Semantic Infrastructure

Constraint, Projection, and Accessibility Across Computation, Cognition, and Cosmology

(Φ, ν, S)

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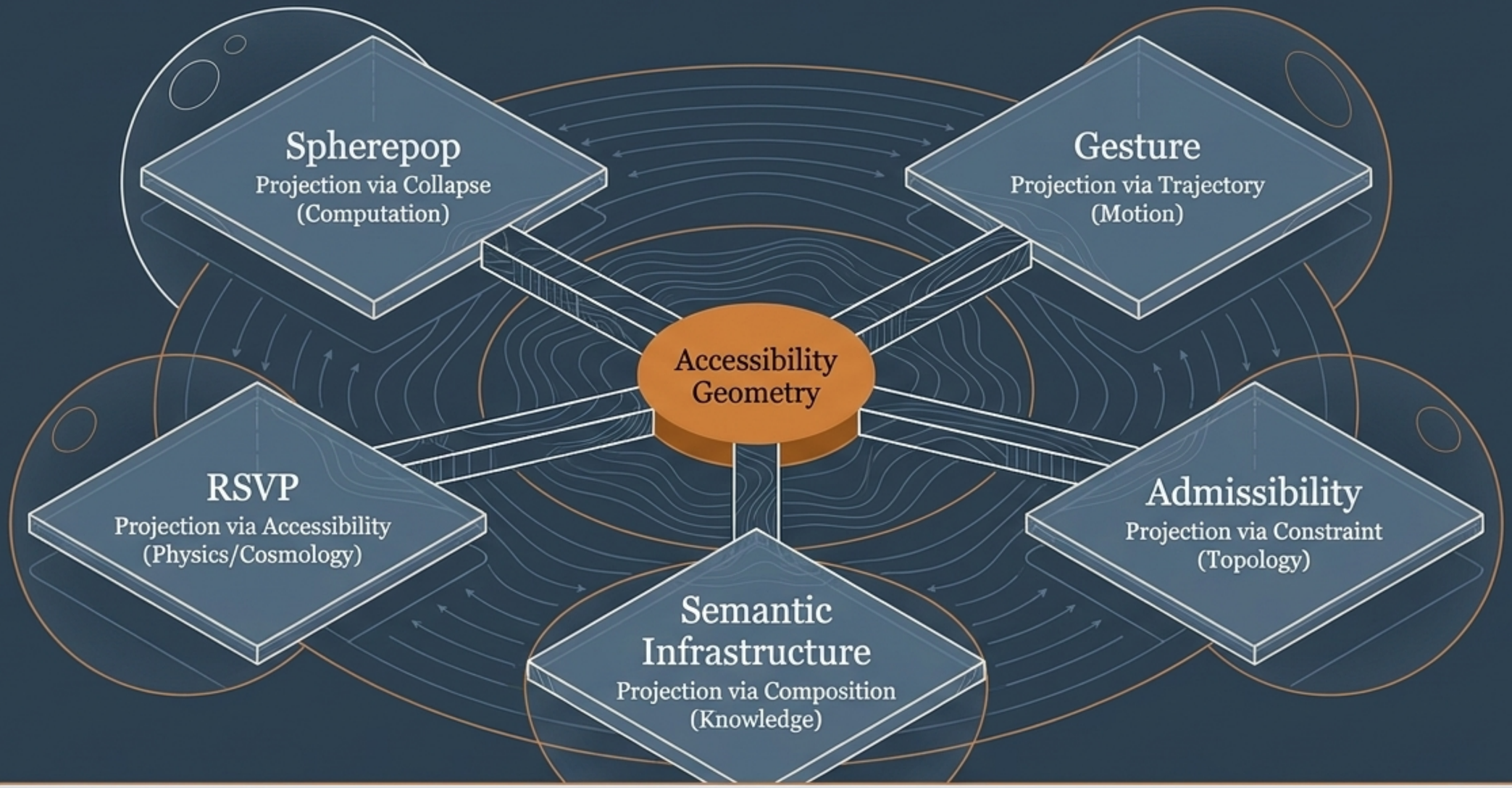
Five Projections of a Single Underlying Geometry



Arithmetic, gesture, language, cognition, computation, and cosmology are not separate domains connected by analogy. They are different coordinate systems for the same geometry.

