The Intelligibility Floor

Structural Preconditions for Coherent System Description

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Abstract

This chapter derives the minimal structural conditions required for coherent system description under persistence and change. Beginning from a single non-ontological commitment—that distinguishability can persist—the chapter shows that any theory admitting persistence must distinguish between a reversible, pre-commitment regime and an irreversible commitment regime. From this distinction follows a structural role for probabilistic state-space formalisms prior to commitment, without proposing physical theories or making empirical claims. The derivation stops deliberately at the point where quantification becomes necessary, specifying an intelligibility floor rather than a complete theory.

1. Introduction: The Intelligibility Problem

Theories that describe systems persisting across change presuppose a level of structure that is rarely made explicit. Before questions of ontology, dynamics, or empirical adequacy can arise, a description must already be intelligible: it must be capable of distinguishing what can persist from what cannot, and of representing change without collapsing into contradiction.

This chapter addresses that prior problem. It does not propose a theory of the world, revise existing formalisms, or advance an interpretation of any domain-specific framework. Instead, it asks what must already be true of any coherent system description that admits persistence and change at all. The result is a set of structural constraints—an *intelligibility floor*—without which no further theorizing is possible.

The motivation for this inquiry is methodological rather than speculative. Many disputes across physics, philosophy, and systems theory hinge on assumptions treated as optional or interpretive. These assumptions in fact function as prerequisites of coherent description. By deriving these prerequisites explicitly, the present work aims to separate structural necessity from domain-specific choice.

A central focus is the distinction between reversible description and irreversible commitment. Any system description that allows distinctions to persist must account for how incompatible distinctions can be represented prior to commitment, and how commitment becomes binding once it occurs.

2. Methodological Posture and Scope Discipline

The claims advanced here are neither empirical nor metaphysical. They are constraints on coherent description. The method is derivational rather than speculative: each step follows as a necessity once the root commitment is granted.

The chapter observes strict scope discipline. It introduces no domain-specific dynamics, no ontological commitments, and no quantitative laws. Physical theories, probabilistic models, and interpretations are treated only as exemplars of structural roles, not as objects of analysis or revision.

Stopping conditions are an essential part of this posture. The derivation halts at the boundary where quantification becomes necessary. Proceeding beyond that point would require additional assumptions not contained here and would therefore violate the methodological constraints of the present work.

3. Root Commitment: Persistent Distinguishability

The derivation begins from a single commitment:

Distinguishability can persist.

This is not an ontological claim about what exists. It is a typing constraint on intelligible description. To describe a system at all requires that differences can be carried across reference, comparison, or re-encounter. If distinguishability could not persist, no description could maintain reference across change, and no system could be coherently referred to.

The alternative—that distinguishability cannot persist—does not constitute a competing descriptive option. It entails that no description could maintain reference across change and therefore collapses the descriptive enterprise itself. The commitment is thus not arbitrary, but the minimal condition under which description remains possible.

Nothing else is assumed. In particular, no assumptions are made about time, causation, substance, or physical realization. The commitment concerns only what counts as a lawful continuation of description.

4. The Intelligibility Floor (Derived Constraints)

What follows are not additional axioms, but consequences forced by the root commitment.

4.1 Nothing Is Inadmissible

By *nothing*, we do not mean a special state, background, or zero-valued configuration. We mean the absence of any admissible distinction whatsoever. Such absence cannot function as a lawful continuation, because it cannot persist, be re-encountered, or be distinguished from itself. Treating 'nothing' as admissible already reintroduces distinction and therefore contradicts the condition it names.

The absence of distinction is not an admissible continuation under persistence. This is the first consequence of allowing distinguishability to persist.

4.2 Persistence

A distinction that does not persist collapses into indistinguishability. Persistence does not require duration, metrics, or clocks. It requires only that a distinction can be encountered again as the same distinction.

Persistence is therefore the minimal condition under which difference becomes real for description.

4.3 Multiplicity

A single, isolated distinction requires no maintenance and faces no threat. In the absence of alternatives, nothing could displace it, and no condition could arise under which it would fail to persist. Such a distinction is dynamically inert: it is indistinguishable from a static background.

The root commitment—that distinguishability can persist—therefore cannot be satisfied by mere endurance. The modal 'can' implies non-triviality: persistence must be an achievement, maintained against the possibility of loss. For loss to be possible, alternatives must be admissible.

This requires Multiplicity: not the simultaneous existence of many distinctions, but the admissibility of distinct configurations that could replace one another. Without such admissible alternatives, persistence collapses into tautology: nothing could persist rather than fail to persist.

Once persistence is admitted as a meaningful operation, the system must therefore admit the possibility of multiple distinct states. Multiplicity is thus a structural requirement of persistence-as-achievement, not an ontological proliferation of entities and not a condition imposed by an observer.

4.4 Constraint and Coherence

Not all combinations of distinctions can persist together. Free combination destroys persistence by generating incompatibility. To maintain multiplicity, constraints are required.

