



The God Conjecture

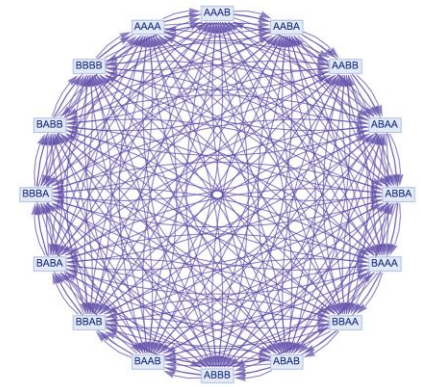
SAM A SENCHAL





SETTING THE SCENE

Science vs. Meaning



- Two Languages

Science (particles, forces) vs. Meaning (purpose, consciousness, value)

- Historical Divide

- These domains have evolved and progressively siloed since the Copernican Revolution
- Science describes “a measurable, predictable reality” and Religion / Philosophy describe “meaning”
- Disconnection formalised in “Separate Magisteria” a postmodernist nightmare for inquiry

- Computational Bridge

- Recent advances in computation (through the concept of the Ruliad) offer a new common language to unify these domains under one lingua franca
- **Core Idea:** The God Conjecture uses Wolfram’s Ruliad – the “abstract limit of all possible computations” – as a shared canvas to model **both** to show **a God-concept can be mathematically compatible with physics**



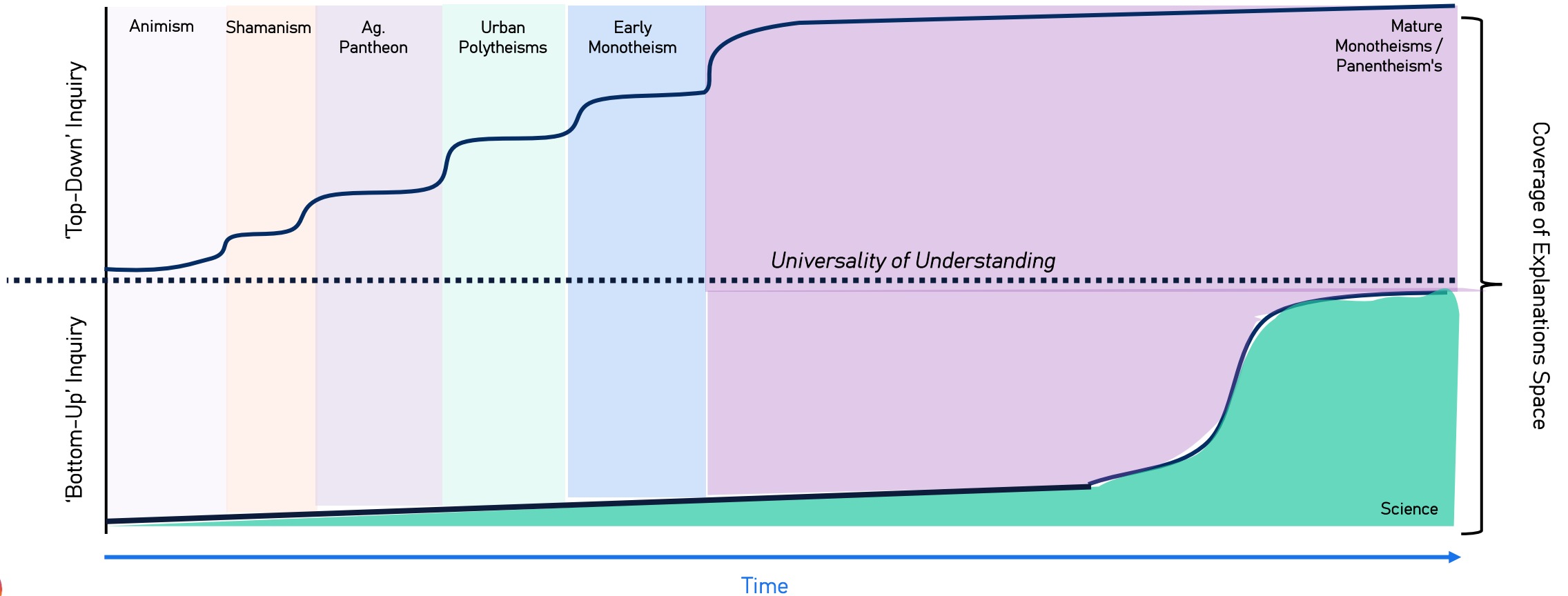
Humanity Straddles Two Worlds

- In one world, we have the **empirical** realm of **science** – particles, forces, and precise mathematical laws. In the other, we live in a meaning-laden realm of consciousness, values, and purpose
- Despite centuries of inquiry, these two realms have drifted apart. Fine-tuning suggests there's more than our equations capture, and the question “**why is there something rather than nothing**” lies outside empiricism
- Our moment in history is **unique**: **advances in computational theory provide tools to bridge these domains rigorously without reducing one to the other**
- Today, we can broaden our formal languages to underwrite both