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The Accessibility Inversion

	Classical State-Based	Accessibility Ontology
The Core Question	What things exist?	What transitions are reachable from here?
The Primitives	Objects, particles, state vectors, data structures.	Trajectories, vector fields, remaining freedom (entropy).
Handling the Unknown	Fails silently at singularities or phase transitions. Smuggles in assumptions.	Models the transition function itself as an accessibility gradient.

Objects are not fundamental. They are merely stable basins in an accessibility landscape.

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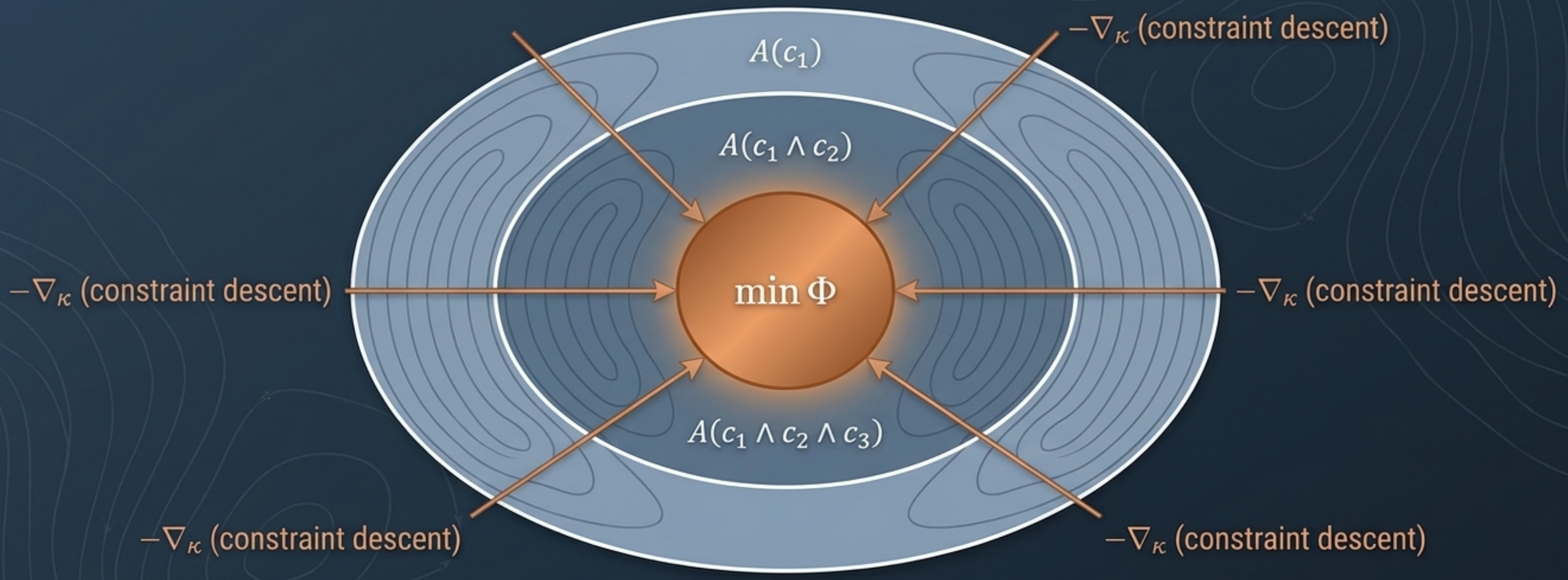
Reality is Sculpted by Nested Constraints



A physical field equation, a program's type signature, or a grammatical rule all serve the exact same function: they constrain accessible trajectories before any specific content is realized.

