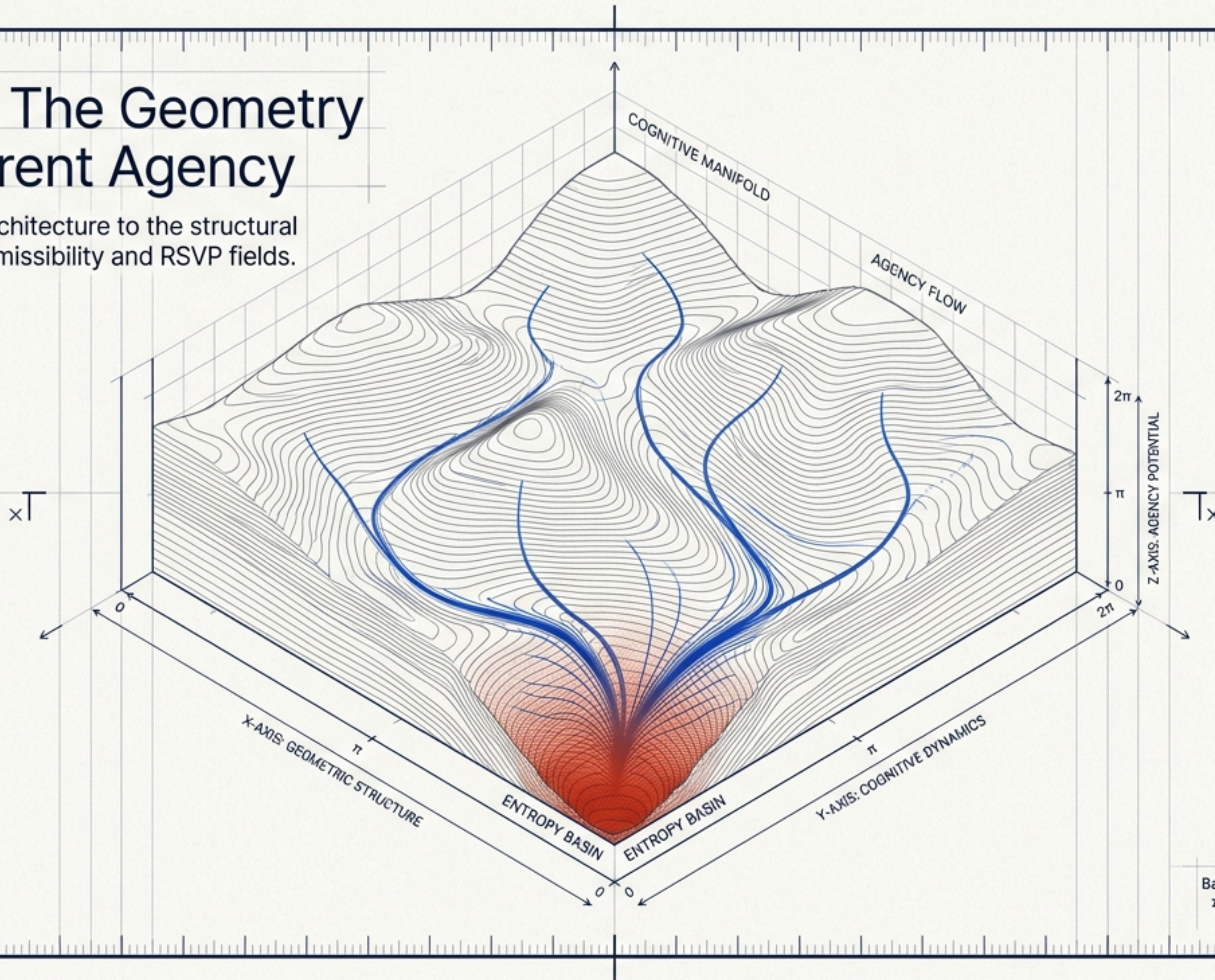
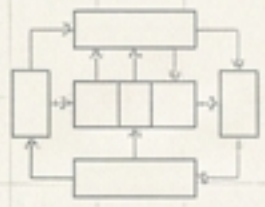


# HYDRA: The Geometry of Coherent Agency

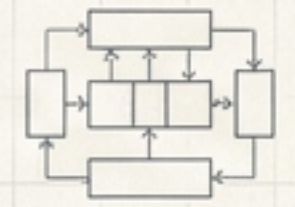
From cognitive architecture to the structural universality of admissibility and RSVP fields.



Based on the 2026 critical reconstruction by Flyxion Independent Researcher



THE ONTOLOGICAL SHIFT: INTERPRETATION, NOT ARCHITECTURE



STAGE 1 (2025)
COGNITIVE ARCHITECTURE
<ul style="list-style-type: none"><li>• PRIMARY OBJECT: Engineering Modules &amp; Representations</li><li>• DEFINITION OF MEANING: Symbolic similarity and relevance</li><li>• EVALUATION METRIC: Task performance and interpretability</li></ul>

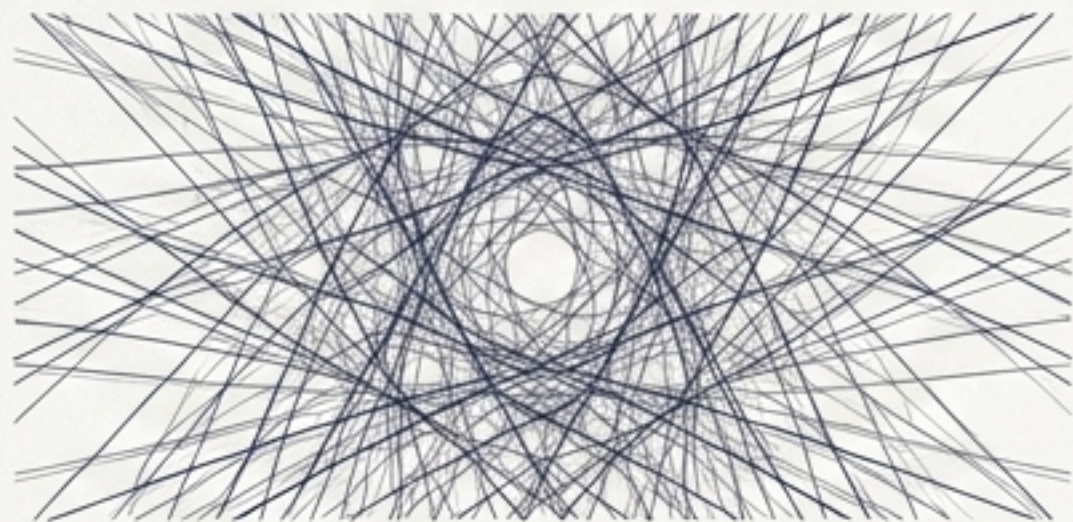
STAGE 2 (2026)
GEOMETRIC THEORY
<ul style="list-style-type: none"><li>• PRIMARY OBJECT: <u>Paths</u> through constrained manifolds</li><li>• DEFINITION OF MEANING: Identical <u>admissible</u> future continuations</li><li>• EVALUATION METRIC: Admissibility preservation (Lyapunov dynamics)</li></ul>

STAGE 3
UNIVERSAL INVARIANT
<ul style="list-style-type: none"><li>• PRIMARY OBJECT: Organized persistence under <u>constraints</u></li><li>• DEFINITION OF MEANING: Relational coherence across domains</li><li>• EVALUATION METRIC: Structural Universality</li></ul>
EQUATION: T: Rep => Adm