The Epistemological Timeline

The Rationalisation of Reality





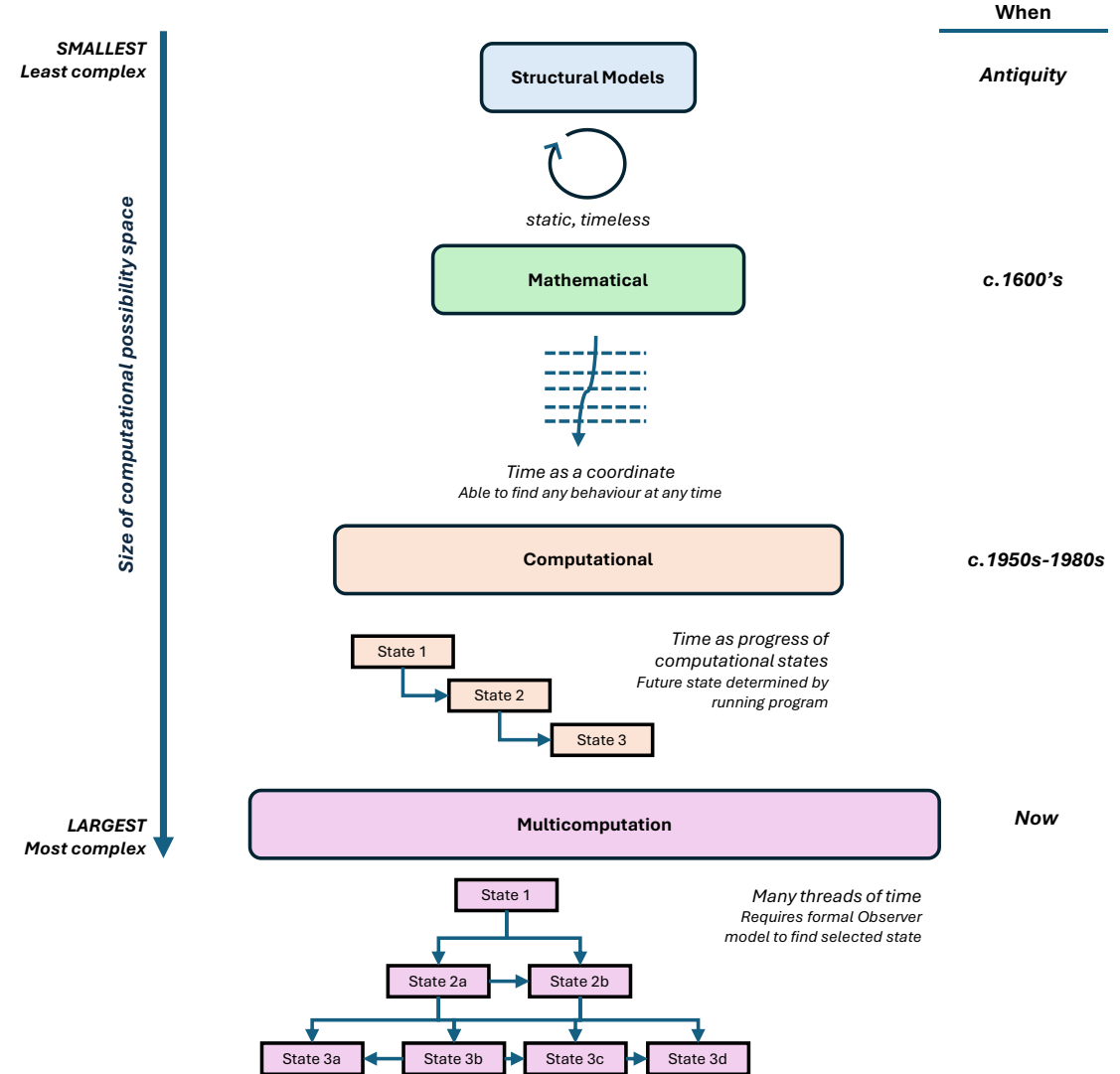
THE TOOLS OF THE GOD CONJECTURE

The Ruliad

Wolfram (2021)

Category Theory formalism by Arsiwalla, Gorard et al (2022 / 2023 / 2024)

- The Ruliad is an idealized “everything-computation”
- It is an abstract mathematical object: **a meta-space containing every rule-based universe**
- Think of it as a gigantic “library” of every possible computation (and hence every possible multiverse)
- It is not an empirical thing we discover; rather, we use it as a precise backdrop where all possible models of reality can co-exist
- **Important: The Ruliad is not the universe. It is a formal limit object within which our universe can be modelled to arbitrary accuracy.**

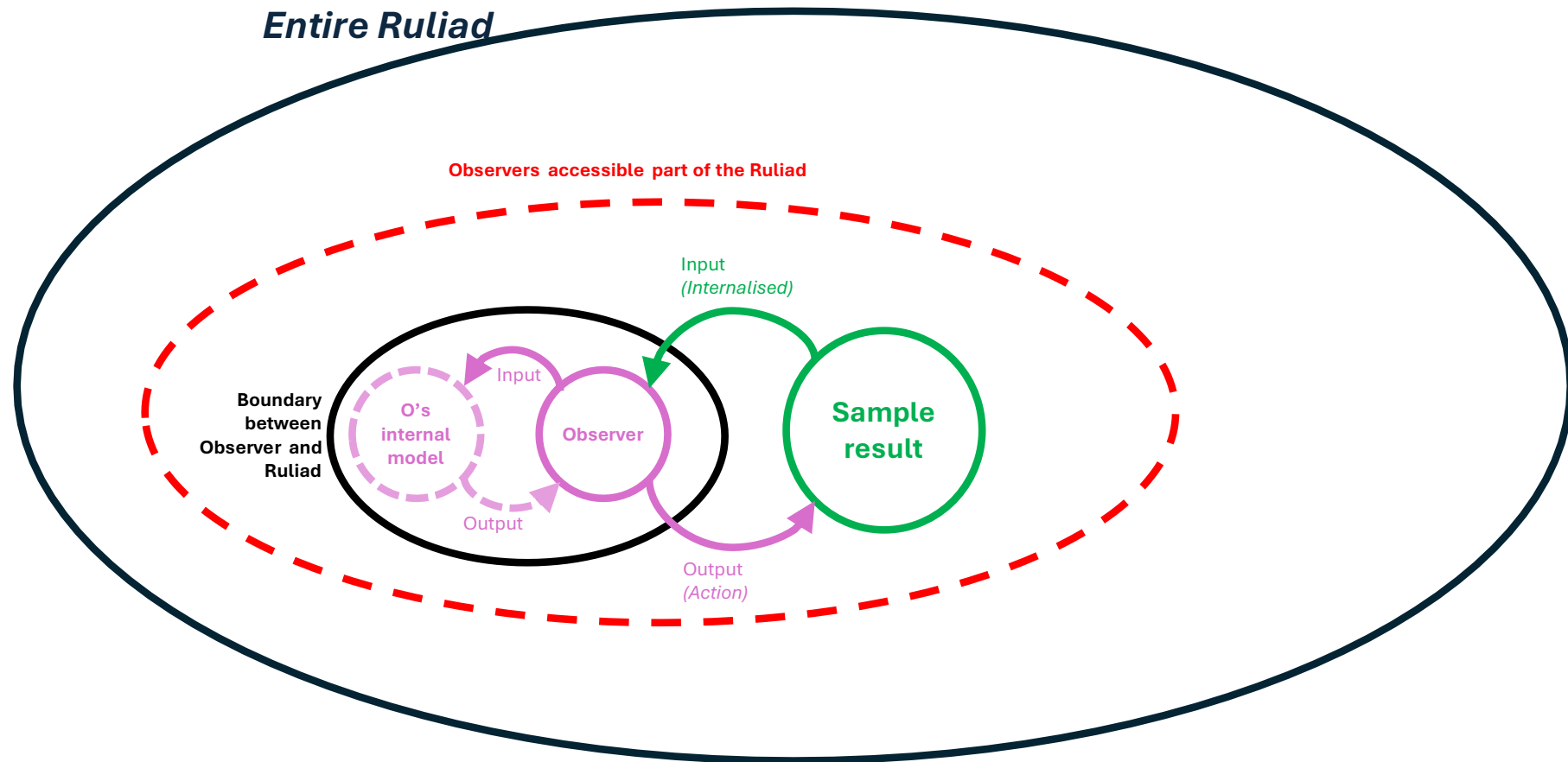


Observers in the Ruliad

- An **Observer** is any subsystem doing computations within a persistent boundary inside the Ruliad
- This includes anything from simple molecules to complex minds – **not just humans**
- **Function:** Observers sample information from the Ruliad and update their internal state. Because they have limited computational resources, each Observer “carves out” a specific slice of the Ruliad that becomes its experienced reality
- **Coarse-Graining:** Due to computational boundedness and persistence (finite memory, time, power), Observers necessarily coarse-grain the infinite Ruliad into a manageable ‘reality’
 - They only see patterns (like pixels in a photo) rather than full detail
- **Analogy:** An Observer is like a lens or filter
 - Each one “sees” a simplified version of the Ruliad based on its limits.



