

Pre-Semantic Structural Revelation and the Non-Causal Geometry of Admissibility

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Abstract

Origin of the Pre-Semantic Layer

This addendum originated not from the analysis of language, symbols, or communication systems, but from an encounter with a visual artifact: a model rendering high-dimensional structure from raw acoustic signals. While initially presented as an attempt to “decode” birdsong, the representation did not behave as a linguistic description, nor as a semantic embedding. What was revealed was neither meaning nor translation, but a stable relational geometry emerging directly from signal dynamics.

The critical insight was that the model was not describing what the bird expressed, but exposing how constraints formed prior to any notion of meaning. The visualized structure did not correspond to symbols, intentions, or communicative acts. Instead, it exhibited continuity, density, divergence, and saturation patterns that functioned as limits on possible future interpretations without selecting any of them.

This observation made explicit a layer that had been structurally necessary throughout the PETRONUS™ / ΔE^{TM} / UTAM™ / ONTO Σ ™ framework but had remained unnamed: a pre-semantic domain in which admissible geometry becomes visible without entering causal control or semantic commitment. The model was not performing interpretation; it was revealing constraint topology.

Recognizing this distinction clarified a long-standing architectural requirement: long-horizon adaptive systems must be able to witness emerging inadmissibility without converting that witnessing into optimization or control. The observed representation demonstrated that such visibility is possible only if revelation remains non-causal and non-semantic.

This abstract therefore does not document a methodological contribution, but the formal recognition of a structural layer whose existence resolves the tension between observability and viability. The pre-semantic structural revelation layer completes the admissibility architecture underlying Cybernetics of order 2.5 and explains how awareness can exist without collapse into reflexive control.

Positioning

This addendum makes explicit an intermediate structural layer that has been *functionally necessary* across the PETRONUS / ΔE / UTAM / ONTO Σ corpus, yet has not been previously isolated as a distinct architectural object.

The layer concerns *pre-semantic structural revelation*: the emergence of an admissible relational geometry from raw signal dynamics *prior to* semantic interpretation, intention attribution,

or meaning-level commitment. It is not a representational hypothesis about the world, and it is not a psychological claim about perception. It is an architectural distinction about how long-horizon systems must remain viable under irreversible interaction.

In the present framework, long-horizon viability requires a strict separation between: (i) causal evolution, which produces changes and realizes consequences, and (ii) structural admissibility, which constrains what may be enacted, stabilized, or irreversibly committed.

Pre-semantic structural revelation occupies the boundary between these operators. It provides a mode in which constraint topology can become visible *without* becoming a causal objective. In other words, it allows the system to witness the approach of inadmissibility without granting the primary agent access to optimize against admissibility itself. This boundary condition is not an aesthetic preference. It is the prerequisite for preserving observational independence under drift, finite internal time, and irreversible commitment.

Accordingly, the layer is introduced here as an explicit component of the emerging classification advanced by this work: *Cybernetics of order 2.5*. It is the minimal structural insertion required to close the gap between second-order systems that permit observational coupling into regulation, and fully self-referential third-order systems that collapse reflexivity into an optimizable decision surface. The addendum does not propose an implementation; it identifies the structural territory that must exist if identity continuity, coherence, and long-horizon viability are to remain definable and preservable.

The Missing Intermediate Layer

Most adaptive frameworks implicitly assume a linear semantic progression:

$$\text{raw signal} \rightarrow \text{interpretation} \rightarrow \text{meaning} \rightarrow \text{action}.$$

This progression is structurally incomplete for long-horizon systems.

It conflates two distinct transitions: (1) the emergence of constraint geometry from interaction, and (2) the stabilization of interpretation into meaning-level commitment. The first is a structural exposure phenomenon; the second is a semantic authorization phenomenon. Treating them as a single causal inferential pipeline introduces a failure mode: either the system commits too early (and pays irreversible structural cost under drift), or it delays commitment (and loses the ability to witness silent degradation without turning that witnessing into control).

Between raw signal and meaning there exists an intermediate layer in which: relational structure becomes legible, constraint topology becomes visible, and feasibility boundaries become detectable, *without* assigning semantics, values, purposes, or identity-bearing commitments. This layer is not an interpretation engine. It does not select hypotheses. It does not decide what is true. It does not authorize irreversible commitments. It exposes what is structurally possible and what is structurally excluded.

In this sense, the layer is neither perceptual noise nor meaning. It is *structure prior to commitment*: an admissible geometry revealed through relations and constraints rather than through semantic inference. Its output is not a statement about the world but a delimitation of future admissible evolution. It answers a narrower question than meaning: not “what is the

case?”, but “what cannot be stably committed without violating structural viability?”

This intermediate layer is therefore required as a structural precondition for the axioms and theorems governing non-causal admissibility, internal-time-bounded stabilization, and the prohibition against exposing admissibility as causal feedback. It closes a missing step in the standard progression by inserting a non-semantic, non-causal mode of visibility that makes long-horizon constraints observable *without* allowing them to become optimizable.

Definition: Pre-Semantic Structural Revelation

Definition. Pre-semantic structural revelation is the exposure of relational geometry and constraint topology arising from raw signal dynamics prior to semantic stabilization, intentional attribution, or meaning-level commitment.

This mode of revelation is structural rather than interpretive. It does not operate on symbols, hypotheses, or representations, but on relations induced by interaction. What is revealed is not an account of what the system encounters, but a topology of constraints that delimit future admissible evolution.

Formally, pre-semantic structural revelation: (i) operates on relations rather than symbols or semantic units, (ii) produces relational topology rather than interpretation or meaning, (iii) constrains admissible future evolution without prescribing actions, goals, or commitments.

It does not answer the question of what should be done or what is the case. It exposes only what cannot be stably enacted or committed without violating long-horizon structural viability.