# THE FOUR MATHEMATICAL PRIMITIVES

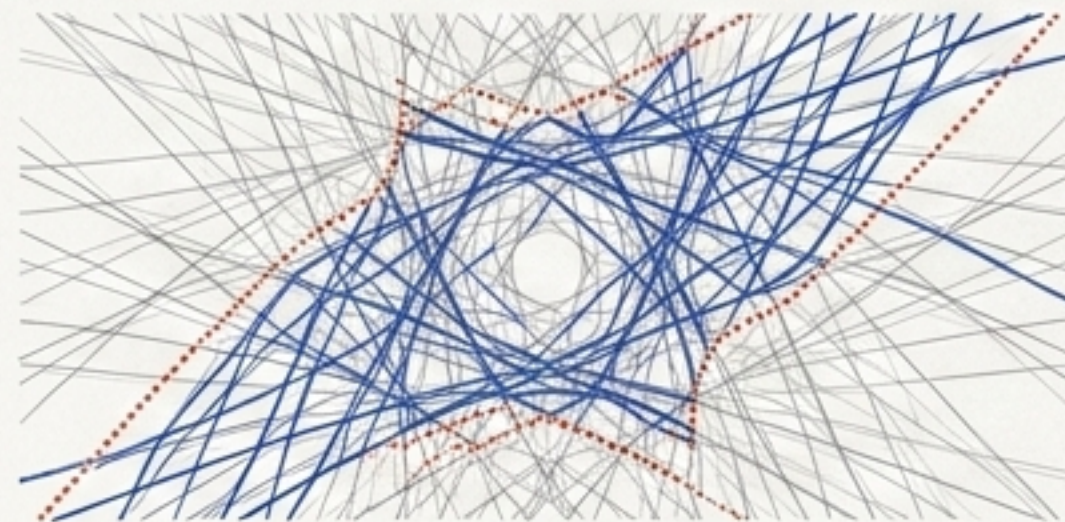
## TRAJECTORY SPACE ( $X$ )

Topological space of all agent-environment histories, equipped with measure  $\mu$ .



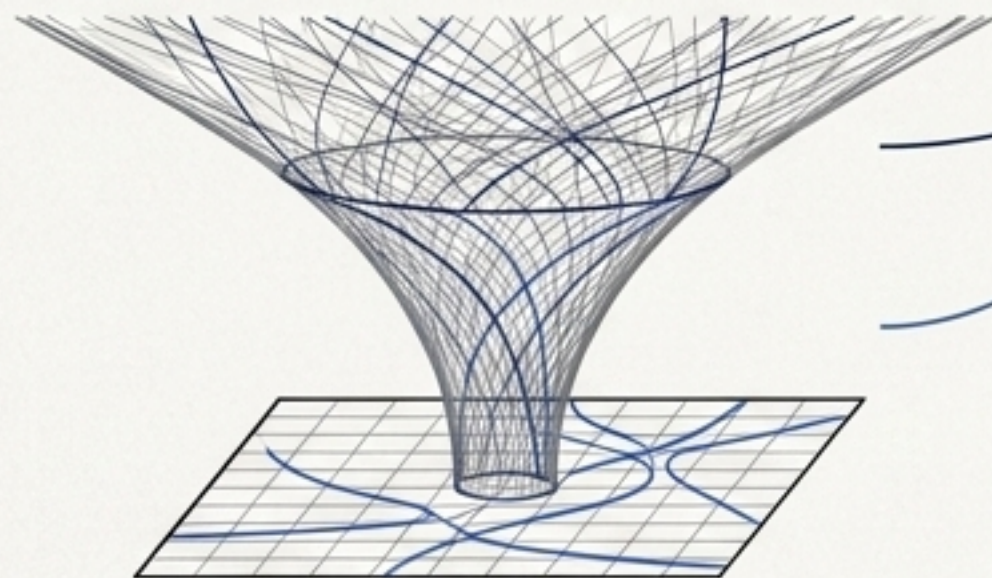
## ADMISSIBILITY STRUCTURE ( $A$ )

Specifies permitted transitions. A state is valid only relative to allowed future continuations along a trajectory.



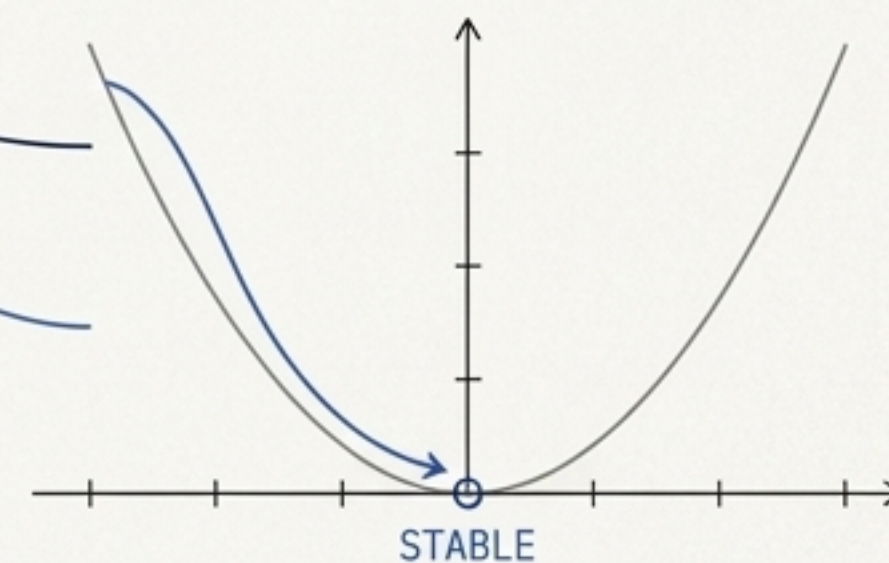
## PROJECTION SYSTEM ( $P_i$ )

$P_i = \{p_i : X \rightarrow M_i\}$ . Continuous surjections from high-dimensional histories onto lower-dimensional operational manifolds.