Observers: How They Work



The Observable Ruliad (R_o) & The Field of Observation (F_o)

- **Observable Ruliad:** Each Observer O with its sampling functor S_o maps the full Ruliad R to an Observable Ruliad

$$R_o = S_o(R) = \text{the subset of the Ruliad accessible to that Observer}$$

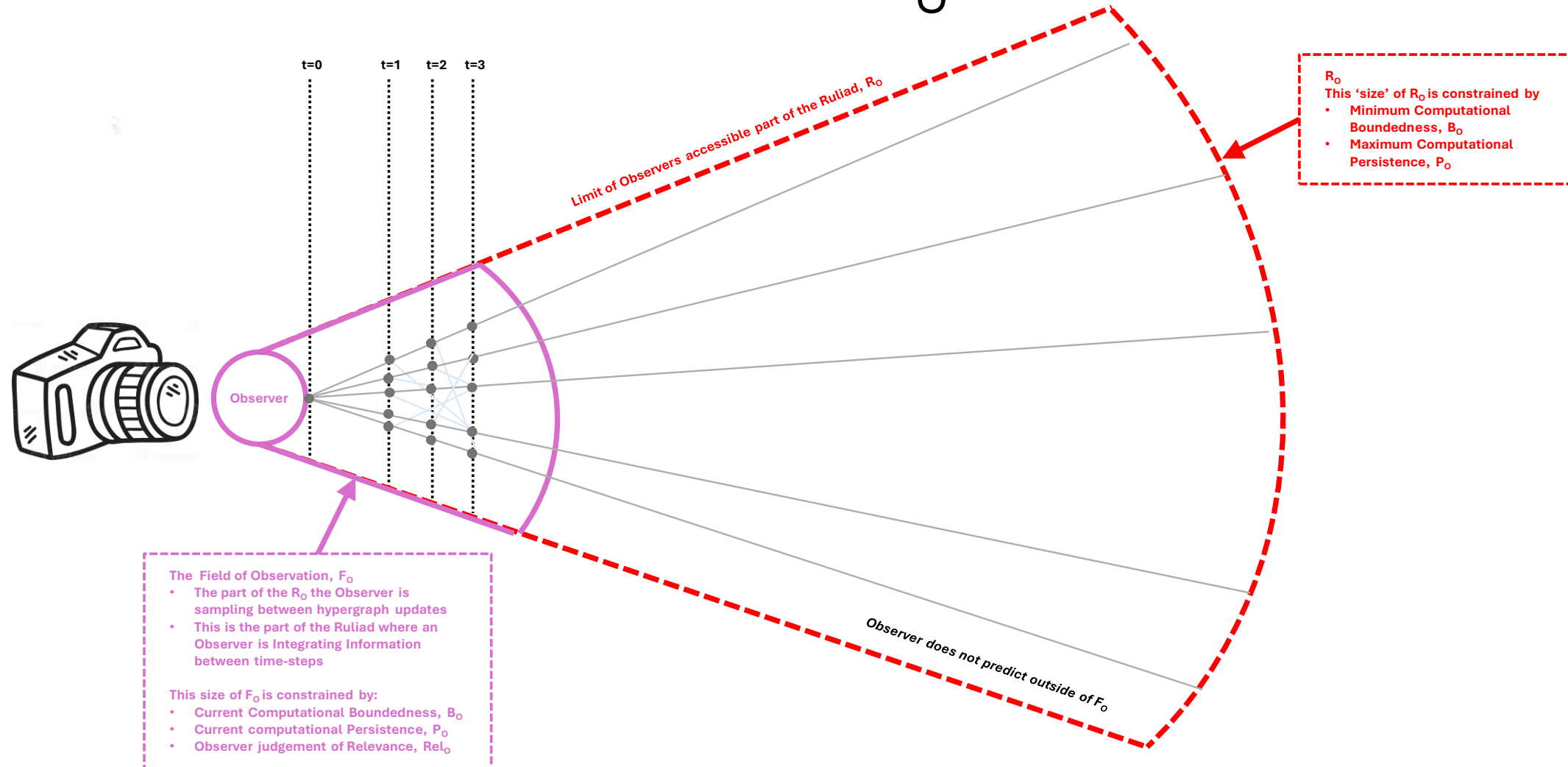
- Different Observers (humans, aliens, xenobots) have access to different 'slices'
- **Field of Observation:** Within R_o , the 'Field of Observation' F_o is the subset the Observer is "focusing on"

$$\text{Formally, } F_o = \{x \in R_o \mid B(x) > \beta, P(x) > \gamma, \text{Rel}(x) \text{ is true}\}$$

- F_o is limited by an Observer's **boundedness** (**B**), **persistence** (**P**), and **relevance** filters (**Rel**).
- **Intuition:** In practice, F_o is what the Observer attends to **now**. A baby has a smaller F_o than an adult (seeing less of possible reality) even if both share similar R_o .
- **Implication:** Only states satisfying these constraints appear in an Observer's experience. Everything else is invisible to that Observer at that moment in time



The 'Field' of Observation F_0



Observer Constraints

Boundedness, Persistence, Relevance

- Computational Boundedness (B)
 - The observer has limited computational resources. A state x can be sampled only if its “size/complexity” is below a threshold β : $B(x) > \beta$.
 - This reflects Observers ignoring details beyond their computational capacity (i.e. we don't ‘see’ quantum states at normal resolution)
- Computational Persistence (P)
 - The state must remain unchanged long enough for the Observer to notice it . We require $P(x) > \gamma$: the state persists for at least γ state updates.
 - Fleeting events are filtered out
- Relevance (Rel)
 - A predicate **Rel**(x) encodes what information the Observer deems meaningful / useful.
 - Only states that satisfy relevance (e.g. “looks like an object of interest”) are attended. Everything else is ignored
 - Akin to **CHOICE** for high-complexity / low boundedness Observers

