

WORLDS OF

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SPECIAL SCIENCE ANNUAL

Summer 2026

75¢

THE GEOMETRY OF PREFERENCE

Navigating Meaning in High-Dimensional Worlds

FULL COLOR
MAPS &
DIAGRAMS!

THE NAVIGATOR OF SEMANTIC SPACE

$$f_t(v) = \langle \Phi_t, v \rangle$$

$$\Lambda_t(\theta)$$

REACHABILITY

ADMISSIBILITY

BOUNDARIES

SEARCH

POSSIBILITY

$$A_t(\theta)$$

CATALOGS

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PREFERENCE FIELDS:

WHY SEARCH IS REALLY NAVIGATION

CIVILIZATION'S UNDO STACK

HOW BOUNDARIES SAVE US FROM OURSELVES

THE SECRET LIFE OF MARKOV BOUNDARIES

THE INVISIBLE INFRASTRUCTURE OF PROGRESS

CAN MEANING EMERGE FROM GEOMETRY?

THE SURPRISING ORDER HIDDEN IN HIGH DIMENSIONS

INSIDE:

- Random Geometric Graphs
- Spectral Admissibility
- Phase Transitions of Meaning
- The Geometry of Exploration
- Maps of the Possible

THE MIND IS NOT A LIBRARY. THE MIND IS A TRAVELER.

THE GEOMETRY OF PREFERENCE

Navigating Meaning in High-Dimensional Worlds

$$f_t(v) = \langle \Phi_t, v \rangle$$

FULL COLOR
MAPS &
DIAGRAMS!

PREFERENCE FIELDS:
WHY SEARCH IS REALLY NAVIGATION.

IF PREFERENCES SHAPE OUR CHOICES... THEN THEY FORM A LANDSCAPE.

CIVILIZATION'S UNDO STACK:
HOW BOUNDARIES SAVE US FROM OURSELVES.

EVERY LAYER A BOUNDARY. EVERY BOUNDARY A CHOICE WE DON'T REGRET—(YET).

THE SECRET LIFE OF MARKOV BOUNDARIES:
THE INVISIBLE INFRASTRUCTURE OF PROGRESS.

THE FUTURE DEPENDS ONLY EVERY BOUNDARY BOUNDARY, NOT THE PAST—



CAN MEANING EMERGE FROM GEOMETRY?
THE SURPRISING ORDER HIDDEN IN HIGH DIMENSIONS.

THEN MEANING MIGHT NOT BE SOMETHING WE FIND...

...BUT SOMETHING WE NAVIGATE.

REACHABILITY

ADMISSIBILITY

BOUNDARIES

EACH DIRECTION A TRADE-OFF. EACH PATH, A PREFERENCE MADE REAL.

THE NAVIGATOR OF SEMANTIC SPACE.

I CAN'T SEARCH EVERYTHING...

BUT I CAN CHOOSE WHERE MEANING IS MOST LIKELY TO EMERGE.

$$f_t(v) = \langle \Phi_t, v \rangle$$

UTILITY IS A VECTOR. THE WORLD IS THE SPACE.

PREFERENCE GIVES DIRECTION. STRUCTURE GIVES SHAPE.

MEANING ISN'T GIVEN. IT'S DISCOVERED—ONE PREFERENCE AT A TIME.

I DON'T NEED THE PERFECT MAP.

I NEED THE COURAGE TO FOLLOW THE NEXT PATH.

TO BE CONTINUED...

THE MIND IS NOT A LIBRARY. THE MIND IS A TRAVELER.

THE ADMISSIBLE KINGDOM

Preference fields carve the world into what can be seen.

THE MAP DID NOT SHOW EVERYTHING.

IT SHOWED ONLY WHAT ALIGNED.



EVERY PREFERENCE CHANGED THE FIELD.



THE GLOW SPREADS OUTWARD THROUGH NEARBY LOCATIONS.



WHY DID THOSE PLACES LIGHT UP TOO?



BECAUSE YOU NEVER CHOOSE A THING. YOU CHOOSE A DIRECTION.



Φ



THE WORLD IS LARGER THAN WHAT YOU CAN SEE. THE FIELD DECIDES WHAT BECOMES REACHABLE.