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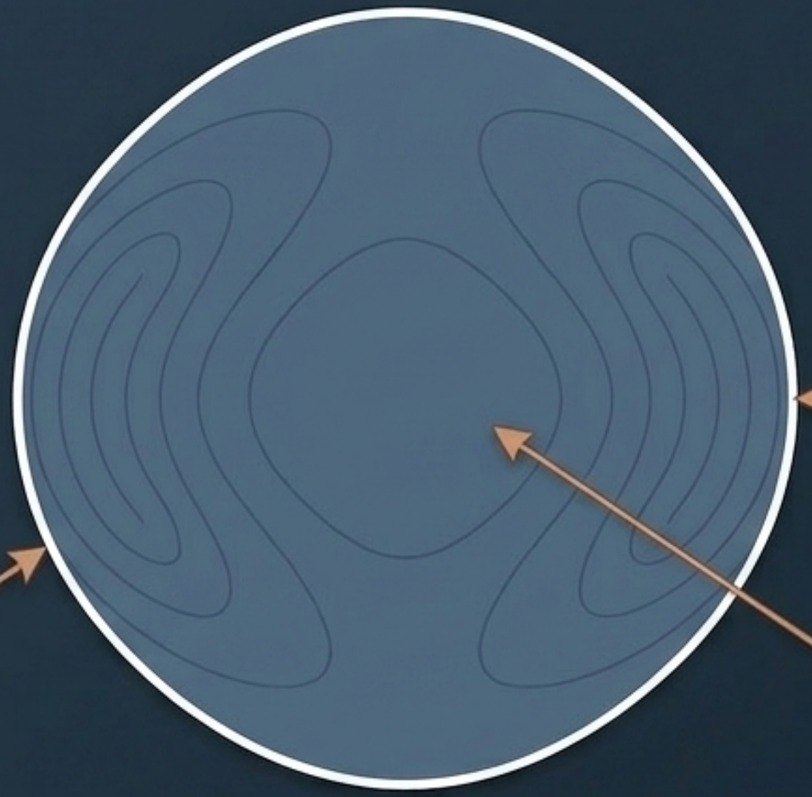
The Boundary Generates the Distinction

Axiom: Pre-symbolic: Containment is the first cognitive operation (inside vs. outside the box) preceding counting or logic.

Axiom: Anti-symmetry: If A is inside B, B cannot be inside A. True nested depth exists.



Productive: A single boundary crossing creates mutual complement structure. It generates exactly one bit of structural information.

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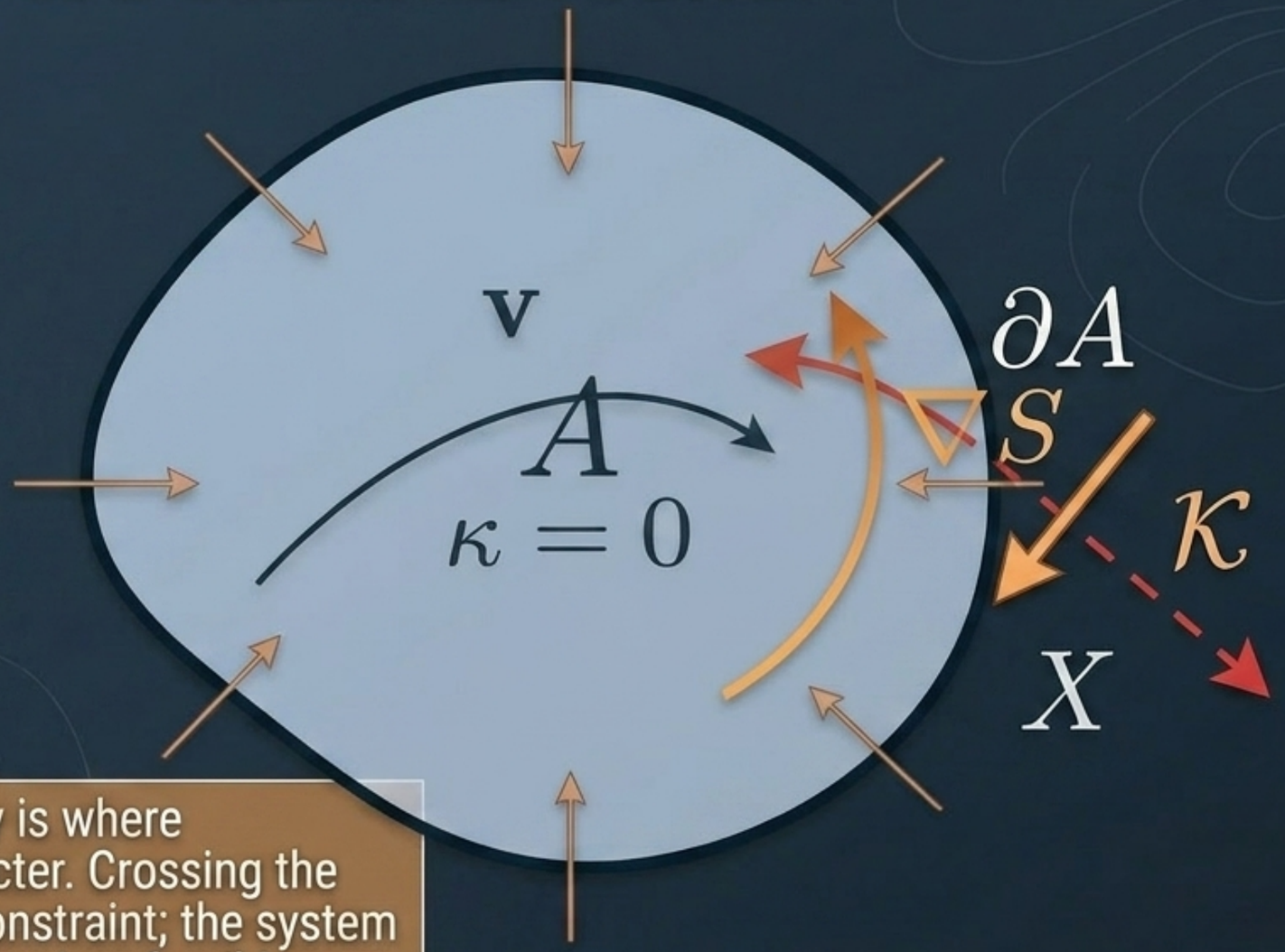
The Anatomy of a Constraint Surface