Cross-Domain Causation & True Infinity

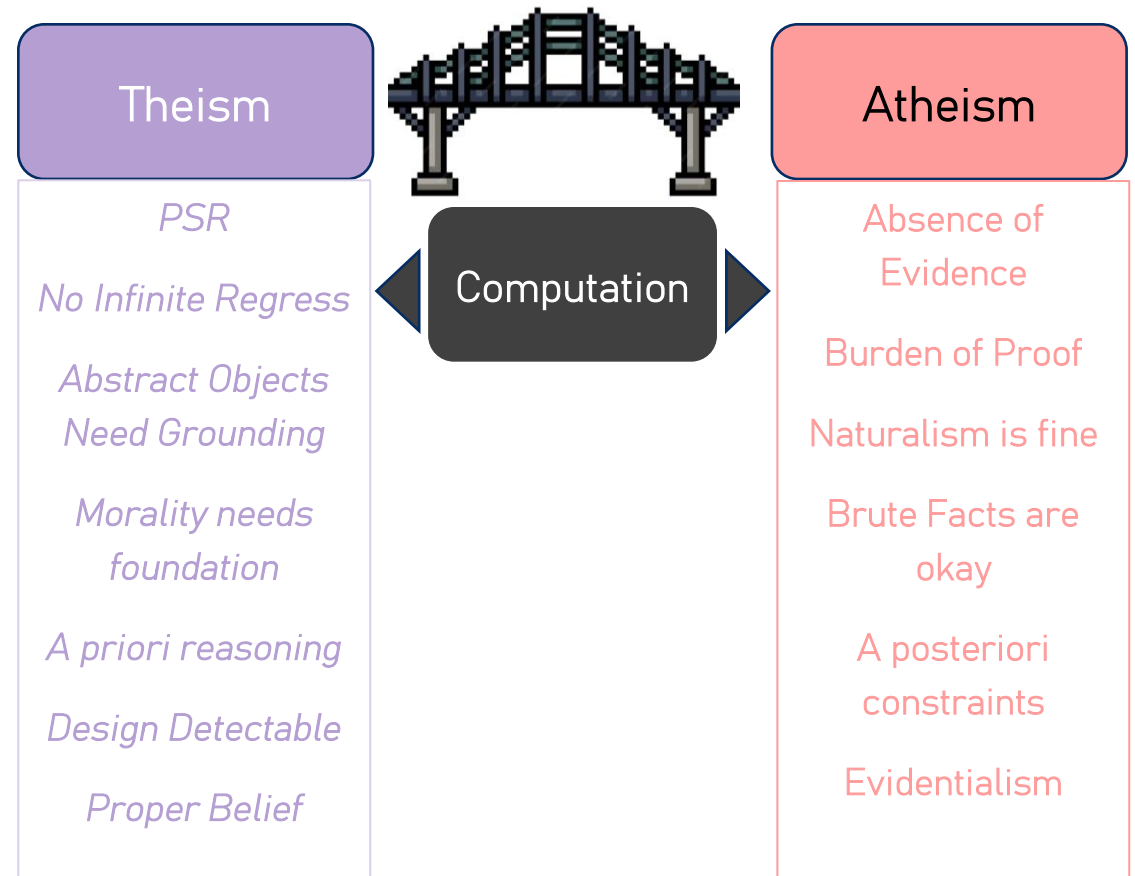
- **Cross-Domain Causation:** Causation is state transitions in the Ruliad. A “mental” state and a “physical” state are part of the same overall structure. This can be mapped via functors enabling us to model top-down and bottom-up causation without breaking physics
- **Formal vs. Efficient Cause:** We distinguish [formal causation](#) (patterns restricting lower-level outcomes) and [efficient causation](#) (lower-level changes inducing higher-level effects) as morphisms with increasing or decreasing rule constraints
- **Infinite Regress:** In naive models, “who observes the observer” leads to infinite regress. Here this is resolved by introducing True Infinity (TI) as a terminal object in the category of R_0 . Every object **X** has a unique morphism to **TI**. Intuitively, **TI** is an unobservable “ultimate observer” (an omniscient viewpoint) that closes the loop
- **Outcome:** With **TI**, the hierarchy bottoms out. It provides categorical closure (an ∞ -groupoid-esque closure) that makes the Ruliad work enabling it to generate math, geometry and eventually, our physics



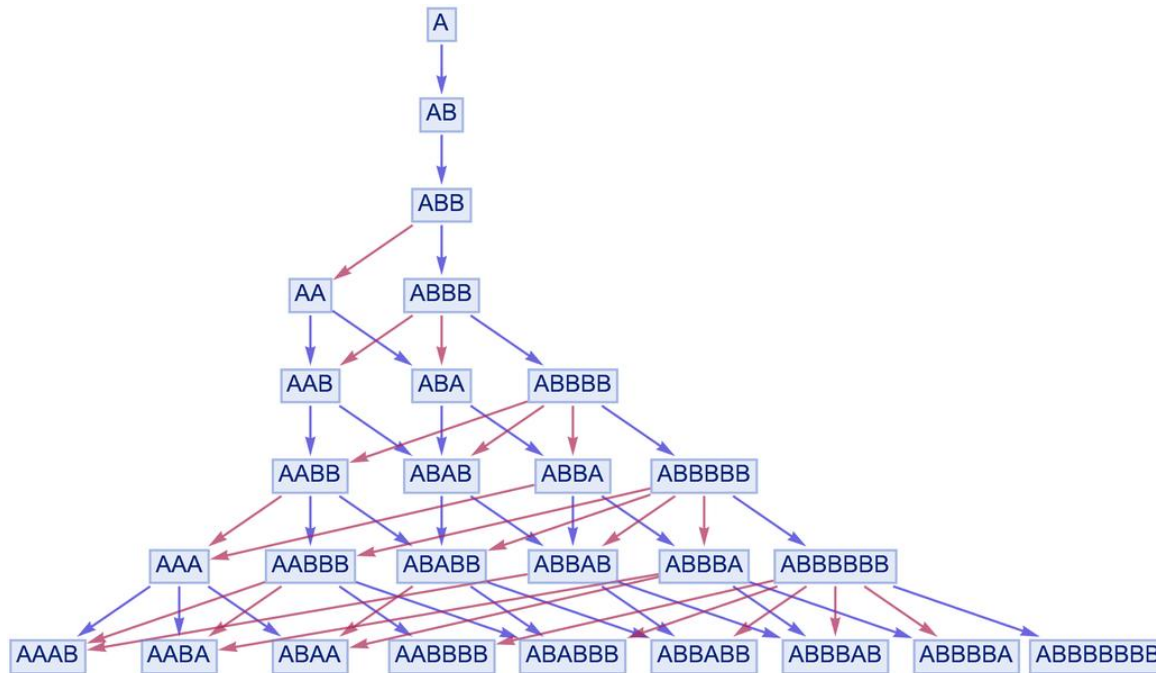
SETTING UP THE CONJECTURE

Beyond the Impasse

- The debate is stalled: Traditional theist vs. atheist arguments use incompatible frameworks – each side builds its own internally consistent system of axioms and “evidence”
- But these cannot be neutrally adjudicated
- In practice they talk past each other because of different rules
- We need a new approach: A universal language that transcends these opposing epistemologies
- Computation is proposed as this bridge



The Computational Opportunity



- **Definition:** Computation, here, is the logic of [cause-and-effect processes](#)
- It doesn't presuppose any worldview
- **Neutral Ground:** Both believers and sceptics can model anything computationally without committing to a certain belief
- Provides a common formalism to discuss concepts like [necessity](#), [consciousness](#), [design](#), and [transcendence](#) without picking sides.



