

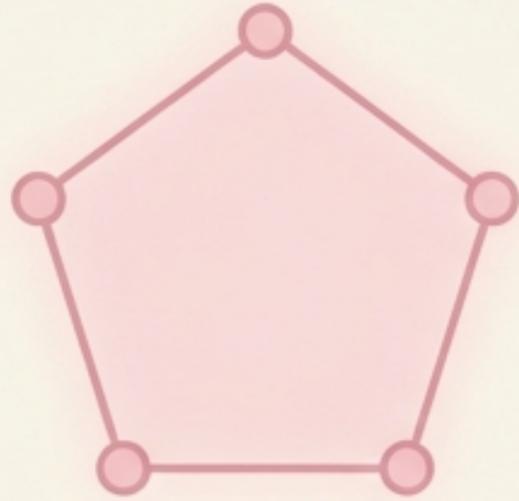
# The Geometric Architecture of Perception

Chromatic Number and the Sensory Constraint on Embedded Observers



Based on The Imagination Machine XVI (Tracy & Nabaala, 2026)

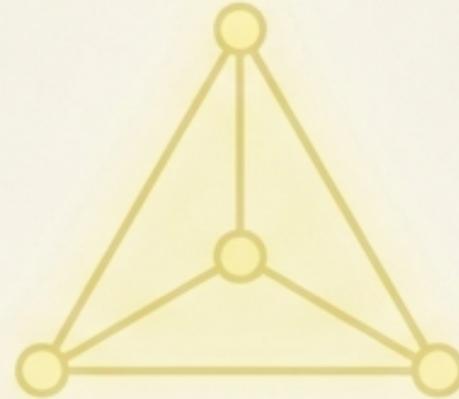
# The Enigma of the Sensory Count



## The Classical View

5 Senses

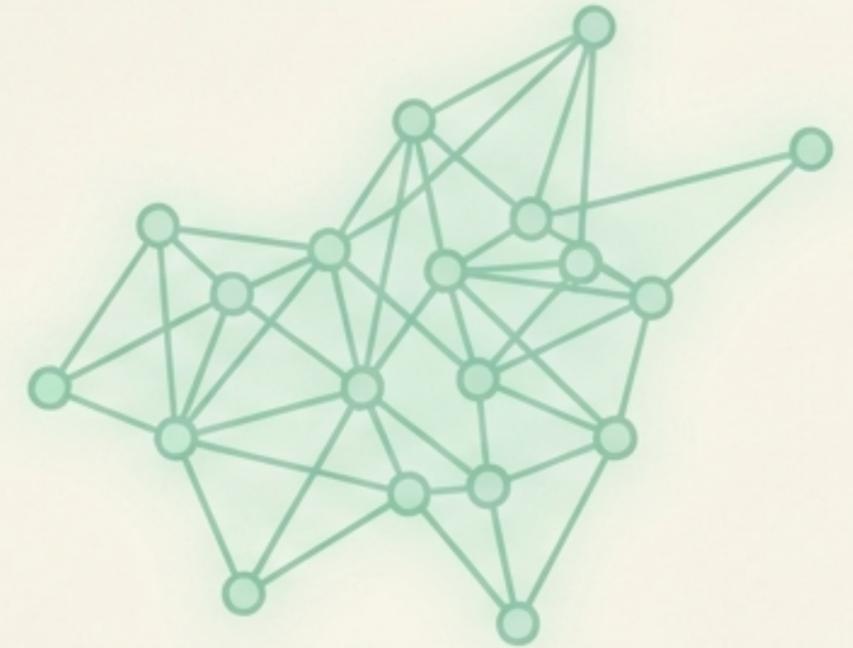
The stable, historically dominant enumeration (sight, hearing, smell, taste, touch) derived through reflective attention



## The Reductionist View

$\leq 4$  Senses

Functionalist analysis argues that some classical senses decompose, pushing the irreducible count downward