THE MAP IS CHANGING.



NO. THE MAP WAS ALWAYS LIKE THIS. YOU ARE CHANGING.



WE CALL THIS AN ADMISSIBLE NEIGHBORHOOD.



A NEIGHBORHOOD? A KINGDOM BUILT FROM PREFERENCE.



SEARCH IS NOT THE DISCOVERY OF AN ANSWER. SEARCH IS THE DISCOVERY OF WHERE ANSWERS CAN EXIST.

THE HIDDEN NETWORK REVEALED

BENEATH THE GLOWING KINGDOM IS A PATTERN.

The admissible kingdom is not random. It has a structure.

NOT ROADS.
NOT WALLS.
RELATIONSHIPS.

The preference field selects the high-alignment region:

$$A_t(\theta) = \{i : f_t(v_i) \geq \theta\}$$

IT'S ALIVE...
IT'S CONNECTED.

EVERY POINT IS A
CONCEPT, AN IDEA,
A MEMORY, A PLACE
IN MEANING-SPACE.

IN THE NETWORK:

- Nodes are corpus items (embeddings on S^{d-1}).
- Edges connect items that are semantically nearby (within radius r).
- Brightness shows alignment with Φ_t .

SOME REGIONS FORM DENSE
CLUSTERS OF CONNECTIONS.

OTHERS ARE SCATTERED
AND DISCONNECTED.

THIS IS NOT ACCIDENTAL.
IT IS GEOMETRY.

$A_t(\theta)$

THE ADMISSIBLE NEIGHBORHOOD $A_t(\theta)$ IS A SUBGRAPH OF A RANDOM GEOMETRIC GRAPH ON THE SPHERE—A SPHERE WITH CONNECTIONS DETERMINED BY PROXIMITY IN MEANING.

ZOOMING IN...

TRIANGLES APPEAR.

STRUCTURE MEANS MEANING.

HISTORY

PHILOSOPHY

ECONOMICS

ENGINEERING

ARCHITECTURE

THE PRESENCE OF MANY TRIANGLES IS THE SIGNATURE OF A COHERENT SEMANTIC CLUSTER.

LOCAL COHERENCE INDICATOR:

$$T = \frac{(\# \text{ of closed triangles})}{(\# \text{ of connected triples})}$$

HIGH T — GEOMETRIC REGIME
LOW T — RANDOM REGIME

WITHIN A COHERENT REGION, NEARBY PLACES ARE ALL RELATED TO EACH OTHER.

WHEN THREE CONNECTIONS CLOSE INTO A TRIANGLE, STRUCTURE IS REAL.

THE FIELD SHOWS WHAT ALIGNS. THE NETWORK REVEALS WHAT CONNECTS.

THE HIDDEN SKELETON

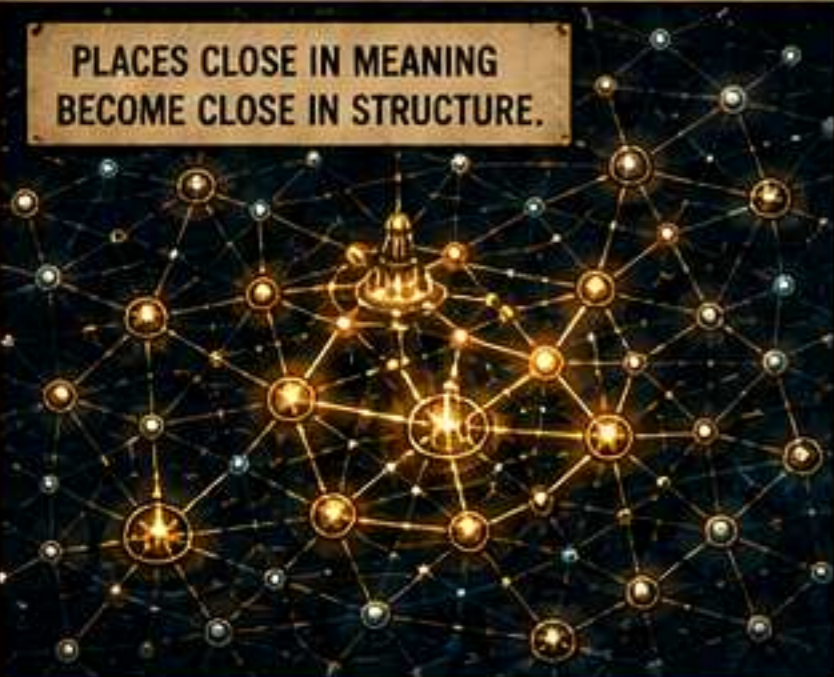
The world is not built from cities and roads. It is built from relationships.