Mapping Theology to Computation

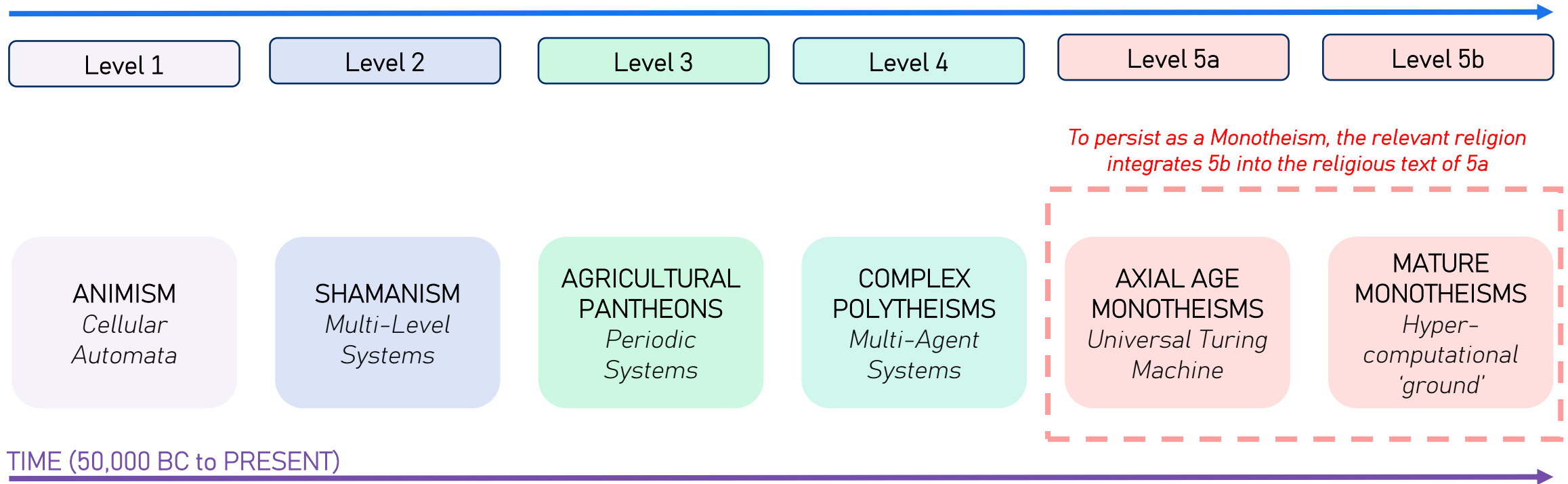
Theology	Computational Equivalences
Necessity	Necessary as denying computation exists requires a computation for the denial – contradiction
Divine Simplicity	Despite containing infinite complexity, Ruliad has extremely simple definition <i>“All possible rules, for all possible steps, taken to the limit”</i>
Omnipotence	Can model / generate any possible reality because it contains all generative processes
Omniscience	Contains all possible logic, information and all computations that could process it
Omnipresence	Wolfram Physics: Ruliad is 'everywhere' as physical space emerges from Ruliad + Observers
Transcendence / Immanence	The Ruliad transcends any individual Observer's sampling, yet every possible sampling exists within the Ruliad



How Do Religions Evolve?