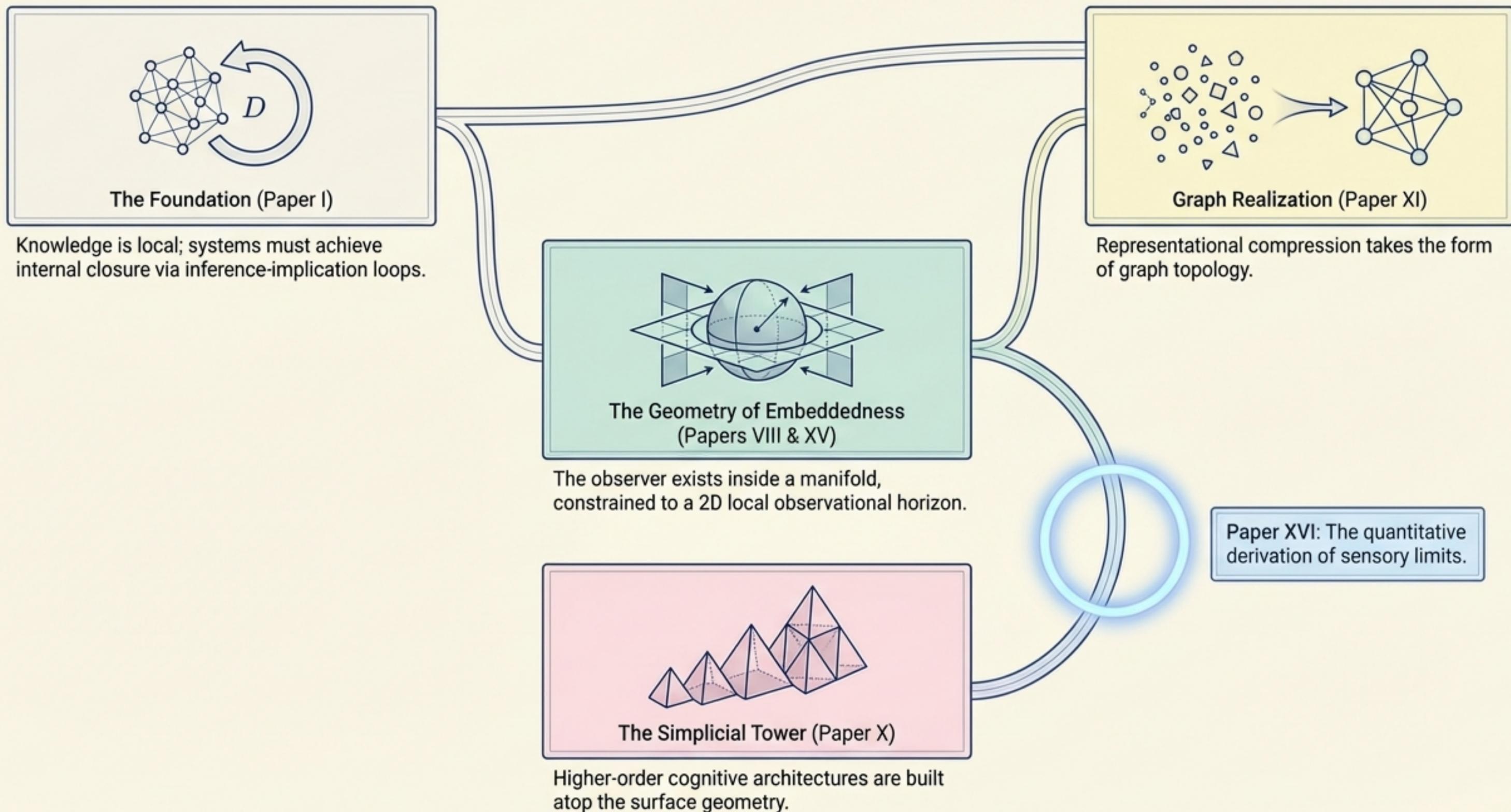
## Modern Biology

20+ Senses

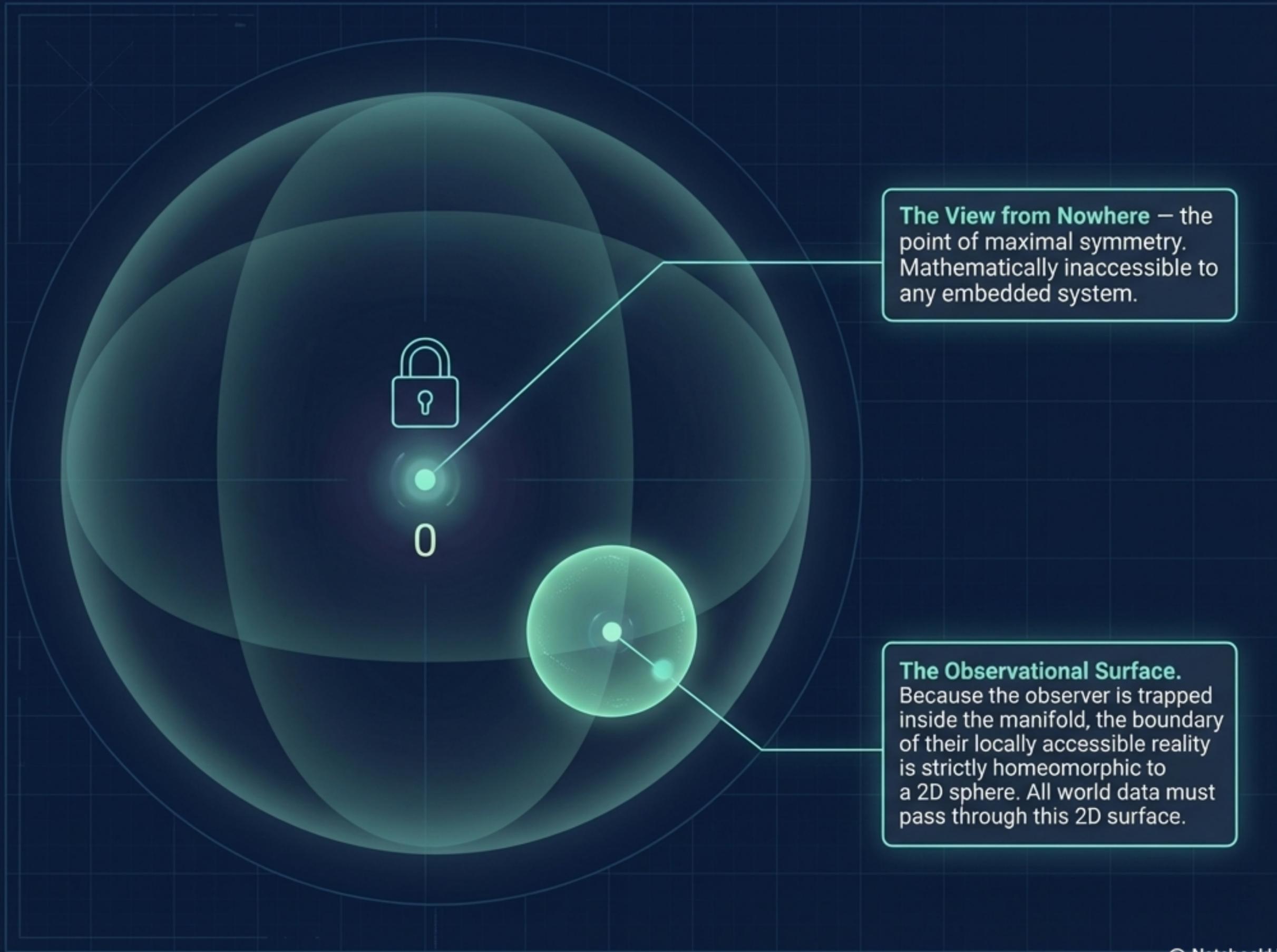
Modern science continually individuates new modes (nociception, interoception), relentless upward pressure

These three conflicting views are not empirical accidents. They are exact mathematical consequences of an embedded observer's geometry.