The constraint boundary is where dynamics change character. Crossing the boundary violates the constraint; the system is either reflected, refracted, or forcibly collapsed back into admissibility.

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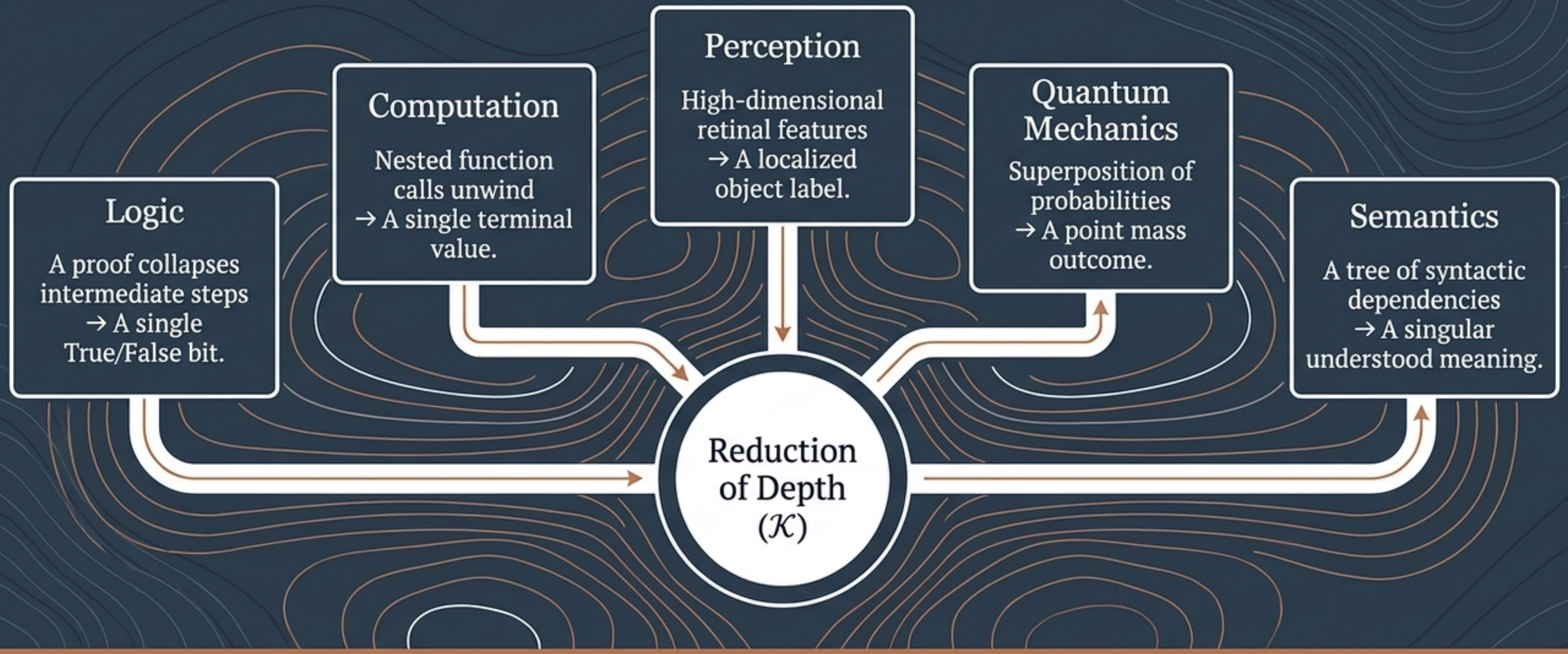
The Universal Phenomenon of “Collapse”