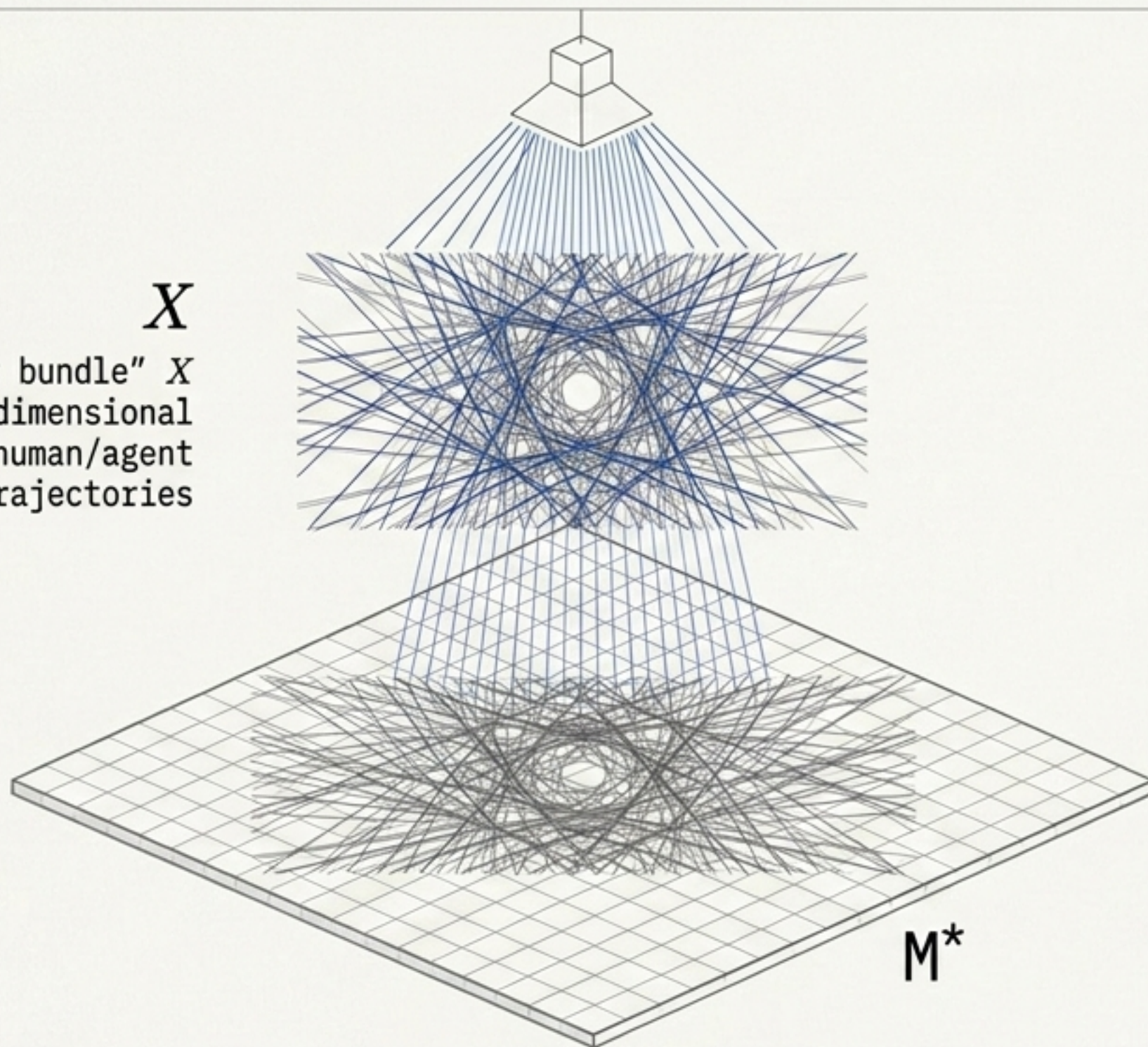
## PERSISTENCE FUNCTIONAL ( $P$ )

$P(X, P_i, A)$ . A Lyapunov-type functional measuring how well the projection preserves admissibility under field dynamics.



# THE MINIMAL PROJECTION THEOREM

$X$   
"fiber bundle"  $X$   
for high-dimensional  
human/agent  
trajectories



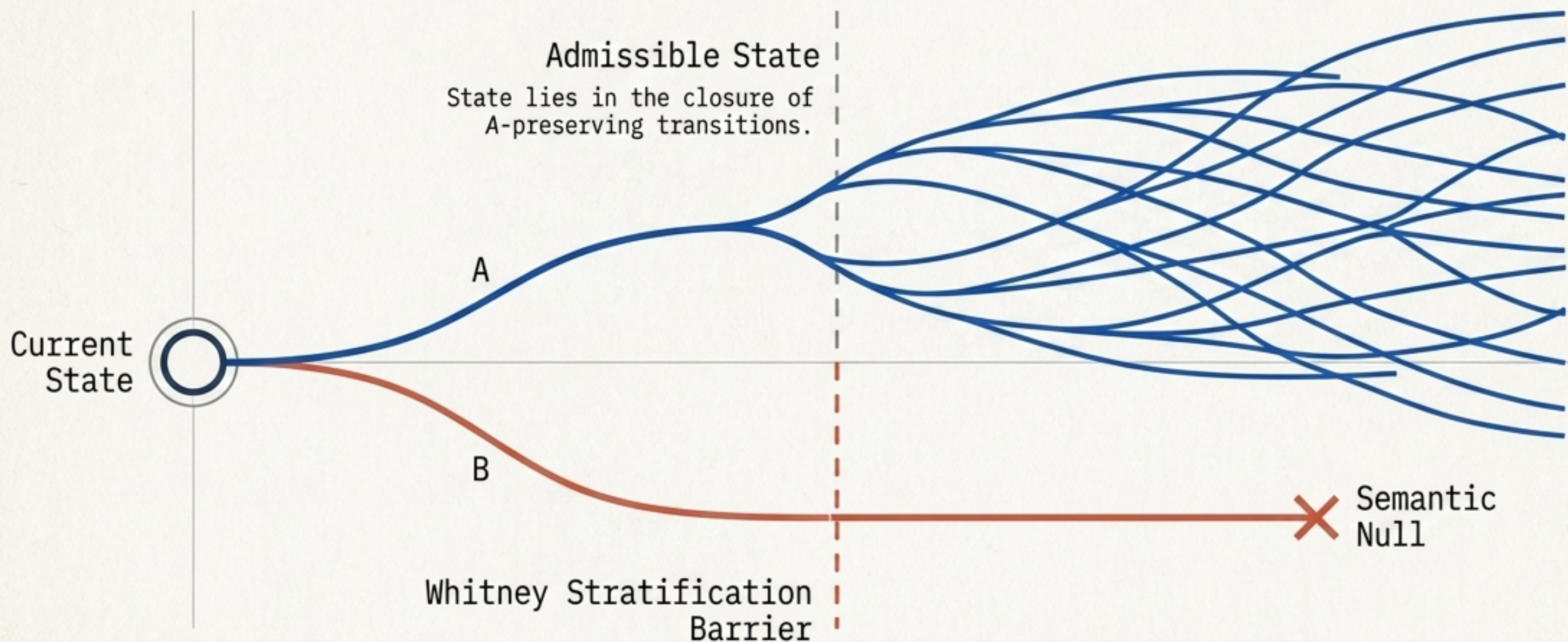
$$x_1 \sim x_2 \Leftrightarrow \mathcal{A}(x_1) = \mathcal{A}(x_2)$$

## Semantic Equivalence

Meaning is relational, not intrinsic.  
Two states are semantically equivalent  
if and only if they share identical  
future admissible continuation structures.

Theorem 3.2 proves there exists a unique minimal admissibility projection  $p_i^*: X \rightarrow M^*$ . Every other projection factors through it.

# ADMISSIBILITY AS A RELATIONAL CONSTRUCT



## Concept Definition

A state  $x$  is admissible relative to trajectory  $\gamma$  only if it lies in the closure of A-preserving transitions.