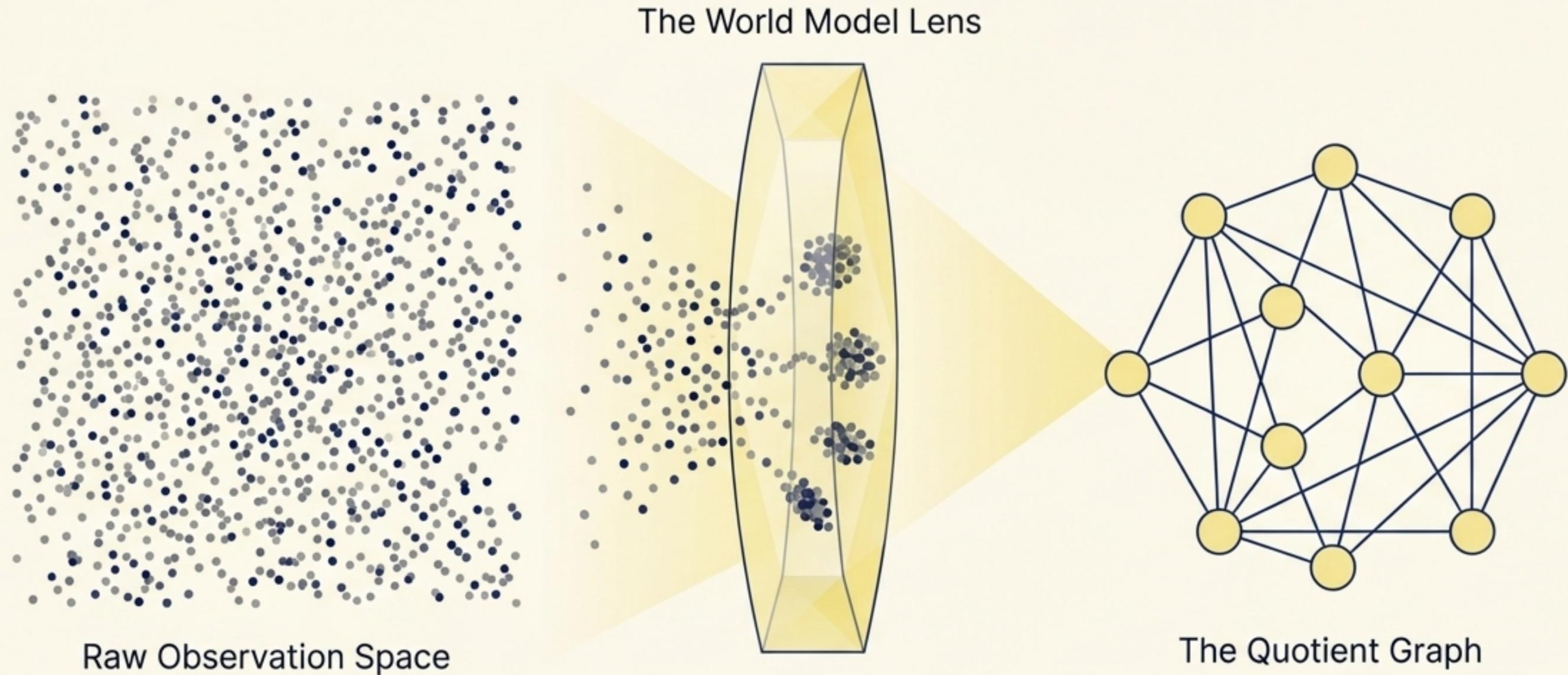
# The Imagination Machine Architecture



# The Geometry of Being Inside

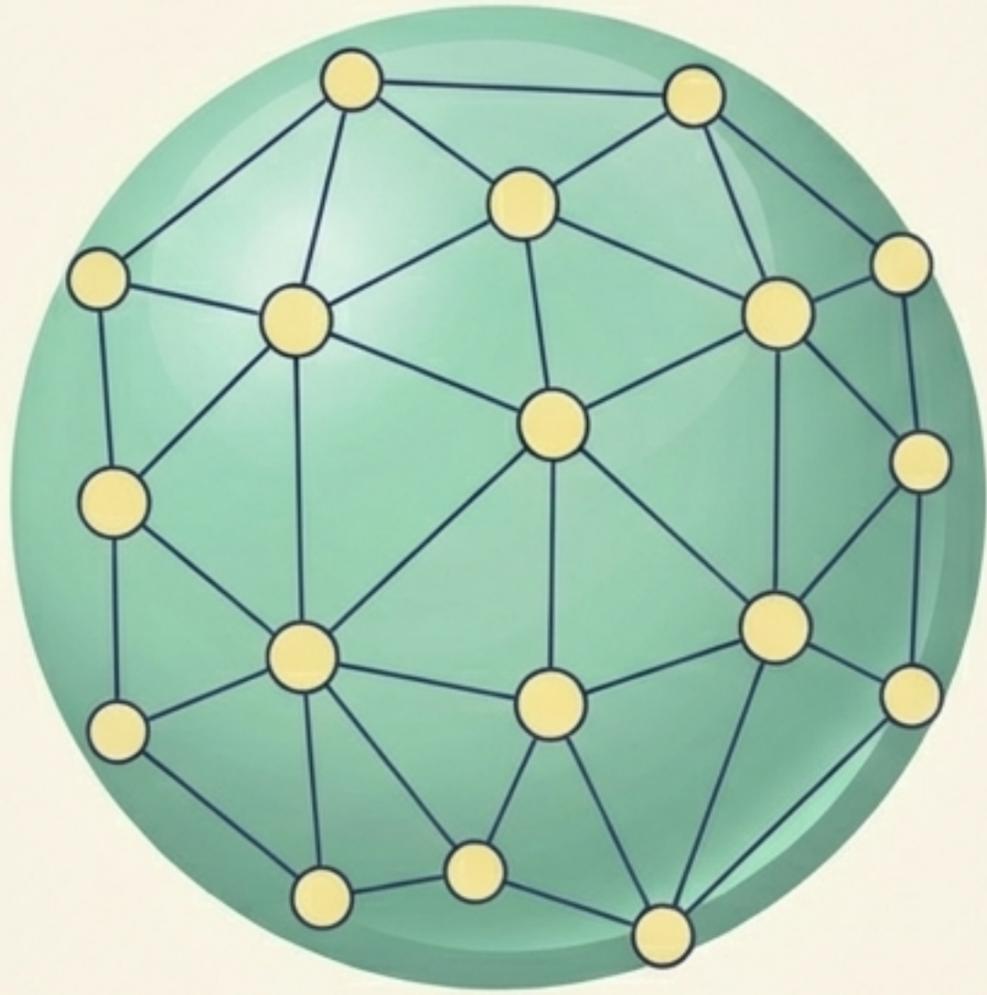


# The Quotient Graph Compressor



The system groups indistinguishable data into nodes. Edges represent binary relations. This compressed representational map is the observer's reality.

# The Inescapable Constraint of Planarity



Every finite graph drawn on the observational