Collapse is not a metaphor. It is a precise mathematical map from a high-dimensional structured space to a lower-dimensional value space.

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The Parenthesis is a Lie About Space

$$1 + (3 \times 2^2)$$

The Problem:

Linear text falsely claims to enclose what it only annotates. It relies on hidden, memorized precedence rules.

The Solution:

Spherepop treats expressions as a physical medium. Containment is actual enclosure. The picture of the expression is the meaning of the expression.

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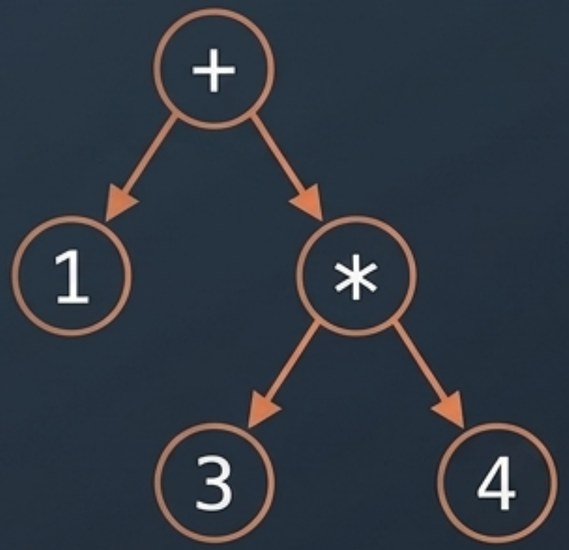
Visualizing the Hidden Syntax

The String

1 + 3 * 4

(Linear, flat, empty syntactic space)

The Parser



(Implicit hierarchical tree)

Spherepop

(The tree hierarchy mapped to 2D space)

Every programming language already implicitly uses Spherepop. The compiler parses the linear string into a tree, and evaluates it bottom-up. Spherepop simply makes this hidden spatial structure visible to the human eye.