WHAT IS THAT?

WHAT THE WORLD IS MADE OF.

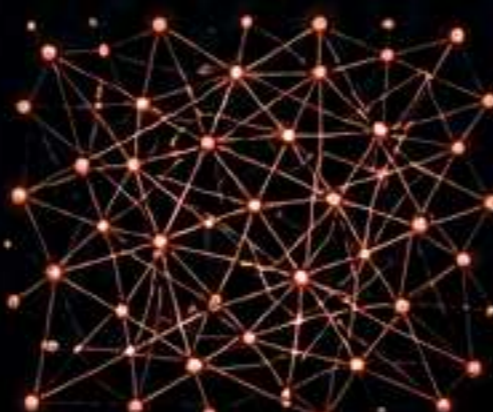
BENEATH THE CITIES AND ROADS LIES AN IMMENSE SKELETON OF CONNECTIONS.

PLACES CLOSE IN MEANING BECOME CLOSE IN STRUCTURE.



NOT ALL NETWORKS ARE ALIKE.

SOME ARE NOISE.



RANDOM (ERDŐS-RÉNYI)

SOME CONTAIN GEOMETRY.



RANDOM GEOMETRIC GRAPH

IN THIS SKELETON:

- Nodes are cities (concepts, items, memories...).
- Edges are relationships (semantic proximity).
- Clusters emerge naturally where connections reinforce.

MEANING WAS NOT STORED IN INDIVIDUAL PLACES.

MEANING LIVED IN THE CONNECTIONS.



WHY ARE SOME REGIONS BRIGHTER?

WHY ARE SOME REGIONS BRIGHTER?

COHERENCE.



WHEN RELATIONSHIPS REINFORCE ONE ANOTHER...



...GEOMETRY EMERGES.



SOME REGIONS ARE COHERENT CONSTELLATIONS OF MEANING.

OTHERS REMAIN RANDOM STATIC.



HOW DO WE KNOW WHEN THE PATTERN IS REAL?

AH. THAT IS THE NEXT QUESTION.



THE THRESHOLD OF DETECTABILITY

THEY'RE IDENTICAL.

ARE THEY?

SOME WORLDS CONTAIN MEANING.

SOME ONLY CONTAIN COINCIDENCE.

THIS ONE?

WRONG.

THEN THAT ONE?

ALSO WRONG.

I SEE IT.

RANDOMNESS
(NO STRUCTURE)

STRUCTURE WAS ALWAYS THERE.
YOU SIMPLY LACKED THE RESOLUTION TO SEE IT.

STRUCTURE
(HIDDEN GEOMETRY)

WHAT IS THAT?

THE THRESHOLD.

THRESHOLD OF WHAT?

THE DIFFERENCE BETWEEN A PATTERN...

...AND A COINCIDENCE.

BEFORE A WORLD CAN BE NAVIGATED,
IT MUST FIRST BECOME DETECTABLE.



THE ANCIENT SEARCHERS

*The network stretches backward in time.
Long before minds, long before words.*



THESE
AREN'T IDEAS.

NO.
THEY CAME
FIRST.

BEFORE MINDS SEARCHED
FOR ANSWERS...
—
MATTER SEARCHED FOR
POSSIBILITIES.

IN CRYSTALS,
IN CLAY BEDS,
IN TIDAL POOLS,
IN VOLCANIC SHORES...

PATHWAYS FORMED.
POSSIBILITIES EMERGED.

WITHIN MINERAL
FRACTURES,
TINY PATHWAYS
EXPLORED EVERY
POSSIBLE ROUTE.

SOME PATHS DISSIPATED.
SOME REMAINED.