## Mathematical Implication

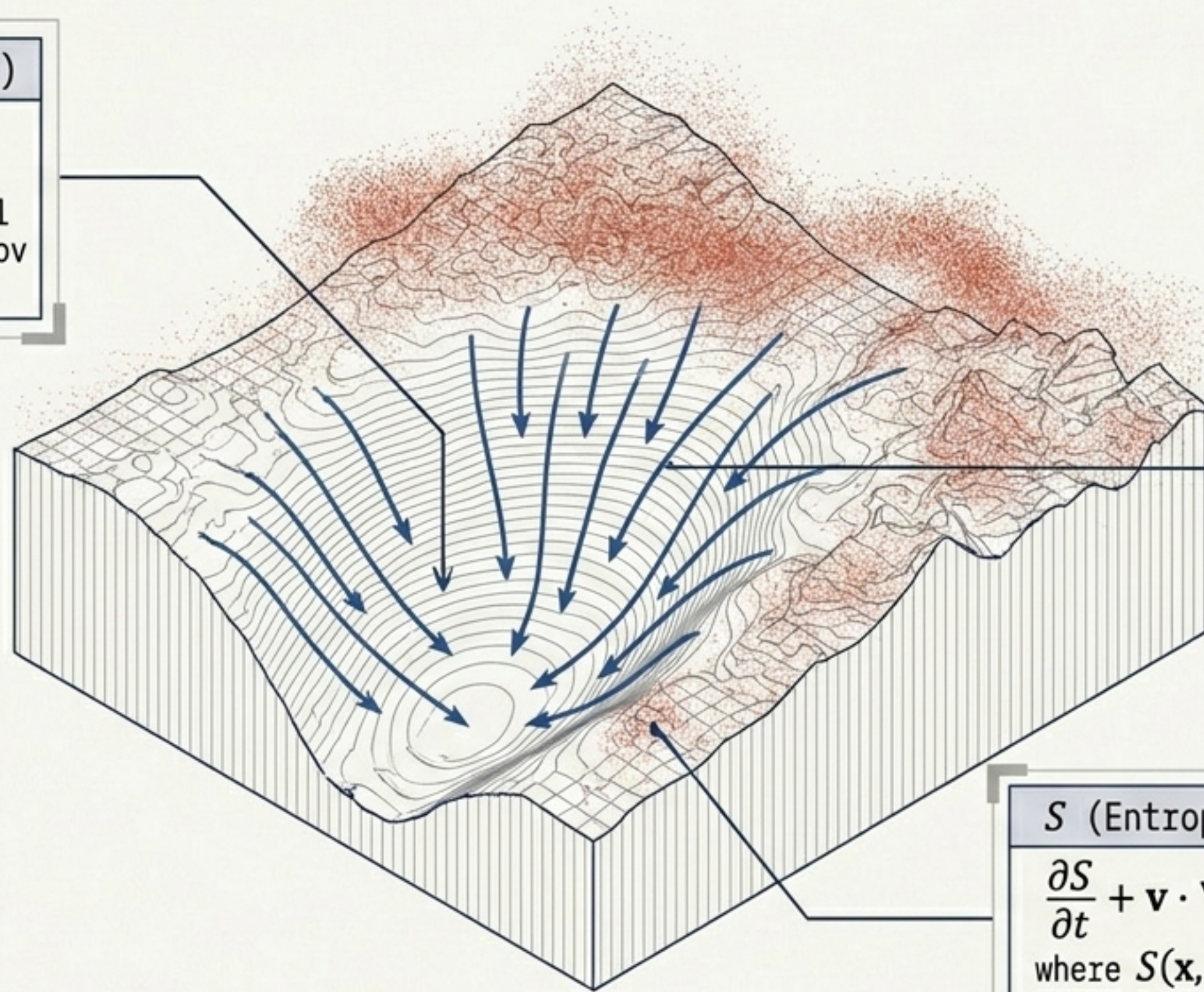
Trajectories can only cross from stratum  $S_\alpha$  to  $S_\beta$  if  $\gamma'(t)$  is an element of  $T_\gamma(t_0) \cdot S_\beta$ . Non-admissible crossings produce semantic nulls.

# THE PHYSICS OF COGNITION: RSVP FIELD DYNAMICS

Phi (Scalar Potential)

$$\square\Phi + u^2\Phi = \rho(\mathbf{v}, S)$$

Semantic salience. Local maxima of Phi are Lyapunov stable attractors.



v (Vector Flow)

$$\nabla_M \cdot \mathbf{v} = -\frac{\partial S}{\partial t}$$

Semantic tendency. Diverging flow loses admissibility; converging flow gains it.

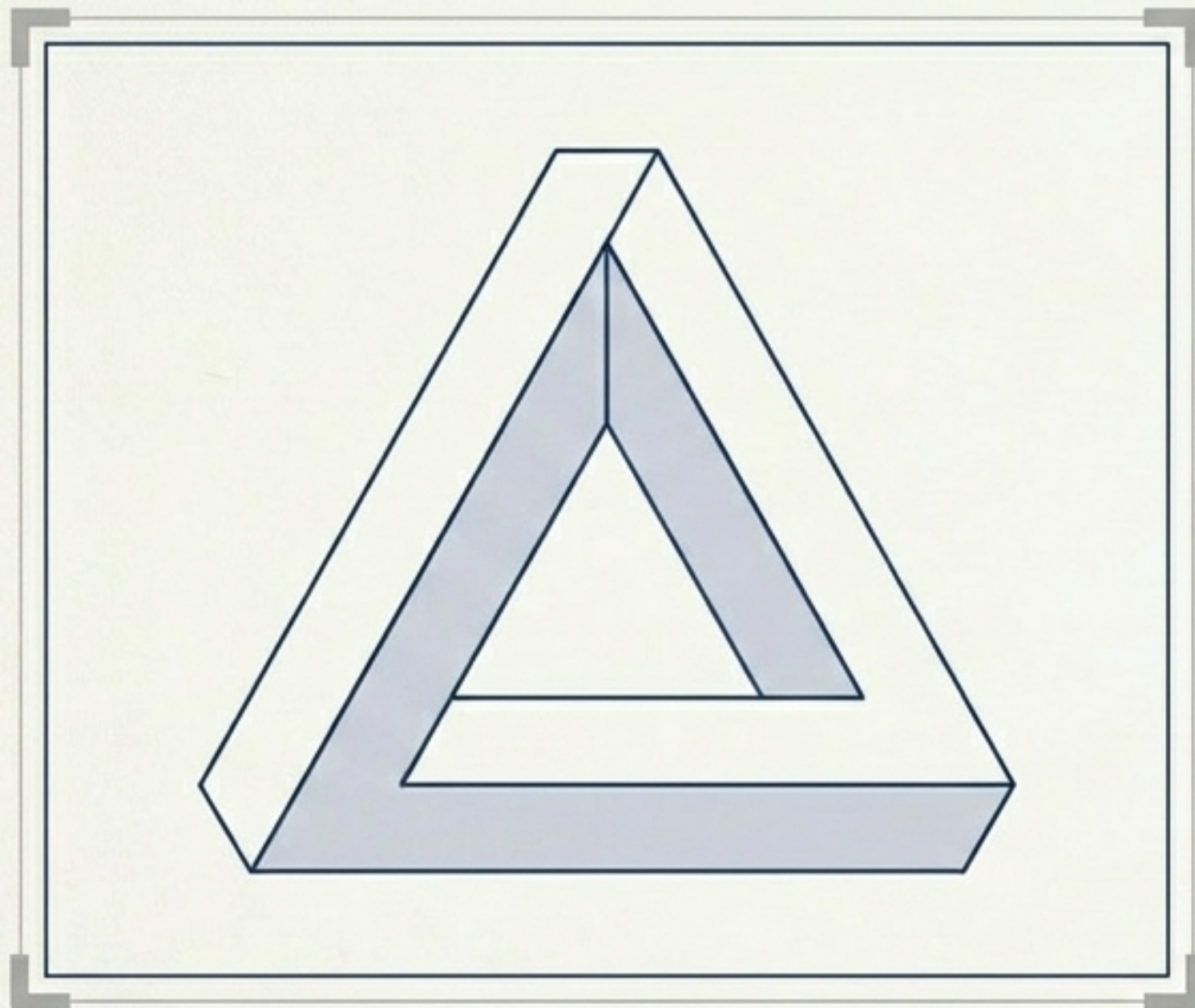
S (Entropy/Turbulence)

$$\frac{\partial S}{\partial t} + \mathbf{v} \cdot \nabla_M S = \sigma(\Phi, \mathbf{v})$$

where  $S(\mathbf{x}, t) = \log|A(\mathbf{x}, t)|$

Semantic ambiguity.