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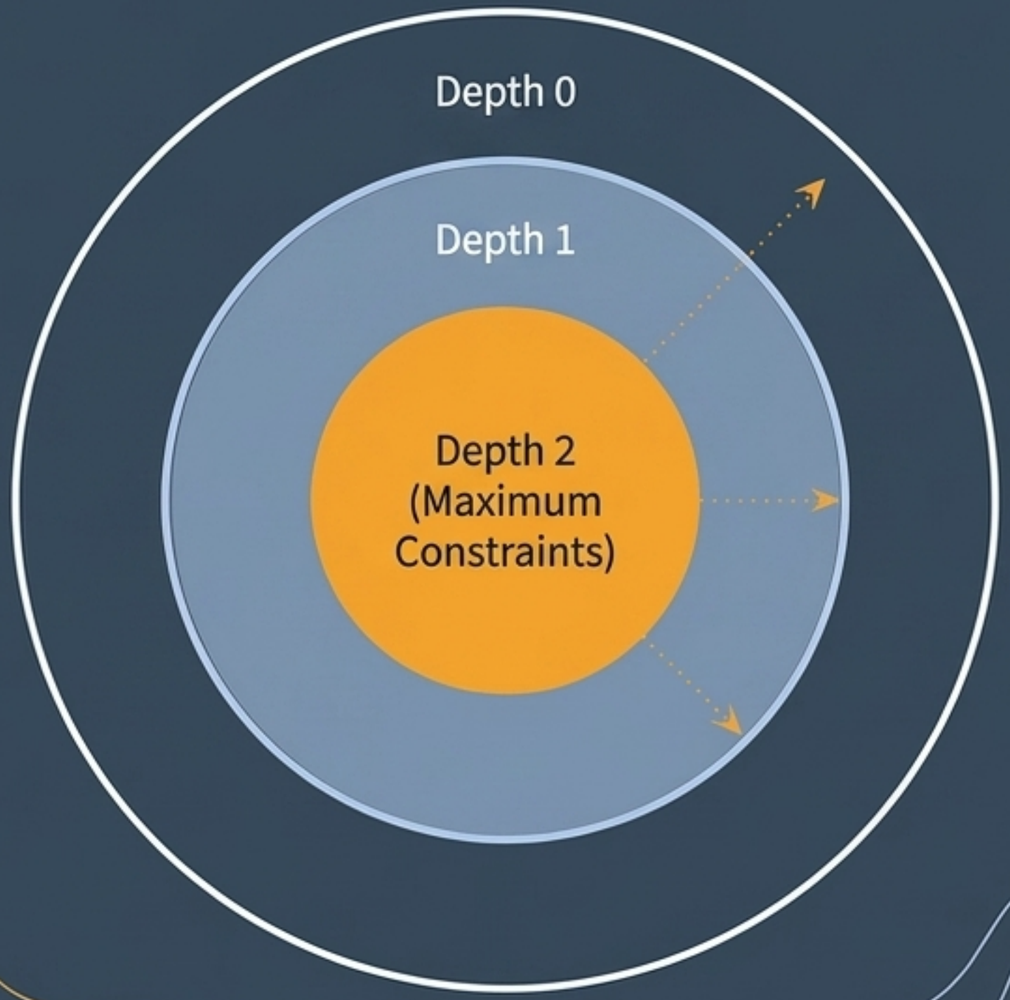
The Dynamics of Evaluation: Reading Inside-Out



Reading Order

Evaluation proceeds from maximum depth to minimum depth. This is the only reading order consistent with compositional semantics.

The Pop Operator

An innermost bubble containing no sub-bubbles “pops,” collapsing into a single atomic value and reducing total depth by 1.

Refusal

A bubble refuses to pop if it lacks bound variables or valid arguments. Refusal is not failure, but suspended evaluation (a closure).

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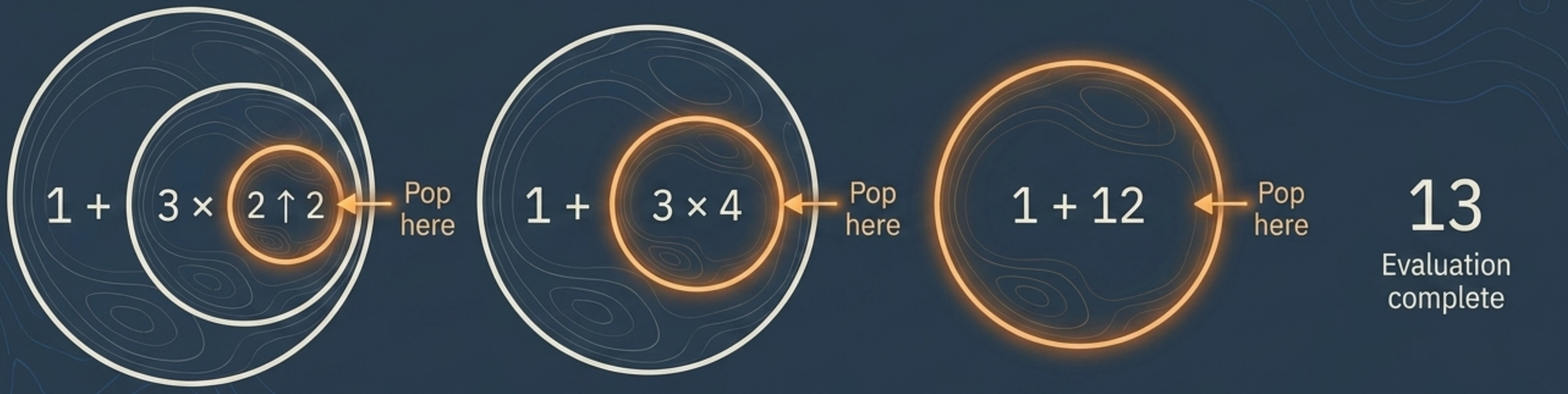
Visual Arithmetic: The Collapse Sequence