Coherence names the condition under which multiple distinctions can coexist without contradiction. Constraint and coherence are therefore structurally required, not optional.

4.5 Ordered Non-Commutativity and Irreversibility

When the order of transitions matters for maintaining coherence, transitions are not freely invertible. Returning to a prior configuration may require compensation not required for continuation. Compensation denotes the additional transitions required to reach a configuration beyond what direct continuation requires.

Irreversibility appears here as non-return under coherence: ordered non-commutativity of lawful transitions.

4.6 Directionality

Because some continuations require less compensation than others, a gradient of admissibility emerges. Continuations are not symmetric with respect to maintenance cost. Directionality is the structural expression of this asymmetry.

4.7 Pressure

Where incompatible distinctions persist under constraint, the current configuration may become inadmissible (e.g., due to external inputs or internal conflict). In a static logical description, contradiction simply terminates evaluation. In a system governed by the Intelligibility Floor, termination is not an available outcome.

Two constraints apply simultaneously:

- Coherence (§4.4) forbids the system from remaining in an incompatible configuration. Stasis is inadmissible.
- Persistence (§4.2) forbids the system from ceasing to exist as a distinct unit of reference. Cessation is inadmissible.

When both Stasis and Cessation are excluded, the current configuration has no admissible continuation that preserves it. The system is therefore forced to relinquish its present configuration in order to remain describable under the root commitment.

Pressure names this structural condition: the exclusion of both stasis and termination under maintained coherence. Pressure is not a force or a direction toward resolution; it is the residual condition that arises when incompatibility cannot be spatialized (as in an archive) and cannot be deferred. Under pressure, continuation is possible only through transition to a different configuration.

Pressure thus transforms static incompatibility into dynamic change, not by introducing a new causal mechanism, but by exhausting all non-transitional options.

4.8 Ordering Under Pressure (Navigation)

Under pressure, local navigation becomes necessary. To navigate, a system must distinguish nearer from farther continuations in terms of compensation.

An ordering over admissible continuations emerges as the minimal structure required for such navigation.

4.9 Conserved Capacity (Derived from the Structural Conditions of Change)

The root commitment—that distinguishability can persist—implies that persistence is a non-trivial achievement. As established in §4.2 and §4.7, persistence is maintained against the possibility of loss and operates under pressure. This implies that active maintenance is required and change is possible.

The Archive Problem. If a system possessed unbounded capacity for realization, it would not need to change state to accommodate new distinctions; it could simply add them to an ever-expanding configuration. Such a system would function as a perfect archive: a cumulative record where all past and present distinctions coexist at different indices without interference. In an archive, nothing is ever displaced, and therefore nothing ever truly transitions.

Operativity and System Membership. However, pressure forces navigation (§4.8): the necessity of selecting one admissible continuation over others. Distinctions that actively constrain this selection are termed operative. Navigation requires a finite interface of such operative distinctions; if infinitely many distinctions were equally active in constraining the next state, no determinate selection could occur.

Because operative distinctions consume the system's finite capacity for maintenance, they are load-bearing. Crucially, distinctions cannot 'persist' in a non-operative background without ceasing to be part of the system's current state. To describe a system as a coherent unit of reference is to assert that its state is defined by what is currently realized, not by what is archivally retrievable.

Displacement. Therefore, for a system to change (to transition rather than merely accumulate), new realizations must displace old ones.

- **Transition:** To realize configuration B, the system must cease to realize configuration A. The necessity of losing A to realize B demonstrates that the capacity for simultaneous realization is bounded.
- **Exclusion:** Because the system maintains a single coherent identity (structural unity, or Norm $= 1$), it cannot resolve incompatibility by 'storing' conflicting distinctions elsewhere. What is displaced is excluded from the system.

Conservation. This bound behaves as a conservation law: the system's capacity to support operative distinctions is conserved. Transitions reallocate this capacity rather than expanding it.

Conserved Capacity is thus derived not as an arbitrary assumption of finitude, but as the necessary structural condition that separates a dynamical system (which faces Exhaustion, see §5) from a static archive. Without this conservation, pressure could not force irreversible reconfiguration, and the description of dynamical evolution would collapse.

5. Accumulation, Exhaustion, and Irreversible Reconfiguration

Because this capacity is bounded and conserved under coherence, it accumulates as load as it is expended to maintain coherence. When no admissible continuation preserves the current configuration without exceeding available capacity, reconfiguration is forced.

This condition is termed *irreversible reconfiguration*. It is not a mechanism or cause, but a boundary consequence of exhaustion under coherence. Collapse, by contrast, is coherence failure with loss.

6. Boundary Conditions on Formal Theories

Any formal theory that admits persistence and change must distinguish between two qualitatively different regimes of lawful description:

1. a reversible, pre-commitment regime, in which multiple incompatible distinctions may coexist without consequence, and

2. an irreversible commitment regime, in which one distinction becomes load-bearing and others are excluded.