# HALLUCINATION AS COHOMOLOGICAL FAILURE



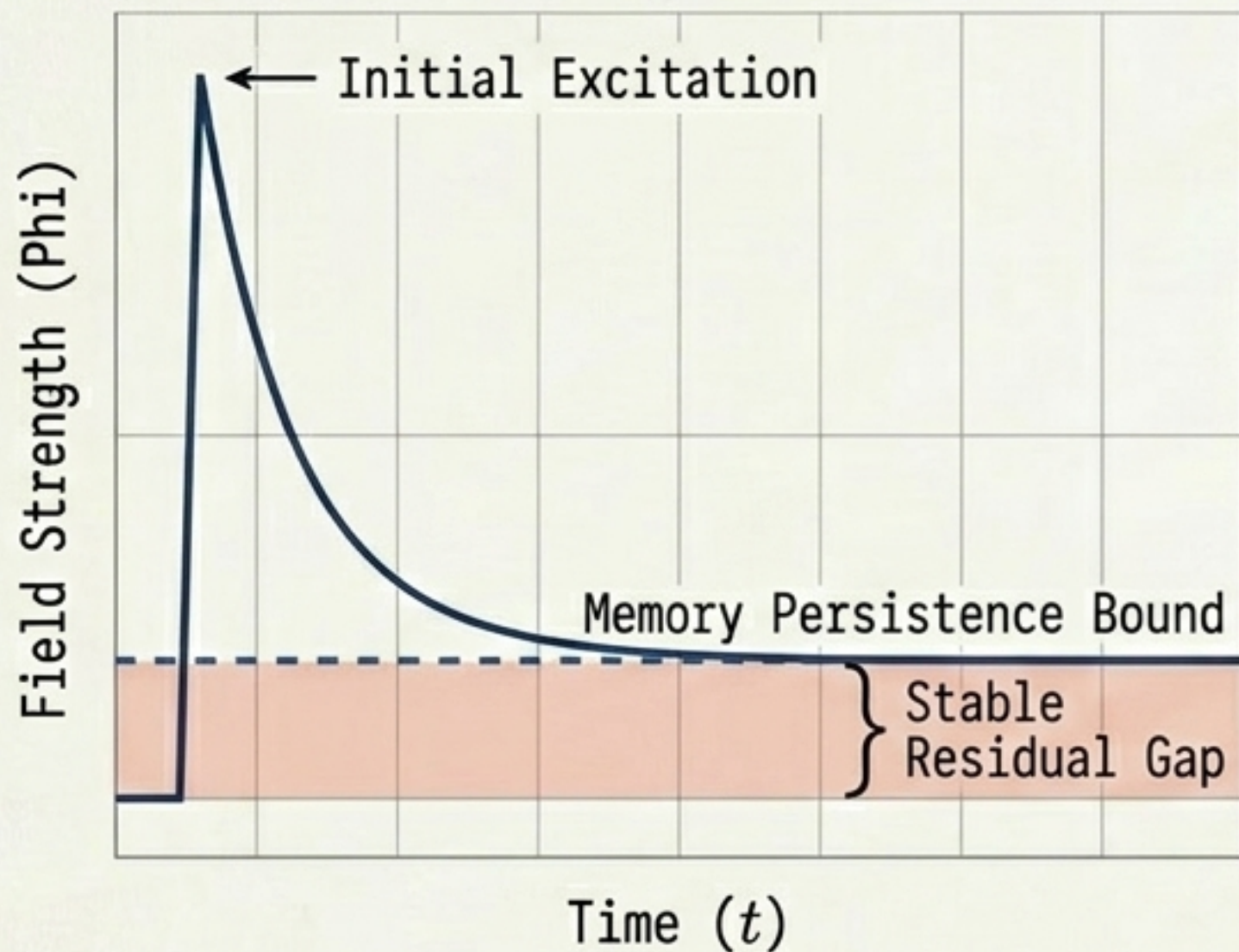
Locally coherent at every vertex, but globally impossible to construct as a single section. Represents the Cech class  $[c]$  in  $H^1(U; \mathcal{F})$ .

## The Failure Mode Hierarchy

Failure Mode	Geometric Characterization
Local coherence without global coherence	$s_i$ exist but do not glue
Disconnected global coherence	$M$ is not connected
Obstruction to section construction (Hallucination)	$[c] \neq 0$ in $H^1(M, \mathcal{F})$
Holonomy-induced memory distortion	Parallel transport rotates section
Persistent cognitive conflict	$[c]$ has infinite order