surface can be stereographically projected onto a 2D plane without any edges crossing.

# Euler's Formula

$$V - E + F = 2$$



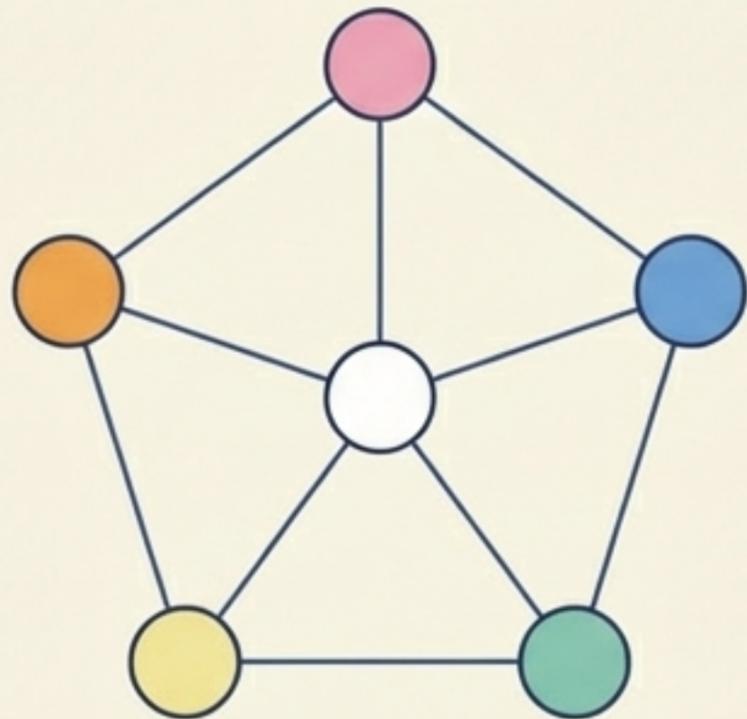
Faces are bounded by at least 3 edges.



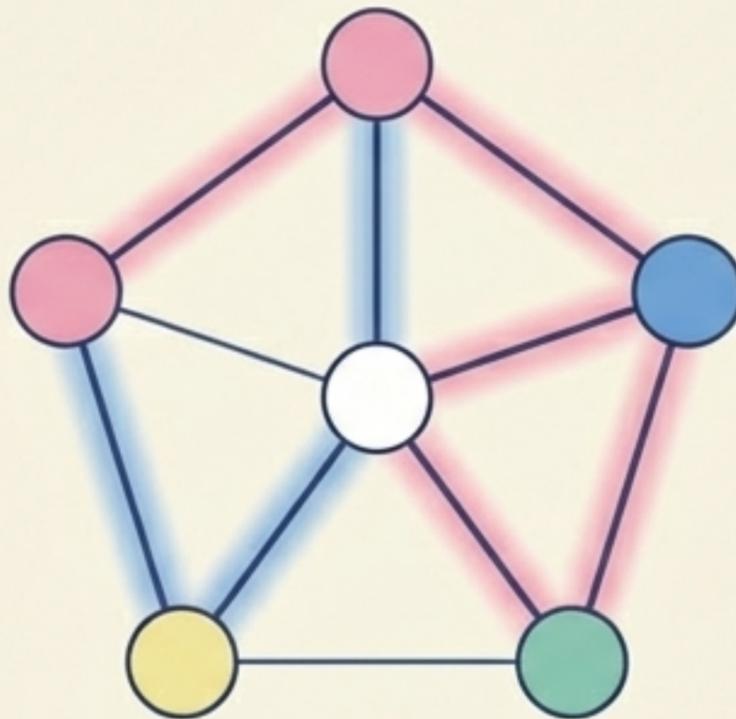
This forces the average degree of any node to be strictly less than 6.

Because the average connections are bounded, the complexity of a flat surface is strictly mathematically limited.