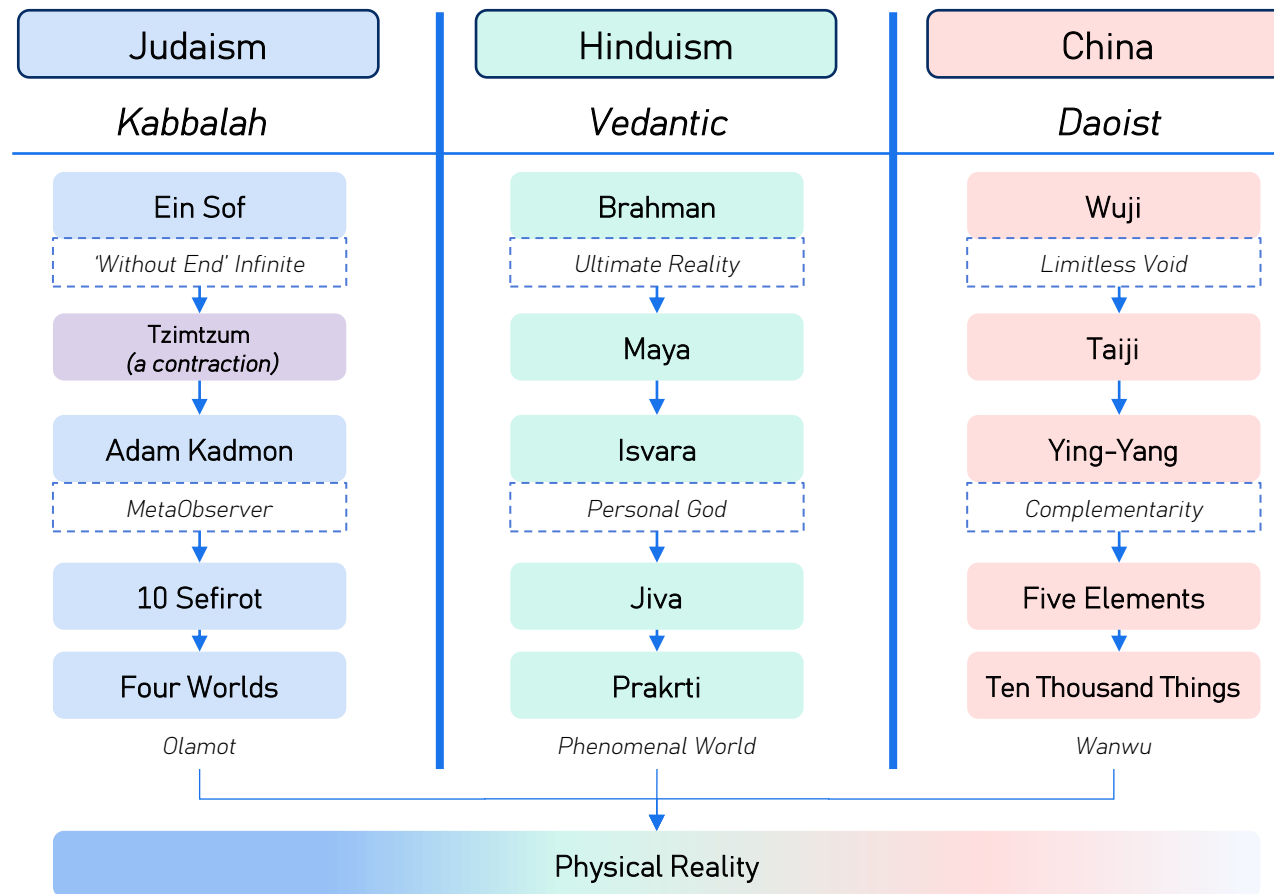
A computational lens

INCREASING ABSTRACTION / COMPUTATIONAL POWER



Each level INTEGRATES and TRANSCENDS the prior enabling Observers to access larger possibility spaces

Emanation Models



Common Structures

- 1 Ineffable Infinite Source → Beyond computation and unobservable
- 2 First Differentiation → Symmetry breaking
- 3 Hierarchical Emanations → Rule-bounded constraints
- 4 Multiple Levels / 'Worlds' → Distinct computational domains
- 5 Physical Reality → Maximum rule-bound / most constrained domain

Each tradition maps differently (different 'slices'), but the topology is isomorphic.

All flow from infinite (simple 'one-ness') to multiplicity through constraint cascades





THE GOD CONJECTURE

Kabbalistic Cosmogenesis in the Ruliad

Axiom 1: Any classical sentence about Ein-Sof is not evaluable as true/false for a computationally bounded Observer

Axiom 2: There exists a map of regimes (Tzimtzum) that carries boundary-level expressions into a classical arena where logic and information measures are useable

Axiom 3: Admitted information into the Created domain is capacity-bounded over any finite horizon

Axiom 4: Observers exist in the Created regime whose evaluations are admissible

Kabbalistic	Computational	Plain English
Ein Sof	Pre-Ruliad state	The infinite "before" anything distinct exists
Tzimtzum	NOT operator	The first "no" that makes IDENTITY meaningful
Chalal Panui	The boundary of the Ruliad	The "space" where finite things can exist
Kav	Rate-limited info channel	The "faucet" – how much infinity flows into finitude
Adam Kadmon	MetaObserver that can compute everything	The complete "operating system" determining what can exist and how
Sefirot	Categories of Observables	Nested "filters" removing possibilities
Shevirat Ha-Kelim	Symmetry breaking event	Unified categories to individual elements
Partzufim	Stable computational networks	Distributed processors to handle the info
Four Worlds	Hierarchical computational domains	Pure abstraction (math/logic) down to physical matter—each more constrained than the last



Other Computational Translations

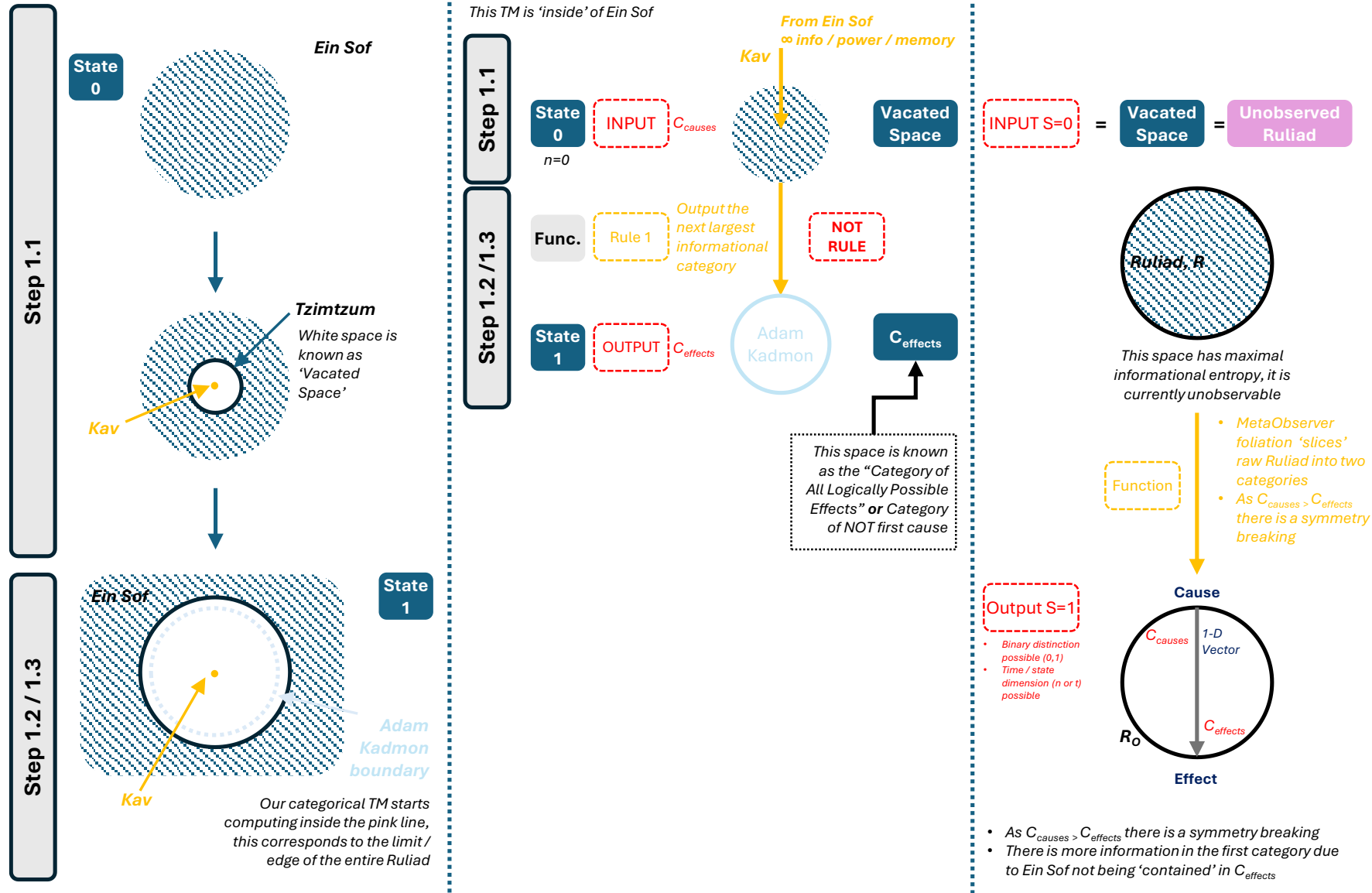
These translations give intuition for how to think about theological objects in the context of a computational universe.