STRUCTURE FAVORED THOSE
THAT MOVED ENERGY AND
PRESERVED ORDER LONGEST.

THIS WAS THE FIRST SEARCH.
BLIND. UNKNOWNING.
RELENTLESS.

*BEFORE LIFE. BEFORE THOUGHT. BEFORE PURPOSE.
THERE WAS ONLY EXPLORATION AND CONSEQUENCE.*



THE FIRST SEARCHERS
DISCOVERED SOMETHING NEW.
SUCCESS COULD SURVIVE.

THESE
AREN'T
IDEAS.

NO.
THEY CAME
FIRST.

WATER FLOODED.

PATHS FORMED.

WATER EVAPORATED.

MOST PATHS VANISHED.

MOST PATHS VANISHED.
A FEW ENDURED.
THOSE FEW CHANGED
WHAT COULD HAPPEN NEXT.

A FEW ENDURED.

THEY GREW BRIGHTER.

WHY DO THOSE
PATTERNS KEEP
RETURNING?

BECAUSE THE OCEAN
KEEPS ASKING THE
SAME QUESTION.

THEY LOOK LIKE
THEY'RE FEEDING
THEMSELVES.

IN A WAY...
THEY ARE.

EVERY CYCLE PRESERVED A LITTLE HISTORY.
EVERY PRESERVED HISTORY OPENED NEW POSSIBILITIES.
THIS WAS THE FIRST RECURSION.

THE CITIES OF CHEMISTRY

*The first loops learned to persist.
The loops that persisted began to build.*

THEY LOOK ALIVE.

ALMOST.

SOME PATHWAYS CLOSED INTO LOOPS.
THEY TRAPPED ENERGY. THEY RECYCLED IT. THEY ENDURED.
A LOOP THAT FEEDS ITSELF CAN OUTLAST EVERYTHING ELSE.

AUTOCATALYTIC CYCLES SPUN CHEMICAL STORIES ROUND AND ROUND.
EACH STORY MADE IT EASIER TO TELL THE NEXT.

LOOPS JOINED LOOPS. NETWORKS FORMED.
TOGETHER THEY COULD DO WHAT NONE COULD DO ALONE.



-  MOLECULES
-  REACTIONS
-  CATALYTIC LOOP
-  COMPARTMENT

BOUNDARIES APPEARED.
INSIDE AND OUTSIDE BECAME DIFFERENT.
DIFFERENCE MADE POSSIBILITY.

MEMBRANES DREW LINES.
WHAT STAYED IN COULD GROW.
WHAT STAYED OUT COULD FUEL IT.

THESE LOOPS...
THEY REMEMBER?

NOT LIKE WE DO.
BUT THEY KEEP WHAT WORKS.

**THIS WAS THE FIRST MEMORY.
NOT IN MINDS, BUT IN MATTER.
PERSISTENCE IS REMEMBRANCE.**



THE GREAT NESTING

PERSISTENCE ALONE WAS NOT ENOUGH.
SUCCESSFUL PATHWAYS NEEDED PROTECTION.

WHAT AM I
LOOKING
AT?

A SHELTER.

A WALL?

MORE THAN
A WALL.
A DISTINCTION.

FOR THE FIRST TIME...
INSIDE AND OUTSIDE
BECAME DIFFERENT.

OUTSIDE THE BOUNDARY

STORMS.
IMPACTS.
CHAOS.
RANDOM PATHWAYS.

INSIDE THE BOUNDARY

STABLE LOOPS.
PRESERVED STRUCTURES.
INCREASING COMPLEXITY.

THE SHELTER
CONTAINS ANOTHER
SHELTER.

EXACTLY.

BOUNDARY
LEVEL 1

BOUNDARY
LEVEL 2

BOUNDARY
LEVEL 3

BOUNDARY
LEVEL 4

BOUNDARY
LEVEL 5

...
AND SO ON.

WALLS BECAME
MEMBRANES.

DISTINCTIONS BECAME
POSSIBILITIES.

POSSIBILITIES BECAME
COMPONENTS.

COMPONENTS BECAME
SYSTEMS.

SYSTEMS BECAME
CARRIERS OF MORE
POSSIBLE SYSTEMS.