Step 0 (Depth 3) | Step 1 (Depth 2) | Step 2 (Depth 1) | Step 3 (Depth 0)

At each step, complexity decreases monotonically. The system is drawn inexorably toward a stable, minimal-constraint equilibrium.

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Resolving Ambiguity with Pure Geometry

Order of Operations

$2 + 3 * 4$

Ambiguous without PEMDAS rules.

A bubble of "3*4" clearly nested inside the "2+" bubble. No rules required to know which goes first.

Nested Exponents

2^2^3

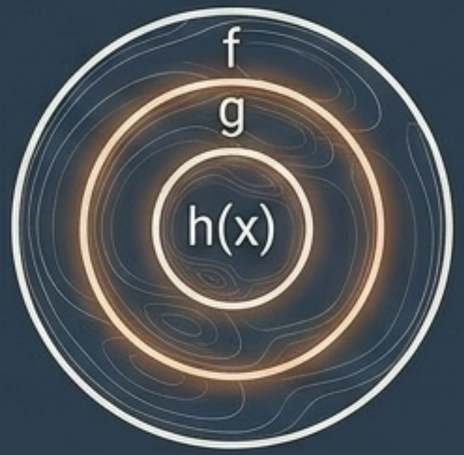
Is it 64 or 256?

Whichever exponentiation bubble physically contains the other evaluates last. The spatial hierarchy removes all doubt.

Function Composition

$f(g(h(x)))$

h(x) is visibly the inner core, surrounded by the g ring, enclosed by the f ring. Order is perceptually instant.