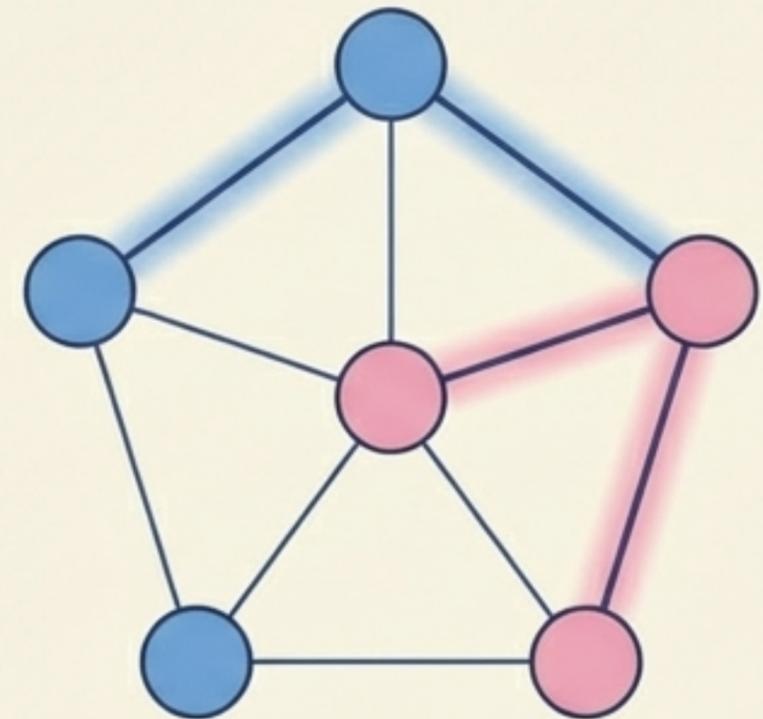
# The Constructive Bound Explains Aristotle's Five



Step 1: The system is stuck. A central node is surrounded by 5 differently colored neighbors.



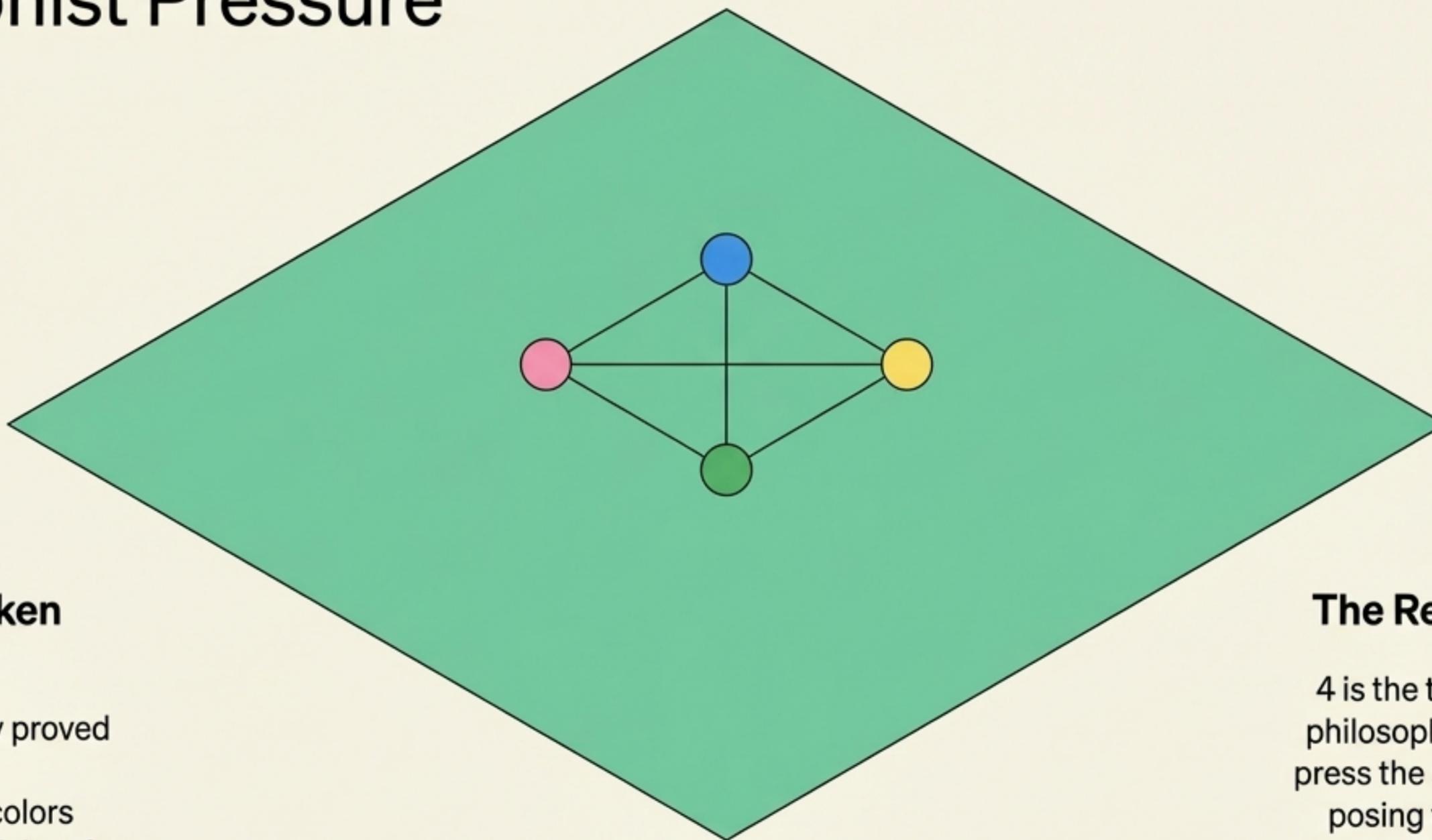
Step 2: The system traces a Kempe-chain of alternating pink and blue nodes.



Step 3: A localized swap frees up a color. The central node can now be colored.