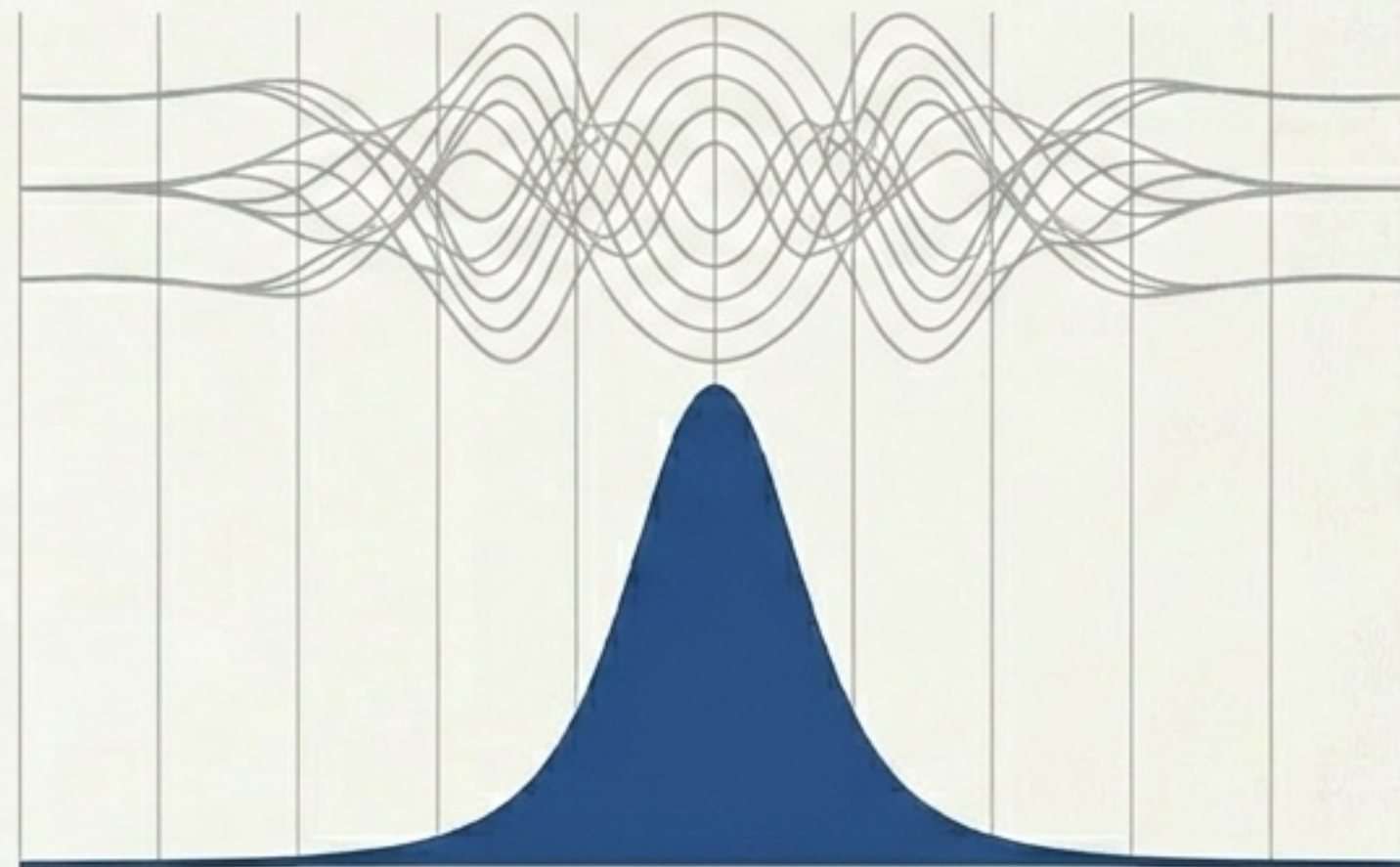
# MEMORY AS STABILIZED FIELD RESIDUE

## Persistence



Gronwall inequality decay:  $\Phi_{\text{thresh}}$  overcomes ambient entropy pressure to prevent complete erasure.

## Retrieval

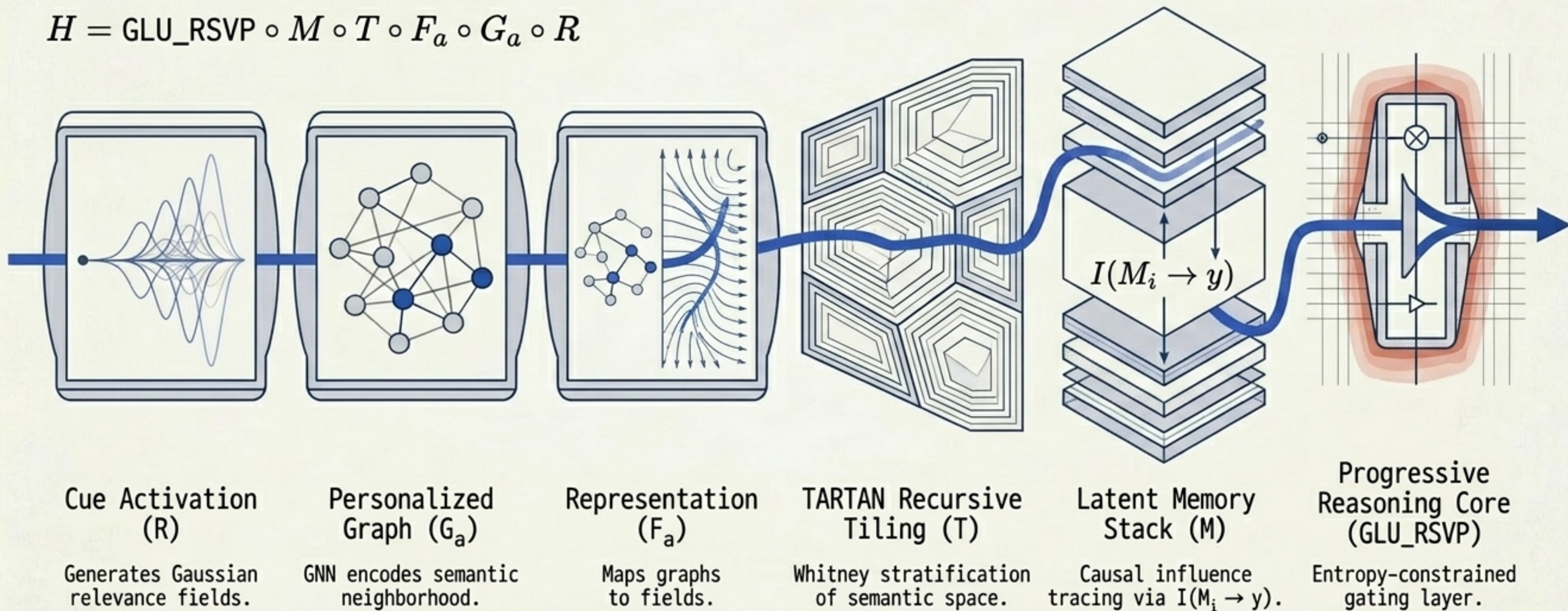


$$\Phi_{\text{ret}}(x) = \sum_m w_m \Phi_m(x)$$

Retrieval is active resonance (superposition converging to a true global section), not passive database indexing. Memoization is a discretized admissibility sheaf.

