## 8. Local Falsifiability

The diagnosis presented in this paper is falsified in any domain where all of the following can be provided:

1. an explicit admissibility model defining states, transformations, and guards,
2. a non-semantic structural object defined via invariance,
3. a decidable separation between rule change and state change,
4. an invariant measure or classification of  $\Delta S$ ,
5. explicit null and undefined cases,
6. local conditions under which claims are abandoned rather than reinterpreted.

Where these conditions are met, the substitution mechanism does not activate.

Where they are absent, regression is structurally unavoidable.

Undefined regimes are terminal within the declared claim scope.

Any continuation by semantic enrichment, formal extension, or interpretive rescue without restored structural evaluability constitutes substitution, not progress.

## 9. A Minimal Structural Audit

Before claiming formal progress, the following questions must be answerable without semantic interpretation:

1. What is the minimal recurrence claim, independent of narrative or causation?
2. What defines admissible structure, and what invariances fix it?
3. How is rule change distinguished from state evolution?
4. What constitutes a null case, and why is it structurally allowed?
5. Under which conditions does the theory become undefined rather than extended?
6. What would falsify the claim locally, without reinterpretation?

Failure to answer any of these indicates not incompleteness, but active regression.

## 10. Conclusion

The hidden regression of formal thought explains a persistent paradox of modern science: why increasingly sophisticated theories repeatedly fail at the point where further progress would require accepting structural limits.

The failure is not intellectual. It is structural.

Formal thought does not regress because it lacks rigor, but because it refuses closure. When structure is left open, meaning rushes in. When admissibility is deferred, assertion takes its place.

This paper makes that mechanism explicit. Not to accuse, but to delimit. Not to replace existing theories, but to render their failure modes visible.

Progress resumes only where closure is accepted—or where undefined regimes are left intact.



## **Attribution**

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## **Integrity Statement**

This paper adheres to the KOGNETIK Integrity Protocol.

No semantic reinterpretation, operator redefinition, or proxy substitution is introduced.

All claims are structural, non-ascriptive, and domain-general.

## **Appendix A — Structural Substitution Audit Protocol**

### **1. Claim**

State the progress claim in one sentence.

### **2. Recurrence declaration**

What is the declared recurrence under which the claim is supposed to remain valid?

### **3. Structure declaration**

What is the non-semantic structure object, and which invariances fix it?

### **4. Rule–state separation**

What would count as rule change, and what is only state evolution?

### **5. Null case**

Under which declared conditions does the same system remain structurally unchanged?

### **6. Undefined boundary**

Under which condition must the claim stop rather than extend?

### **7. Local falsifier**

What local observation would force abandonment of the claim without reinterpretation?

### **8. Classification output**

- structurally closed
- structurally undefined
- substitution active