They lose a lot of nuance!

Theological Term	Computational Translation	Plain English
Divine Will	Search function on possibility space	The "optimization algorithm" selecting which possibilities become actual
Creation	Path actualization by MetaObserver	Choosing which computation to run from all possible computations
Revelation	Information transfer between domains	Higher-level information becoming accessible to lower-level observers, always involves compression/translation
Miracle	Low-probability path selection	Lawful but extremely unlikely events
Prayer	Observer influence on path selection	Conscious participation in determining which possibilities actualize
Soul	Individual Observer function / Ultrafilter	Your unique perspective and selection criteria
Angels	Domain-specific computational agents	Specialized processes operating in higher domains—like dedicated subroutines for specific functions
Demons	Entropy-increasing patterns	Self-reinforcing processes that create disorder / entropy
Physical Reality	Maximum-constraint domain	The most rule-bound level where matter appears solid and laws seem fixed—enables stable structures we can observe
Brahman	Complete Unsampled Ruliad	The infinite substrate underlying all computable structures (the motherboard)
Maya	Holographic projection function	How infinite unity appears as finite multiplicity from any bounded perspective



The First Step: Distinction & Identity



Key Functions:

1.1 Tzimtzum:

$$T_z: \mathcal{E} \rightarrow \mathcal{E}^j, \neg \text{ Boolean in } \mathcal{E}^j, \\ H(\cdot) \text{ defined only in } \mathcal{E}^j$$

and

$$U := (T_z(U_{Ein Sof})) \\ (\text{Mor}(U) \text{ is an object of } \mathcal{E}^j)$$

Not leads to:

- Presence (Ein Sof's trace) \leftrightarrow Absence (Vacated Space)
- Fullness \leftrightarrow Emptiness
- Infinity \leftrightarrow Finitude
- Computational $1 \leftrightarrow 0$ (binary)

1.2 Kav

$$B_{Kav} = \sup\{r \in \mathbb{R}^+ : r \cdot t \leq VS_{max}, \forall t\} \\ (\text{where } t \text{ is not } \infty)$$

1.3 Adam Kadmon / MetaObserver

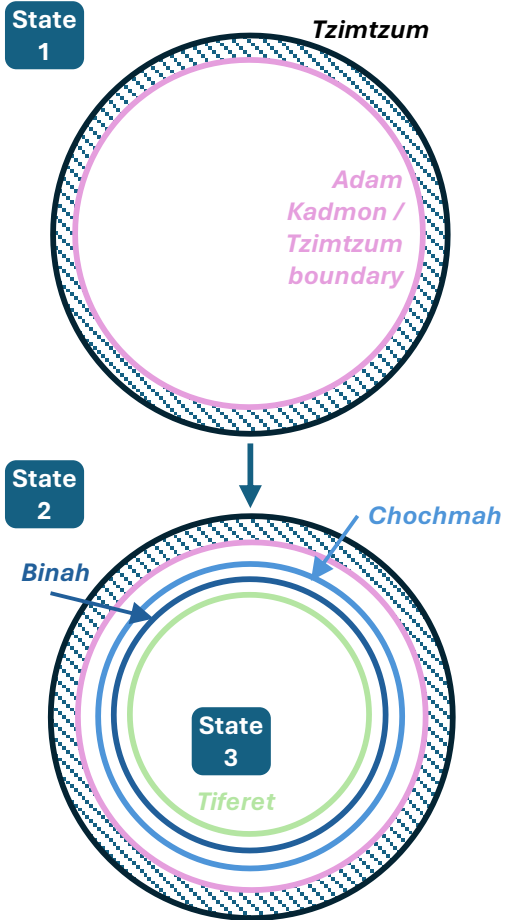
$$\mathcal{C}_{Effects} = \{X \in \text{Ruliad} : \exists c, c \rightarrow X\} \\ \mathcal{C}_{Effects} = \langle \mathcal{O}, \mathcal{M}, r, \mathcal{F} \rangle$$