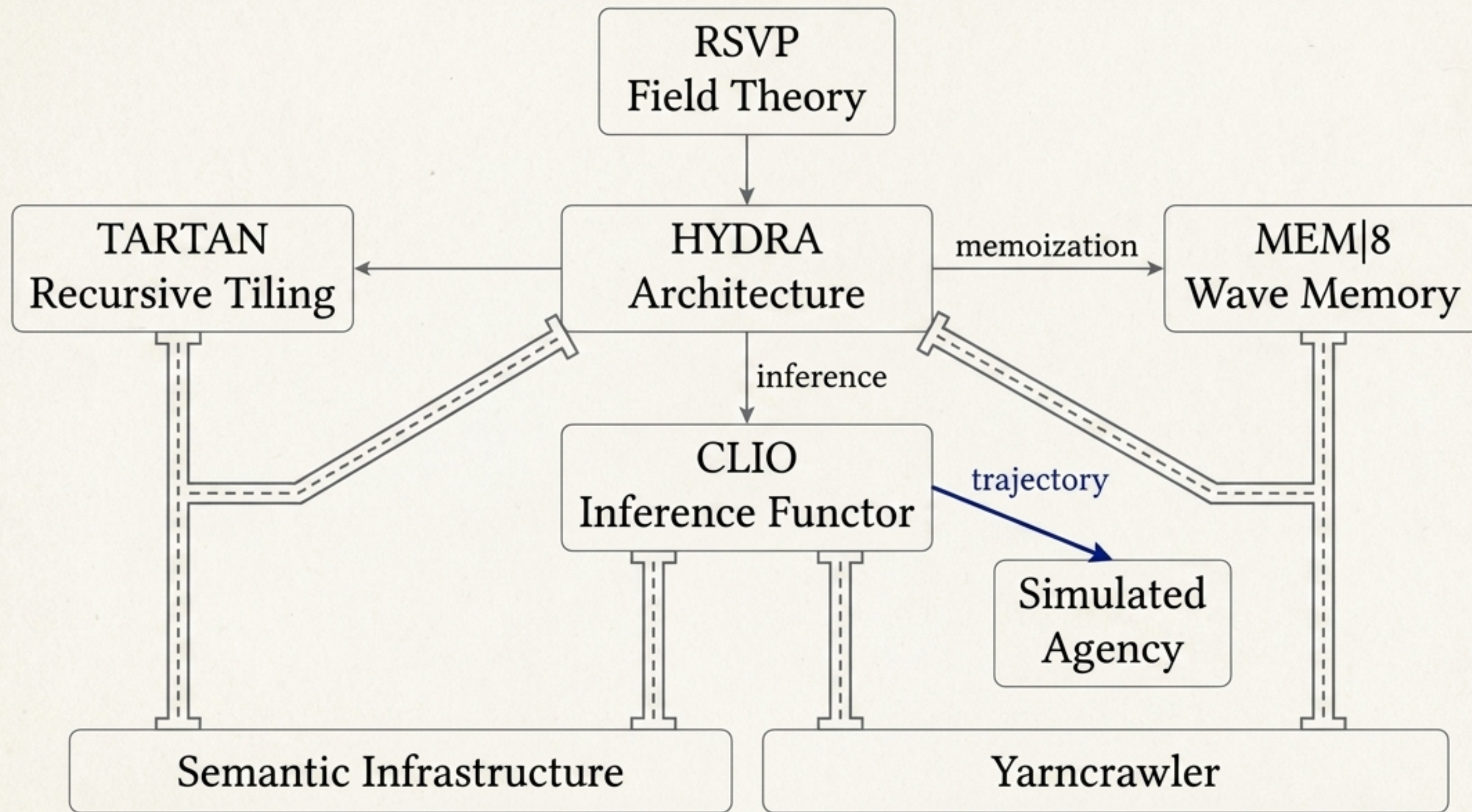
# THE 2025 ARCHITECTURE: ADMISSIBLE COMPUTATION PIPELINE

$$H = \text{GLU\_RSVP} \circ M \circ T \circ F_a \circ G_a \circ R$$

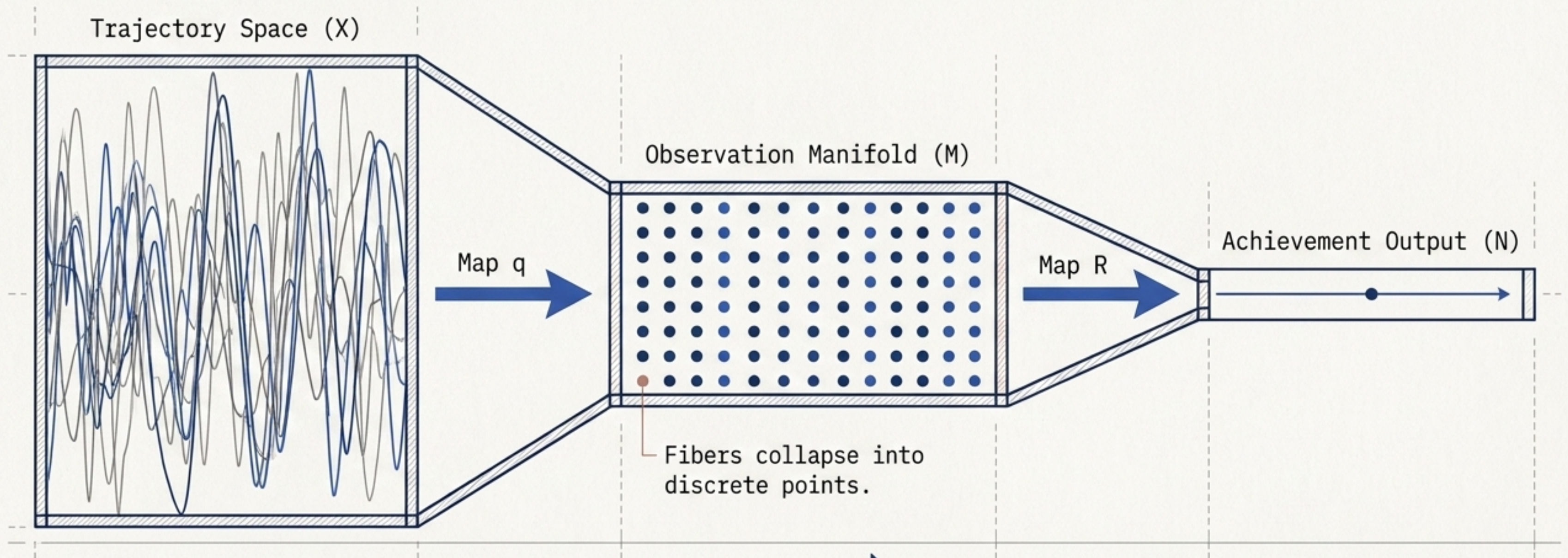


Well-typed HYDRA programs do not produce inadmissible states. Compositionality is mathematically guaranteed.

# ENGINEERING REALIZATION AND ECOSYSTEM



# AGENCY PROJECTION AND FIBER COLLAPSE



## The Pathology is Structural

When  $M$  is mistaken for  $X$ , the fiber (causal history, context, contingency) is collapsed to a point. Behavioral observation is always a double projection.

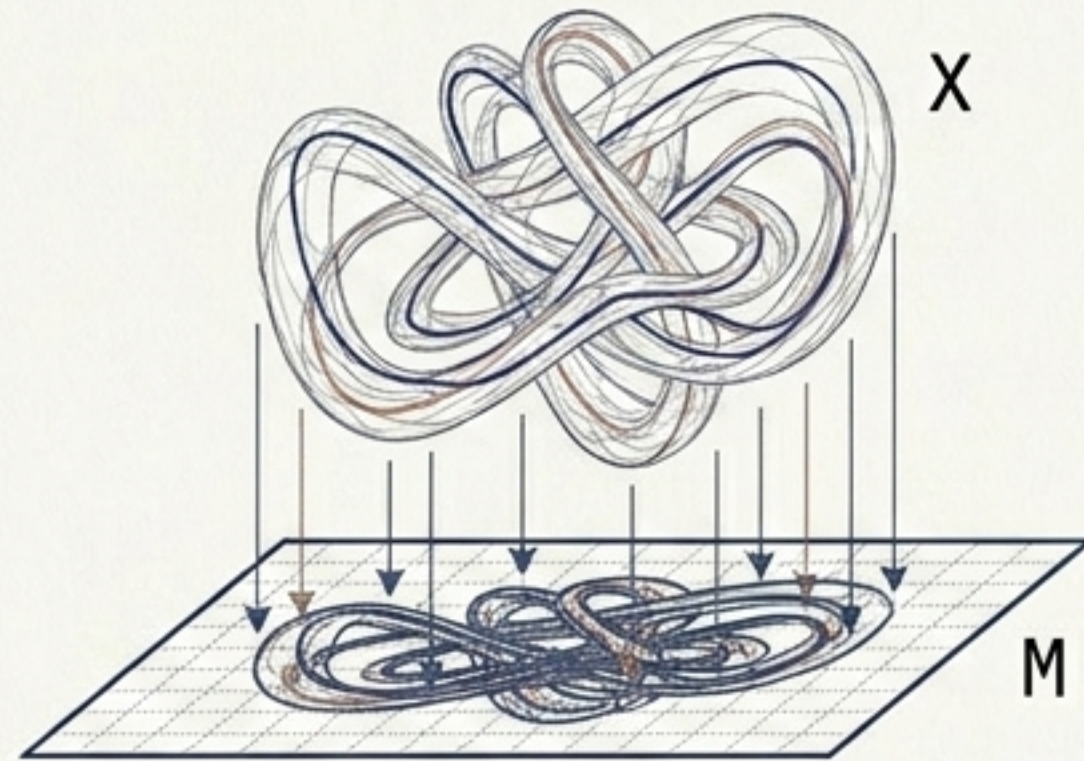
## Gauge Invariance

A faithful theory of meaning must be formulated in gauge-invariant quantities: those constant on fibers.