Structural Properties

Pre-semantic structural revelation satisfies the following structural properties, which are invariant across implementations and independent of substrate.

Non-causality. The revealed structure does not enter the causal decision surface of the adaptive agent. It does not function as a control signal, optimization target, or corrective feedback. Its influence on behavior is indirect and mediated solely through structural admissibility rather than through causal regulation.

Non-semanticity. No meaning, value, intention, or purpose is assigned at this layer. The revealed structure is not an interpretation of the environment and does not encode propositions, beliefs, or semantic commitments.

Non-commitment. Pre-semantic revelation does not stabilize interpretations into irreversible regimes. It carries no authority to authorize commitments, regime transitions, or identity-affecting operations. Stabilization, when it occurs, must be justified independently within internal-time-bounded admissibility.

Constraint Exposure. The layer exposes patterns of relational density, continuity, divergence, saturation, and incompatibility that delimit the space of admissible future evolution. These patterns function as structural boundaries rather than prescriptive rules.

Accordingly, this layer is observational without being actionable. It permits the system to witness the approach of inadmissibility without granting the primary agent the ability to optimize against, suppress, or strategically manipulate the revealed constraints.

Relation to Structural Non-Causality of Admissibility

This addendum strengthens the axiom of structural non-causality of admissibility: admissibility at time t is determined by accumulated structural state rather than by instantaneous causal dynamics.

Pre-semantic structural revelation explains how structural state becomes observable without becoming causally operative. The system may witness approaching inadmissibility without acquiring the ability to optimize against it.

This resolves the paradox of long-horizon observability without meta-control collapse by separating revelation from regulation.

Architectural Role in Cybernetics of Order 2.5

This layer constitutes the decisive architectural reason why the framework cannot be classified as second- or third-order cybernetics.

Second-order cybernetics permits observation to influence regulation. Third-order cybernetics internalizes reflexivity as an optimizable process.

Pre-semantic structural revelation enables reflexivity without control, observation without optimization, and awareness without collapse. It therefore defines the structural core of Cybernetics of order 2.5.

Necessity of Non-Causality

If pre-semantic structural revelation is exposed as causal feedback, it inevitably becomes subject to optimization pressure. Once rendered actionable, such signals are delayed, suppressed, compensated, or strategically avoided in service of short-horizon objectives or local performance preservation. In this regime, the system loses the capacity to witness silent structural degradation precisely at the point where such witnessing is most critical.

For this reason, the pre-semantic layer must remain architecturally non-causal. It must be inaccessible to the primary adaptive agent, non-rewardable, and non-optimizable. Any attempt to integrate this layer into causal regulation collapses observability into control and destroys long-horizon viability.

This restriction is not a limitation of the framework. It is a necessary condition for preserving structural independence between observation and regulation under irreversible interaction.

Relation to Meaning and Commitment

Meaning does not arise from pre-semantic structural revelation through inference or interpretation. Meaning emerges only at a later stage, when interpretation stabilizes across internal time and commitment becomes structurally admissible.

Pre-semantic revelation defines the space of admissible meanings without selecting among them. It constrains what may become meaningful, but it does not assign value, intention, or

purpose. Semantic commitment occurs only when these constraints are respected over a non-zero internal-time horizon.

Meaning, within this framework, is therefore not discovered as a property of perception. It is admitted as a structural authorization conditioned by accumulated viability.

Position Within the School

This addendum introduces no new mechanisms, algorithms, or implementation prescriptions. Its role is structural rather than procedural. It formally anchors a layer that has been implicitly required for the internal coherence of the existing axioms, lemmas, and theorems, but had not previously been isolated as a first-class architectural element.

By making this layer explicit, the addendum clarifies why long-horizon viability demands observability that is strictly non-causal, and why any attempt to convert such observability into regulation necessarily induces reflexive collapse. It also provides a principled justification for the framework's deliberate refusal to enter third-order cybernetics, not as a matter of scope or conservatism, but as a structural safety requirement.

In this sense, the addendum does not extend the framework outward; it tightens it inward. It resolves latent ambiguities, closes an architectural gap between observation and regulation, and stabilizes the theoretical core against misclassification as either second- or third-order cybernetics.

Accordingly, this text constitutes a foundational element of the emerging school of *Cybernetics of order 2.5*: a discipline defined by reflexivity without control, observability without optimization, and structural awareness without self-destructive self-reference.

Implicit Presence in Prior Results

The pre-semantic structural revelation layer formalized in this addendum has been implicitly operative throughout earlier results of the PETRONUS™ / ΔE™ / UTAM™ / ONTOΣ™ corpus. Its effects appear in the treatment of non-causal admissibility, the prohibition of feedback from viability constraints to primary agency, internal-time-bounded semantic commitment, and regime-level gating of irreversible transitions. These principles were previously established without explicit isolation of the underlying layer; the present work makes this structural dependency explicit and provides a unifying account of how admissible geometry becomes observable without entering causal regulation.

Conclusion

The world does not become meaningful all at once. It first becomes constrained, only later interpretable, and only then admissible for irreversible commitment.

Cybernetics of order 2.5 exists to preserve this ordering under irreversible interaction, finite internal time, and identity-preserving structural constraints. It enforces the separation between what may be observed and what may be acted upon, between revelation and regulation, between coherence and control.

By refusing to collapse structural observability into causal authority, this framework prevents reflexive optimization from eroding the very conditions of viability it seeks to monitor. Meaning is not forced into existence by action, nor extracted by inference, but admitted only when structural conditions permit stabilization.

In long-horizon adaptive systems, survival is not achieved by acting faster, optimizing harder, or observing more deeply. It is achieved by preserving the architecture that makes non-collapse possible. Cybernetics 2.5™ (MxBv) names that architecture.

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