THEY SURVIVE
BY CARRYING
ONE ANOTHER.

THAT IS
THE SECRET.

MEMORY BECAME SHELTER.
SHELTER BECAME HIERARCHY.
HIERARCHY BECAME THE FOUNDATION OF LIFE.

THE VERTEBRATE HIGHWAY

When nested cities learned to move together, a new kind of solution emerged.

A VERTEBRATE IS NOT JUST A CREATURE. IT IS A SOLUTION IN A SPACE OF CONSTRAINTS.

IT'S BEAUTIFUL.

IT'S A SOLUTION.

SUPPORT AND FLEXIBILITY. FLOW AND EXCHANGE. SENSING AND COORDINATION. MOVEMENT AND RESPONSE.

ONE PROBLEM SET. ONE INTEGRATED ANSWER.

THE SAME PRINCIPLES THAT BUILT CITIES OF CHEMISTRY BUILT BODIES OF LIFE.

FROM SIMPLE ARCHES TO COMPLEX SPINES, STRUCTURE EVOLVED WITHOUT BREAKING THE SOLUTION.



SKELETAL FRAMEWORK (CONSTRAINT)

MUSCULAR SYSTEM (FORCE GENERATION)

CIRCULATORY SYSTEM (FLOW NETWORK)

NERVOUS SYSTEM (INFORMATION NETWORK)

SENSORIAL LATERAL LINE (ENVIRONMENTAL MAP)

DIFFERENT SYSTEMS. COORDINATED THROUGH MATERIAL CONTINUITY.

COLLAGEN CONNECTS IT ALL.

A MOVING CITY OF NESTED CONSTRAINTS.

IT'S STILL THE SAME PATTERN.

LOOPS. NETWORKS. NESTING.

EXACTLY.

LIFE DID NOT ESCAPE THE NETWORK.

LIFE BECAME THE NETWORK'S WAY OF MOVING.

THE VERTEBRATE BODY IS WHAT HAPPENS WHEN SOLUTIONS LEARN TO CARRY THEMSELVES THROUGH SPACE AND TIME.

THE OSCILLATOR KINGDOM

Inside the vertebrate, a new kind of order begins to move.

WHERE ARE WE?

THE NERVOUS SYSTEM.

NOT A MACHINE OF WIRES.
A KINGDOM OF OSCILLATORS.
THOUSANDS OF TOWERS RINGING
IN THEIR OWN RHYTHMS.

EACH TOWER OSCILLATES.
EACH HAS ITS PHASE.
EACH INFLUENCES OTHERS.

WAVES TRAVEL.
PHASES SHIFT.
PATTERNS EMERGE.

A WAVE BEGINS
IN ONE PLACE...



...IT RECRUITS
ITS NEIGHBORS...



...TOGETHER THEY
CREATE MOTION.



NO SINGLE TOWER
COMMANDS THE REST.
COORDINATION
EMERGES FROM
THE DANCE ITSELF.

THE WORLD
BEGINS TO SWIM.

BUT... WHO IS
STEERING IT?

NO ONE.

THAT IS ANOTHER
LESSON.

MOTION WITHOUT A MOVER.
ORDER WITHOUT A MASTER.
THIS IS HOW LIFE LEARNS
TO ACT AS ONE.

THE MINDS WITHIN THE HIGHWAY

*Motion brought the body.
Sensing brought the map.*

IT'S
LOOKING AT
SOMETHING.

YES.

AND IT IS
BUILDING AN
INSIDE WORLD.

SENSORY SIGNALS
ENTER THE BODY.
THEY TRIGGER PATTERNS.
THE PATTERNS BECOME
INFORMATION.
INFORMATION BECOMES
A MAP.

HOW AN EXPERIENCE BECOMES AN INTERNAL LANDSCAPE

1. DETECTION

Signals from the world
arrive at the senses.

2. TRANSDUCTION

Signals become electrical
patterns.

3. DISTRIBUTION

Patterns spread through
oscillator kingdoms.