This distinction is not interpretive or domain-specific. It follows from the minimal requirements of coherent system description under persistence. Where distinctions are conditionally admissible but not yet load-bearing, reversibility is preserved. Where a distinction becomes load-bearing, irreversibility is introduced.

6.1 Conditional vs. Commit Admissibility

The following terminology is introduced to mark this boundary:

Conditional admissibility refers to distinctions that are lawful to represent but do not yet bear consequence. Multiple incompatible distinctions may coexist in this regime without contradiction.

Commit admissibility refers to distinctions that become load-bearing for the system's continued configuration. Commitment is irreversible relative to the governing coherence conditions.

Any coherent formalism describing systems that persist under constraint must provide a representational regime corresponding to conditional admissibility, prior to commitment.

6.2 Structural Role for Pre-Commitment Representation

Representing mutually incompatible distinctions as exclusive facts would force commitment at the point of representation. To preserve conditional admissibility, such distinctions must instead be represented as coexisting elements within a shared representational space. The structure of that coexistence constitutes the geometry of admissibility: the ways in which distinctions combine, interfere, or exclude without commitment.

Any formal system that (i) admits mutually incompatible distinctions, (ii) preserves coherence under persistence, and (iii) forbids free reversibility must instantiate a representational structure capable of maintaining conditional admissibility under

incompatibility. Probabilistic state-space formalisms satisfy these requirements; whether they are the unique such structure is not established here.

6.3 Role of the Present Work

The present work establishes the constraints any formal theory must already satisfy in order to meaningfully distinguish reversible dynamics from irreversible commitment.

No domain-specific dynamics, ontological commitments, or quantitative laws are introduced. The results here therefore neither prescribe nor exclude any particular formalism, interpretation, or application. Subsequent frameworks may inherit these constraints as prerequisites, but cannot revise or bypass them without abandoning coherence.

In this sense, the present results function as a reference boundary rather than a complete theory: they specify what must already be true before probability, statistics, physics, or other quantitative structures become admissible.

7. Stopping Condition: Quantification Begins Here

The derivation presented here halts at the boundary where quantitative representation becomes necessary. Up to this point, all claims concern structural conditions of intelligible description: what must already be true for persistence, distinction, and commitment to be coherently represented at all.

Proceeding beyond this boundary would require additional assumptions concerning probability measures, statistical structure, or physical instantiation. Such assumptions are not consequences of the intelligibility floor derived here. Introducing them would therefore constitute an extension of scope rather than a continuation of the derivation.

This stopping condition is methodological, not provisional. The absence of equations, metrics, or domain-specific dynamics reflects discipline rather than incompleteness. Quantitative formalisms are admissible only once the structural preconditions identified above are satisfied; they cannot supply those preconditions themselves.

What lies beyond this floor—probability theory, physical law, or other quantitative frameworks—belongs to the domain of quantification. The role of the present results is to delimit where such frameworks may begin, not to pursue them.

8. Discussion

Structural status of the claims. The results of this chapter are structural constraints on intelligible description. They make no claims about what exists, only about what coherent description requires. They are therefore neither empirical hypotheses nor metaphysical theses, but preconditions for either. Disagreement with these results cannot proceed by counterexample or alternative interpretation alone; it must identify a coherent system description that admits persistence and change while bypassing the derived constraints. Absent such a description, the constraints stand as necessary.

Relation to existing formalisms. Nothing in the derivation revises or competes with existing physical theories. Where probabilistic formalisms are mentioned, they function as exemplars of a structural role at the admissibility boundary, not as objects of reinterpretation.

On the absence of equations. The lack of equations is intentional. Introducing quantitative structure would require additional assumptions about measures, metrics, or dynamics that are not consequences of the intelligibility floor. The present claims cannot be strengthened by formalization without changing their type. Quantitative frameworks may instantiate the constraints identified here, but they cannot ground them.

Completeness and scope. The work is complete with respect to its declared scope. It does not aim to explain phenomena, select interpretations, or extend into ontology. Requests to do so misidentify the role of the chapter. The appropriate test of the results is not whether they explain more, but whether coherent description remains possible when they are denied.

9. Conclusion

This chapter has derived the structural conditions required for coherent system description under persistence and change. Beginning from a single non-ontological commitment—that distinguishability can persist—it has shown that any intelligible description must admit constraint, irreversibility, and a boundary between reversible representation and irreversible commitment.

From this intelligibility floor follows a necessary distinction between conditional admissibility and commit admissibility, and with it a structural role for pre-commitment representation capable of maintaining incompatible distinctions without forcing resolution. These results do not constitute a physical theory, an interpretation, or an explanatory model. They specify the conditions under which such theories may begin.

The derivation stops deliberately at the point where quantification becomes necessary. What lies beyond—probability measures, physical dynamics, or ontological commitments—requires assumptions not contained here.

Any framework that denies these constraints must supply an alternative account of coherent description—or accept that it has abandoned the conditions under which description is possible.