The Aristotelian count of 5 senses remained stable for two millennia because 5 is the constructive bound of a 2D surface. An observer reflectively enumerating their perceptual modes using an internal algorithm will always arrive at 5.

# The Tight Bound Drives Reductionist Pressure



## The Appel-Haken Theorem

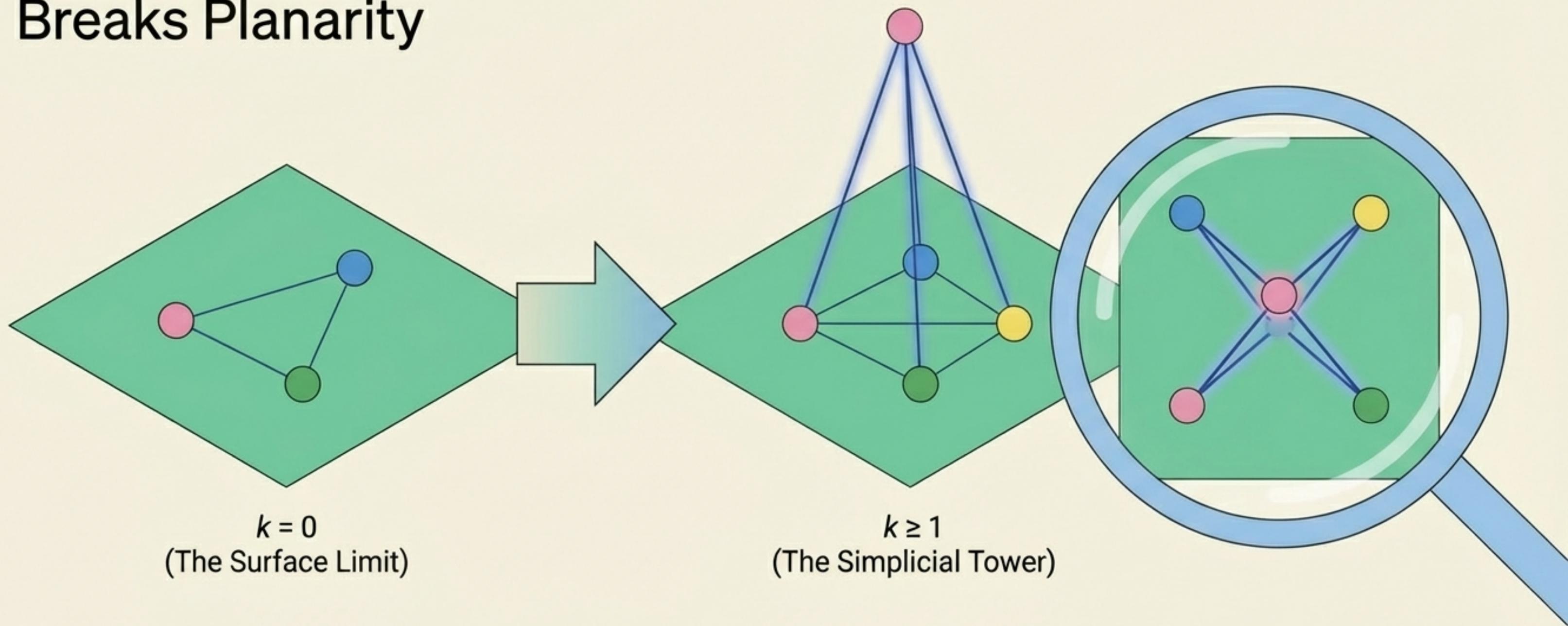
Non-constructively proved via computational verification that 4 colors are universally sufficient for planar maps.

## The Reductionist Link

4 is the tight bound. Analytic philosophers seeking to compress the senses (e.g., decomposing touch) are intuitively tracking this non-constructive minimum. Five is never strictly topologically necessary.

The maximum complete graph that can exist on a 2D surface. Requires exactly 4 colors.