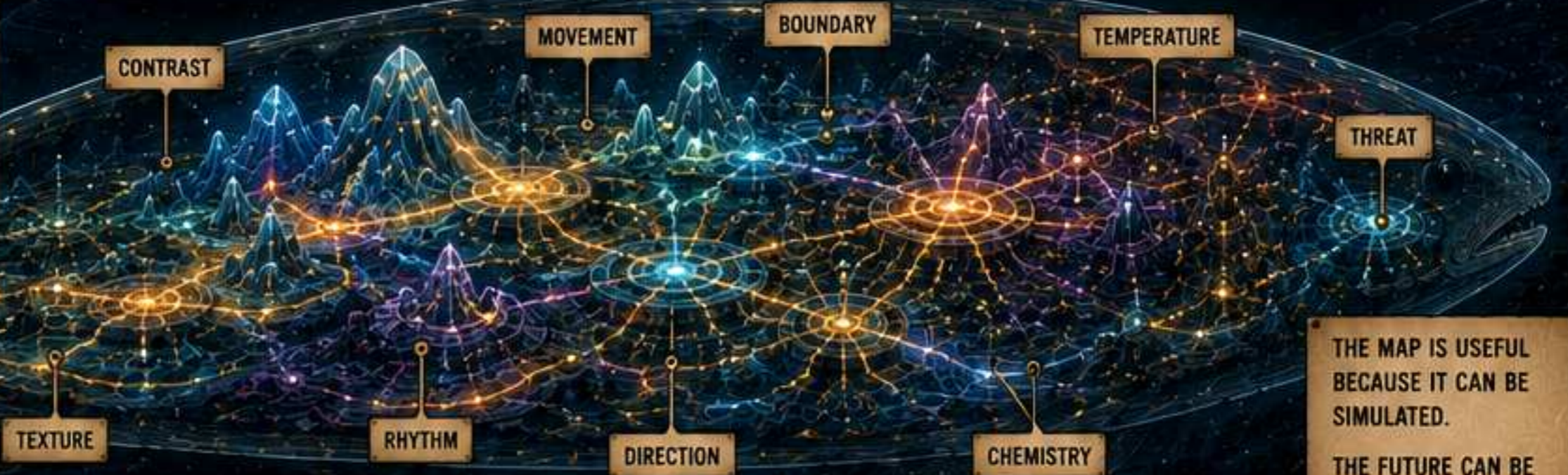
4. INTEGRATION

Patterns combine, compete,
and reinforce.

5. INTERNAL MAP

A structured model of the
world is constructed.

INSIDE, THE WORLD
IS NOT COPIED.
IT IS RECONSTRUCTED
IN A LANGUAGE OF
PATTERNS.



THE MAP IS USEFUL
BECAUSE IT CAN BE
SIMULATED.
THE FUTURE CAN BE
TESTED BEFORE THE
BODY MOVES.

SO THE FISH
DOESN'T JUST
FEEL THE WORLD.

IT BUILDS A
WORLD INSIDE
ITSELF.

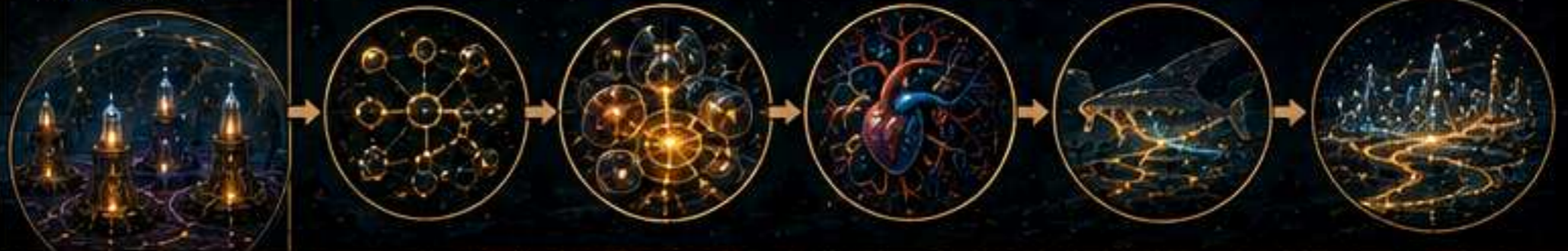
THE SAME PRINCIPLE
AT EVERY SCALE.