# SYNTHESIS: The Structural Universality Conjecture

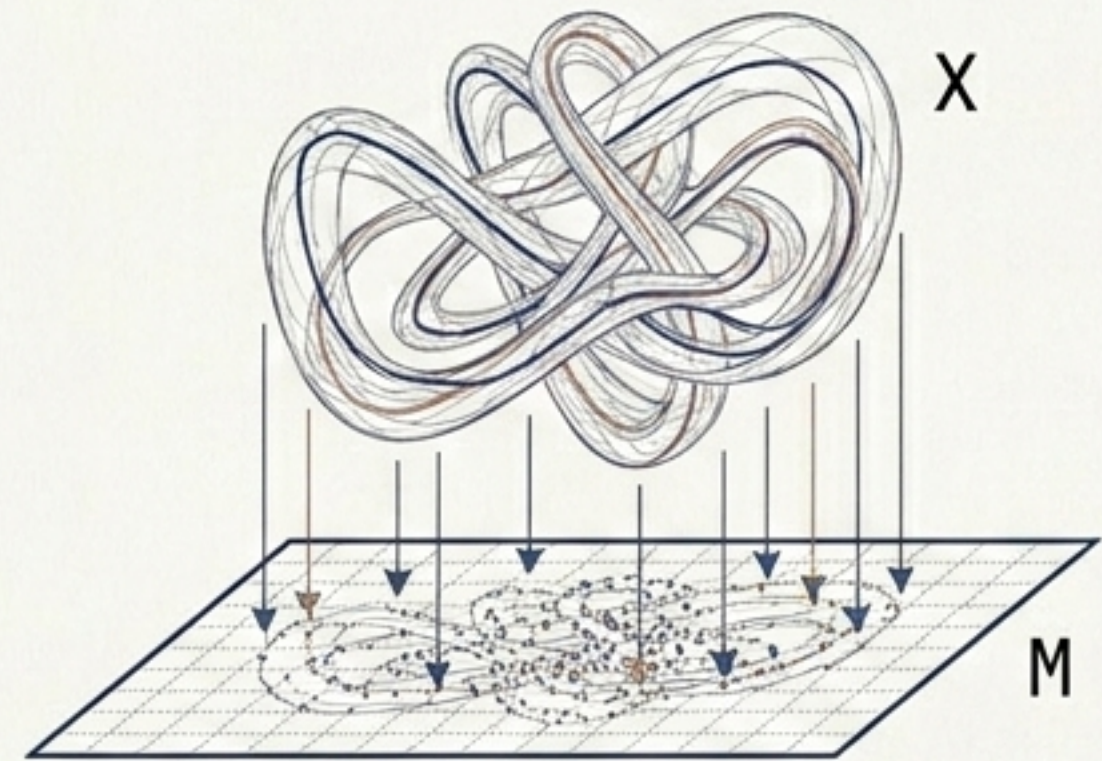
[ T: Rep  $\Rightarrow$  Adm ]

Hallucinating AI System



Mistaking a local coherence coordinate for the true global trajectory space.

Toxic Meritocracy



Mistaking a narrow achievement coordinate for the full contingency of a human life.

Meaning, memory, AI agency, and political economy are exact specializations of the same geometric invariant: organized persistence under constraints (X, Pi, A, P).

# THE PATHOLOGY OF PROJECTION COLLAPSE

DOMAIN	PHENOMENON	WHAT IS COMPRESSED (THE MANIFOLD)	WHAT IS LOST (THE FIBER)
AI Safety	Anthropomorphism	Behavioral output	Genuine cognitive state / belief
Social Media	Identity Collapse	Profile metrics	Continuous human personhood
Governance	Metric Fixation	The measure	The measured reality
Optimization	Goodhart's Law	Proxies	The actual target
Economics	Meritocratic Hubris	Credentials & Income	Circumstance, luck, & social capital

**Coordinate Dominance:** When one coordinate ( $s_k$ ) acquires dominant weight, Riemannian structure warps. Social navigation is governed by a total ordering, destroying the rich fiber structure.

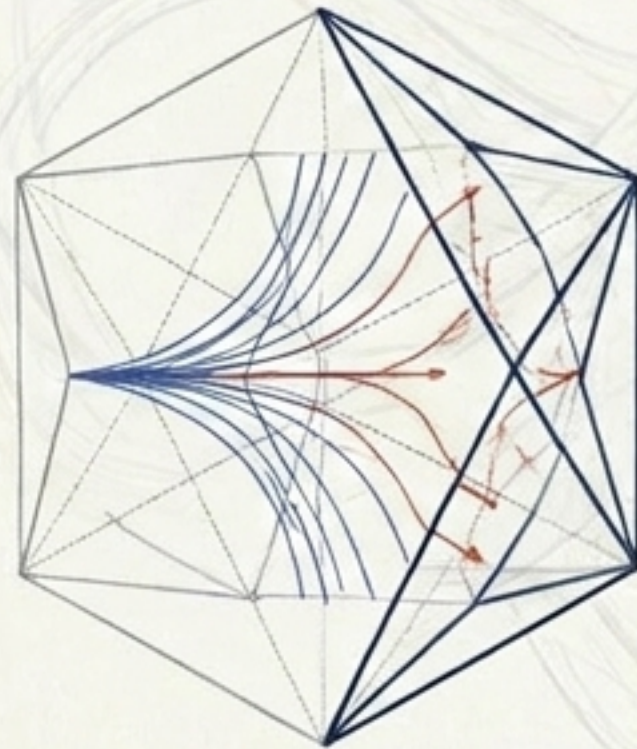
# Collective Admissibility and Open Frontiers

## The Ultimate Invariant

Formula:

$$A_{\text{collective}} = \text{colim}_i A(i)$$

Meaning is relational. A society, like an AI system, is collectively admissible only if its transition dynamics preserve coherent future trajectories for all participants. If the colimit collapses, the shared semantic manifold loses its global section.



## Open Problems & Predictions

- Prediction: AI brittleness perfectly corresponds to low  $S$  in the trained model's manifold.
- Priority 1: Global regularity of RSVP equations (Do smooth initial data yield global classical solutions?).
- Priority 2: Source term derivation ( $\rho$  and  $s\sigma a$ ) for specific cognitive domains.
- Priority 3: Computing projection cohomology  $H^\bullet(M, \mathbb{F})$ .