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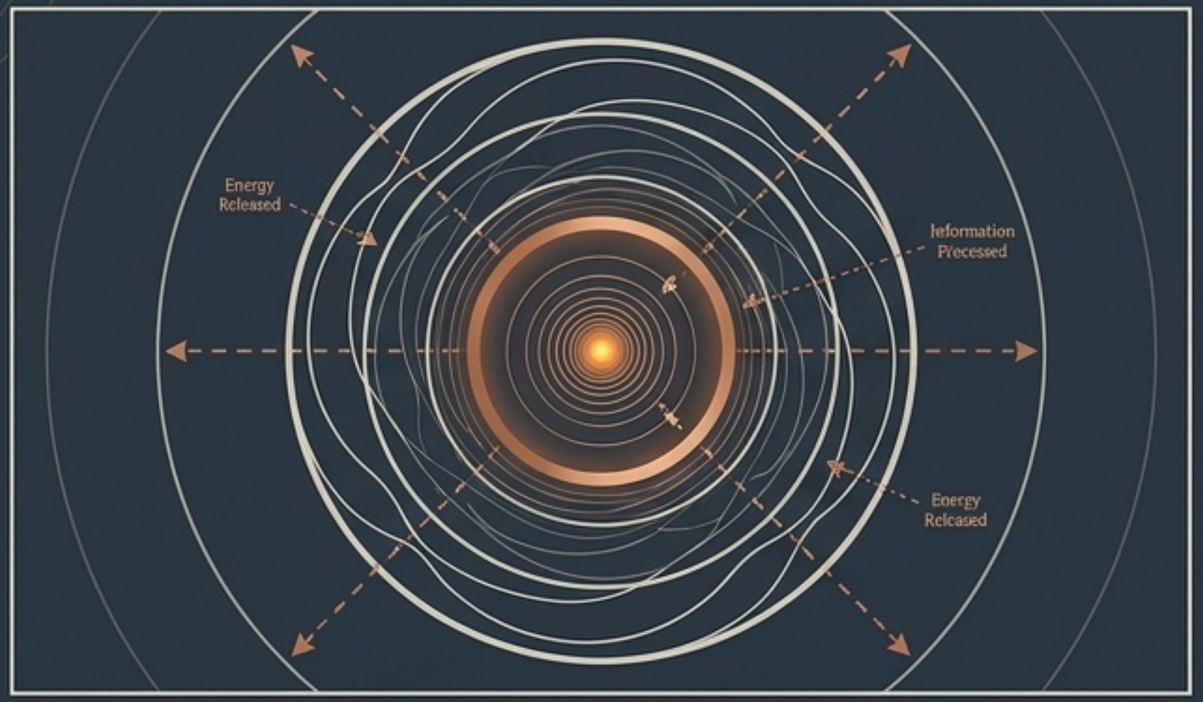
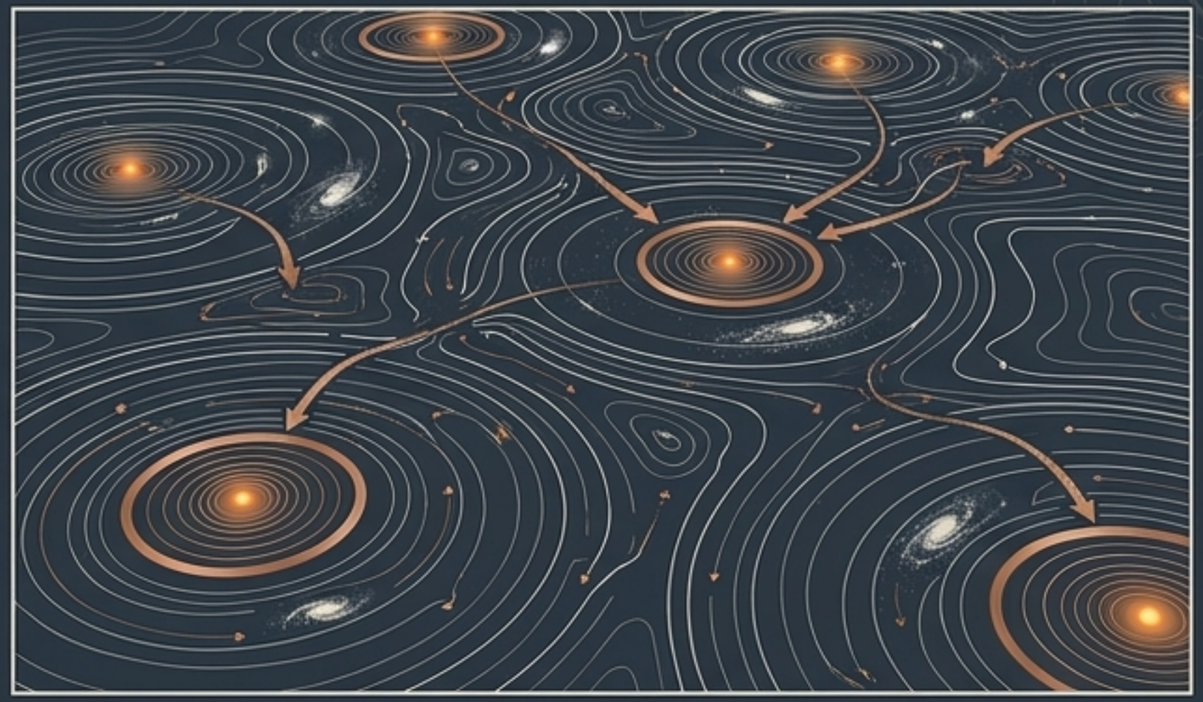
The Plenistic View of Reality

The Micro



Biology: Metabolism is evaluation; death is the final collapse to a terminal state.

The Macro



Cosmology: The universe is an accessibility field. Cosmic evolution is the progressive collapse of high-entropy regions into stable structures.

Whether evaluating an equation, moving a hand, or simulating a universe, the underlying geometry is identical: reality calculates itself by relentlessly collapsing constraints into stable accessibility.

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