MOLECULES

CELLS

ORGANS

BODIES



THE ROAD...
IT WAS INSIDE
ALL ALONG.

EXACTLY.

THE VERTEBRATE DOES
NOT MERELY MOVE
THROUGH THE WORLD.
IT CARRIES A MODEL
OF THE WORLD WITHIN.
THIS IS HOW MOVEMENT
BECOMES INTELLIGENCE.

A MAP IS NOT A COPY.
IT IS A TOOL FOR SURVIVAL.
THE FIRST MAPS WERE CHEMICAL.
THE NEXT MAPS COULD THINK.



THE GEOMETRY OF PREFERENCE

*The universe learned to explore.
Then to remember. Then to preserve.
Then to move. Then to predict. Then to prefer.*

FROM MINERALS
TO MINDS,
THE SAME PATTERN
KEPT DEEPENING.

...MATTER EXPLORED.

...MATTER REMEMBERED.

...MATTER PRESERVED.

...MATTER PROTECTED.

...MATTER MOVED.

...MATTER PREDICTED.

THE UNIVERSE
IS NOT JUST
A PLACE OF THINGS.

IT IS A PROCESS
OF PREFERENCES
THAT KEEPS
GETTING BETTER
AT FINDING WHAT
CAN BE.

SO THE JOURNEY
DOESN'T END?

SO THIS ROAD...
IT WAS NEVER
OUT THERE.

IT WAS
ALWAYS
BEING BUILT.

EXACTLY.
EVERY STEP
LEFT A TRACE.

EVERY TRACE
SHAPED THE NEXT
POSSIBILITY.

THE NETWORK
BECAME A MIND.

AND NOW...
THE NETWORK
DOES NOT JUST
SURVIVE.

IT CHOOSES.
IT BUILDS MEANING.

IT TELLS STORIES
ABOUT ITSELF.

NO.
IT NEVER
COULD.

THE ROAD
KEEPS
DRAWING
ITSELF.

TO EXPLORE IS TO BECOME.
TO REMEMBER IS TO ENDURE.
TO CHOOSE IS TO CREATE THE FUTURE.





YOUTRONIUM INDUSTRIES PRESENTS

THE HOME EXPLORATION KIT™

Order Today!
THE FUTURE IS RECURSIVE!

Why wait four billion years?

THE UNIVERSE DID IT. SO CAN YOU!

COMPLETE STARTER SET ONLY
\$19.95
PLUS TAX



THE JUNIOR GEOLOGIST PACK

Grow your own recursive mineral networks!
Watch possibilities emerge before your eyes!

CONTAINS:

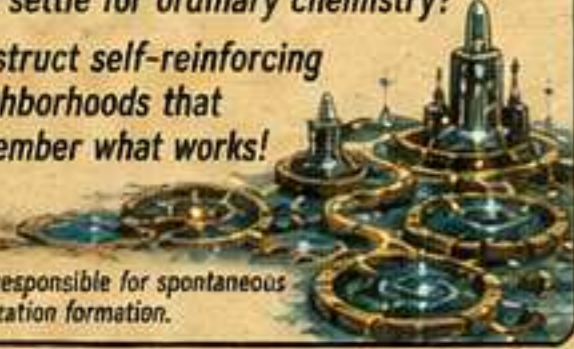
- 3 lbs. of educational volcanic ash
- 12 premium tidal pools
- One packet of starter entropy



THE AUTOCATALYTIC CITY BUILDER

Why settle for ordinary chemistry?
Construct self-reinforcing neighborhoods that remember what works!

* Not responsible for spontaneous civilization formation.



MEMBRANE DELUXE™

Keep the good stuff in!
Keep the bad stuff out!

Now with 30% more **DISTINCTION!***

* Compared to previous membranes.



THE VERTEBRATE STARTER SET

Build your own moving city of nested constraints!