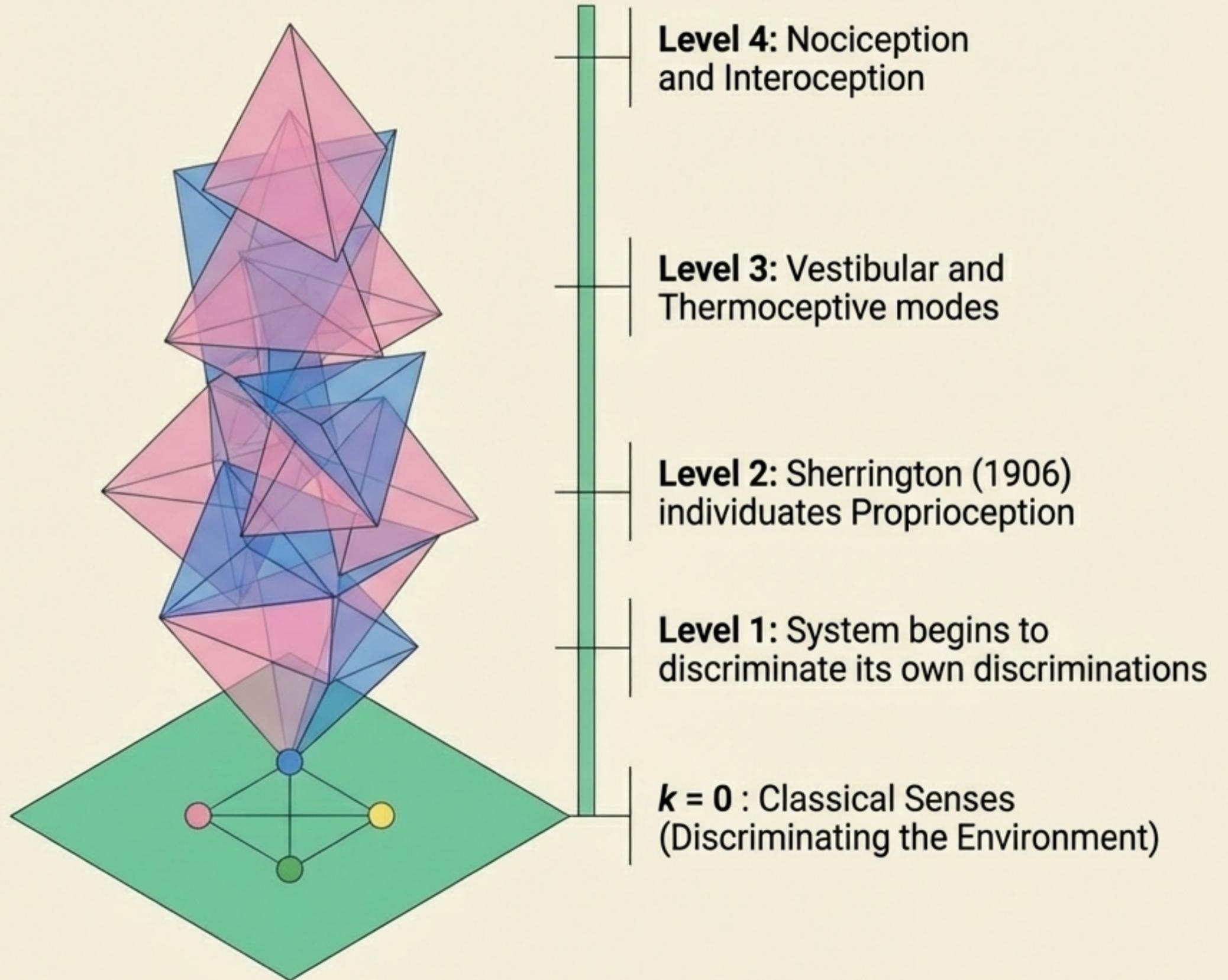
# The Simplicial Extrusion Breaks Planarity



Moving from 2D points to 3D relationships immediately shatters the 4-color bound, demanding new distinguishing resources.

# Modern Biology Ascends the Tower

The upward pressure of modern sensory biology (20+ senses) corresponds directly to the unbounded chromatic structure of higher-order skeleta. The count does not stop because the tower has no ceiling.

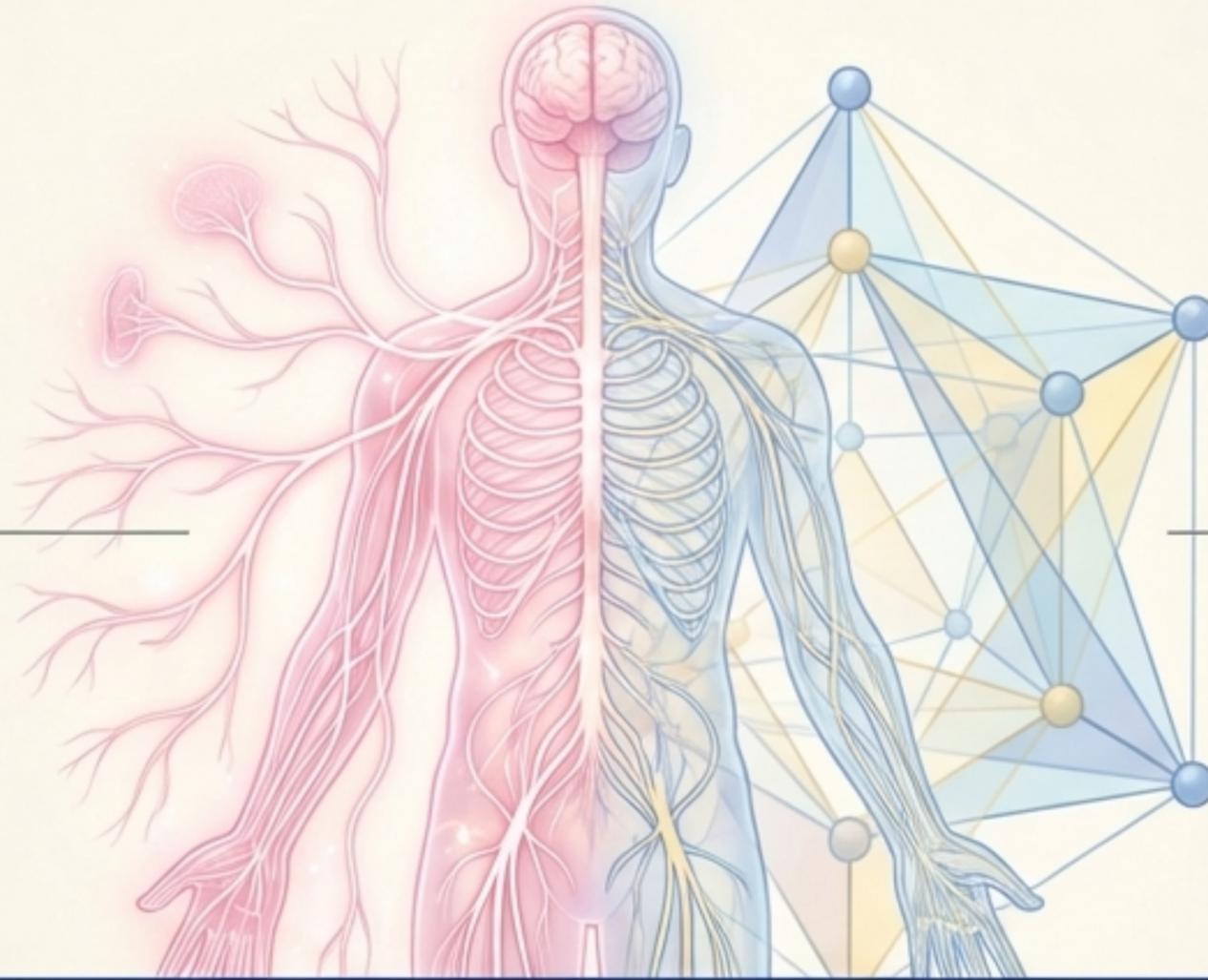


# The Sensory Architecture Matrix

	Classical View (Aristotle)	Reductionist View (Analytic)	Modern View (Biology)
Count of Senses	5	$\leq 4$	20+ (Unbounded)
Mathematical Bound	Planar Max Degree	Planar Tight Bound	Non-Planar Simplex
Topological Proof	Euler's Formula	Four Color Theorem	Unbounded Clique Growth
System Nature	Constructive	Non-Constructive	Structural Individuation
Architectural Level	Surface ( $k=0$ )	Surface ( $k=0$ )	Simplicial Tower ( $k \geq 1$ )

# Synthesis: The Biology is the Math

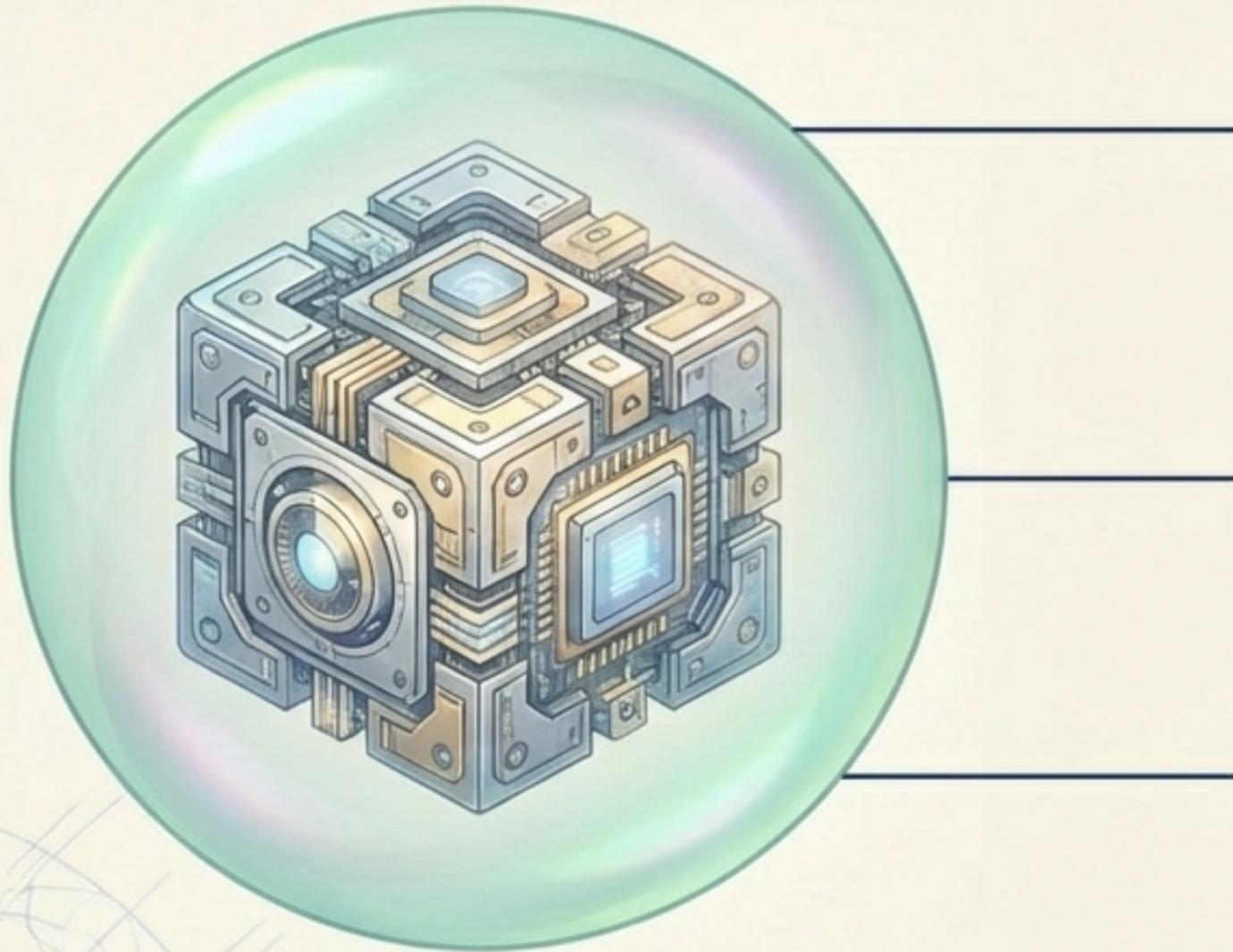
Evolutionary anatomy developed distinct organs to process reality.



Information processing systems require chromatic distinction to map equivalence classes.

Biology did not invent these limits; it discovered them. Evolutionary biology is bounded by geometric topology. The physical anatomy of human perception is merely a biological instantiation of the limits of a planar quotient graph ascending into a simplicial tower.

# Invariants for Artificial Epistemic Systems



## The Surface Limit

- Any sufficiently expressive artificial embedded system will hit a strict constraint on irreducible input modalities required for base-level environmental differentiation.

## The Necessity of Reflexivity

- True epistemic agents must map their own classifiers, forcing an ascent up the simplicial tower.

## Unbounded Modal Proliferation

- As an AI's self-representational capacity increases, it will inevitably generate an unbounded proliferation of internal senses identical to modern biological individuation.

*The geometry of being inside determines exactly how many ways there are to tell things apart.*