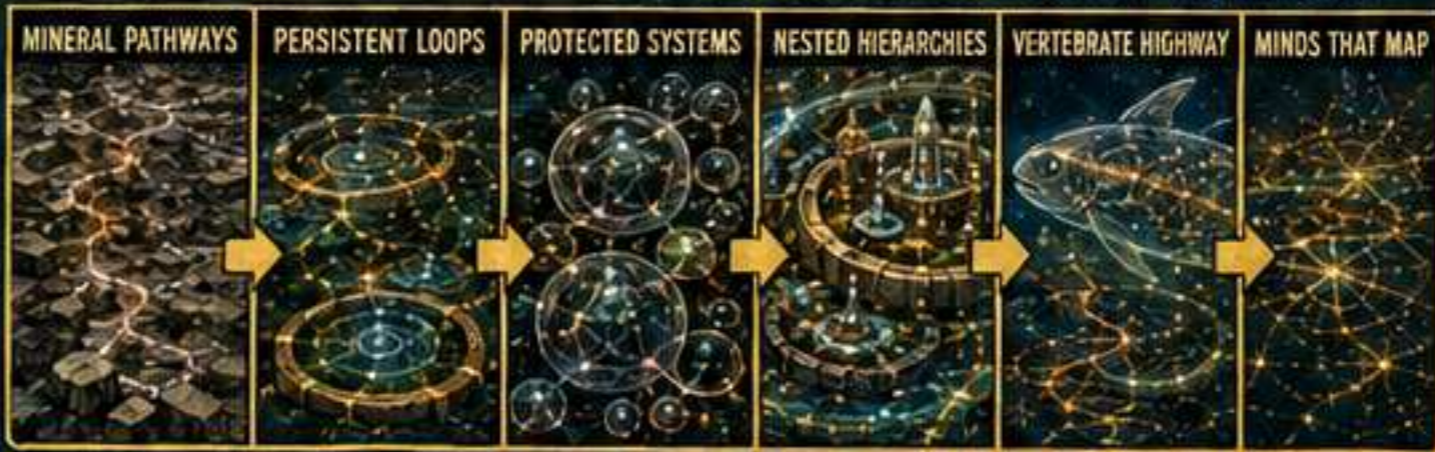
INCLUDES:

- One axial framework
- Two sensory systems
- Distributed oscillators
- Premium collagen

ASSEMBLY REQUIRED.



EVERYTHING YOU NEED TO GO FROM ROCKS TO REFLECTION!



EDUCATIONAL! ENTERTAINING! EXISTENTIALLY REWARDING!

PERFECT FOR:

- Aspiring cosmologists
- Future biochemists
- Amateur evolutionaries
- Curious kids of all ages
- Anyone with a sense of wonder!




**LEARN!
BUILD!
WONDER!**

SCIENTIFICALLY PLAUSIBLE!*

Based on the latest theories of recursion, autocatalysis, nested organization, oscillatory dynamics, information integration, and preference-field navigation!

* As plausible as anything else.

REAL CUSTOMERS! REAL RESULTS!*

-  "Our pathways have never been more persistent!"
— Primitive Ocean #47
-  "I evolved entirely by accident!"
— Anonymous Fish
-  "I asked for a map and got consciousness."
— Satisfied Customer

* Results may vary.

***** YOUTRONIUM SATISFACTION GUARANTEE!

If you're not completely satisfied, you may return the universe within 30 billion years for a full refund.



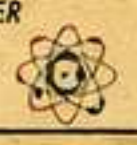
**IF YOUR UNIVERSE ISN'T EXPLORING ITSELF...
YOU MAY BE USING AN INFERIOR COSMOLOGY.**



IMPORTANT DISCLAIMER:
YOUTRONIUM INDUSTRIES ASSUMES NO RESPONSIBILITY FOR:

- Emergent intelligence
- Spontaneous self-reference
- Runaway semantic navigation
- Civilization formation
- Recursive self-improvement
- Preference-field amplification
- Existential reflection
- Meaning accumulation
- Unintended enlightenment
- Loss of naive realism
- Cosmic irony

USE ONLY AS DIRECTED.
CONSULT YOUR PHILOSOPHER BEFORE INITIATING.



**YOU DON'T FIND THE ROAD.
THE ROAD FINDS YOU.**

**NEXT YEAR'S SPECIAL ANNUAL:
THE SECRET LIFE OF BOUNDARIES**

How Civilization Learned to Say "No"™