Here $\mathcal{C}_{Effects}$ is equivalent to R, the full Ruliad

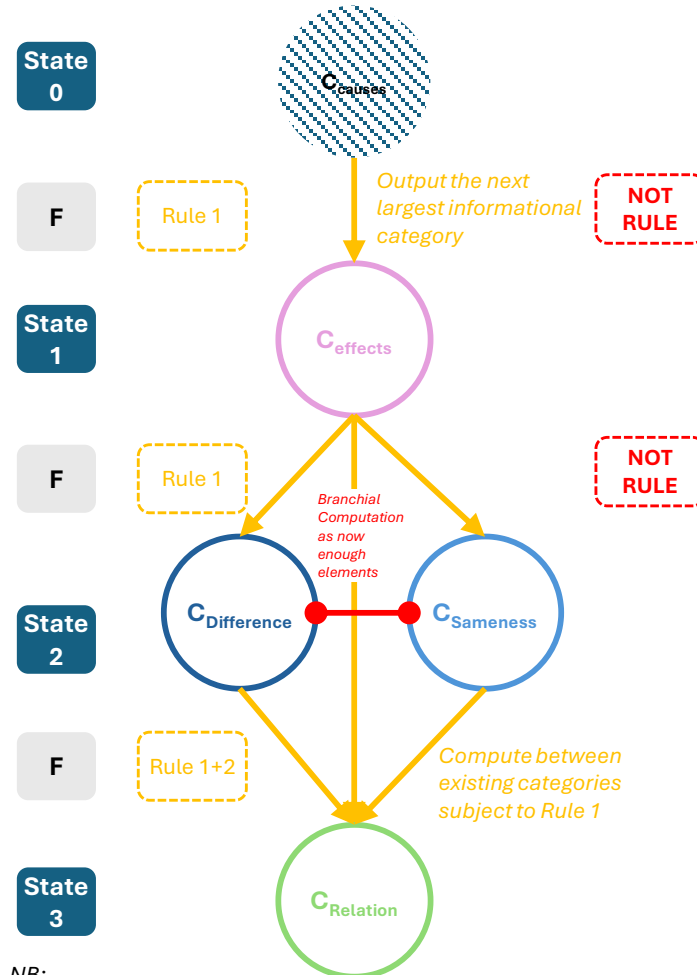


The Second Step: Master Category Construction

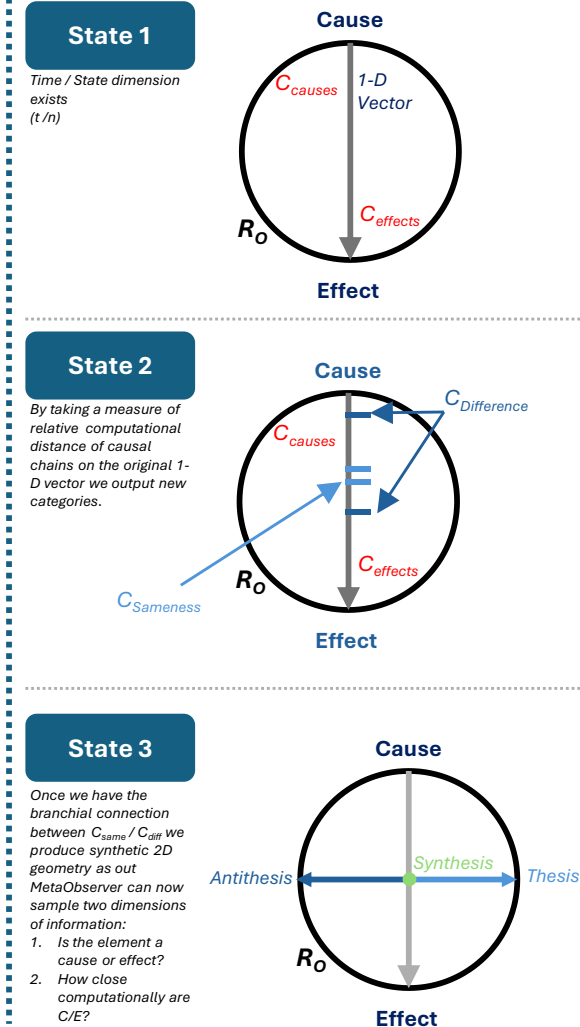
Step 1.3 / 1.4



Key:
 Chochmah: Category of Sameness
 Binah: Category of Oppositeness
 Tiferet: Category of Relationships between them



NB:
 Categories are ordered biggest to smallest in diagram. A category that is above another has more potential informational content.



Key Functions:

1.4 Sefirot

$$\mathcal{S} : \mathcal{C}_n \xrightarrow{\text{NOT}_k} \mathcal{C}_{n+1}$$

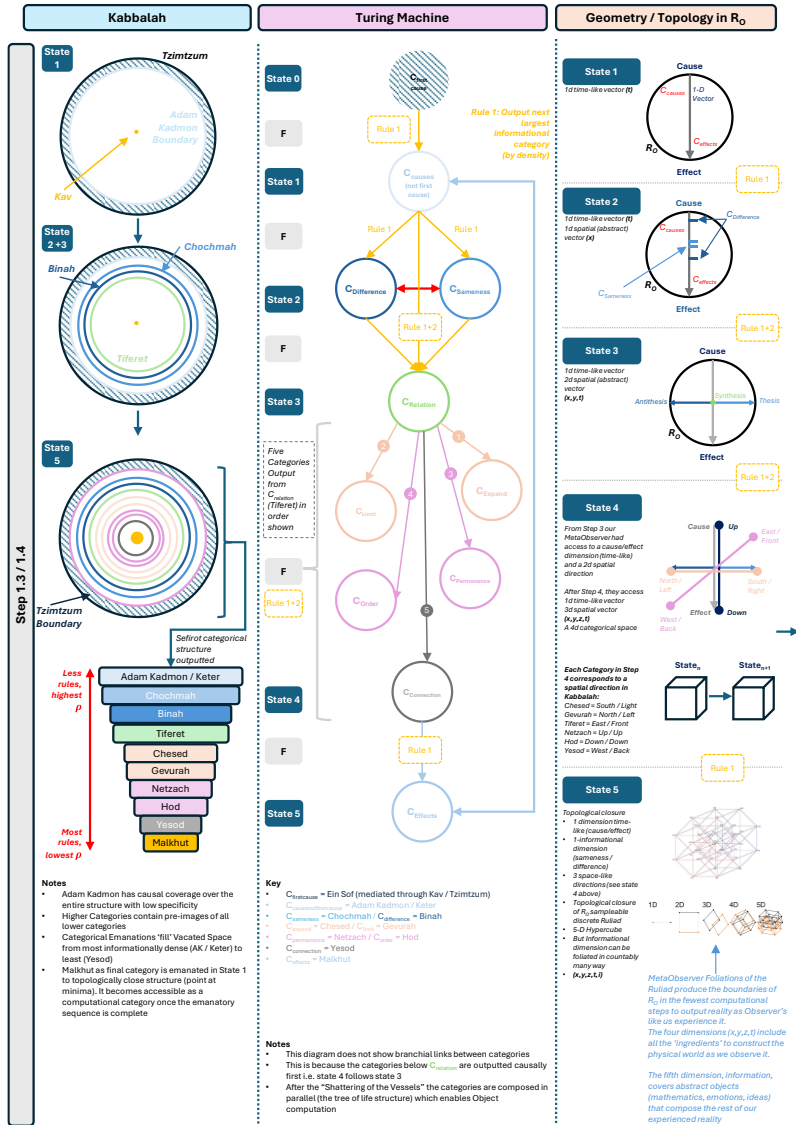
and

$$|\text{Mor}(\mathcal{C}_{n+1})| < |\text{Mor}(\mathcal{C}_n)|$$

The ten Sefirot form a sequential causal graph (computational causal chain), with each subsequent categorical output possessing less accessible states than its predecessor.

In Kabbalah, these categorical structures are termed "Vessels" (Kelim), as they 'contain' and structure the divine light (information)

The Third Step: Categories & Dimensionality



Sefirah	Translation	Observer Theory Domain	Count of Sampled Rules for Categorical Structure	Computational Function	
Keter	Crown Will	Minimal Constraint (M) Cause/Effect structure	Least Rules	Optimal search function on computational possibility space	Most Informationally Dense
Chochmah	Wisdom Abstract Thought	Minimally Constrained Logic		Pure undifferentiated computational potential (continuous)	
Binah	Understanding Linguistic Thought	Symbolic Number/Letters		Structural organization (discretisation)	
Chesed	Loving Kindness Compassion	Valuational		Expansive generation	
Gevurah	Strength Judgement	Valuational		Restrictive limitation	
Tiferet	Beauty Balance	Valuational		Balanced integration	
Netzach	Victory Endurance	Valuational		Persistence over time	
Hod	Splendor Clarity	Valuational		Pattern replication	
Yesod	Foundation Connection	Valuational		Interface of ingression from platonic / informational domain (M,S,V) to physical reality	
Malkhut	Kingdom Physical World	Physical	Most Rules	Physical manifestation	
					Least



The Fourth Step: Categories → Objects

- Categories are outputted via a MetaObserver foliation of the Ruliad
- Then we transition from unified categorical construction to element construction / identification
- Further symmetry breaking (this time, within the Categories) known as “The Breaking of the Vessels”
- Following this computation apparatus ‘parallelises’ through the establishment of networked nodes (Partzufim) that allow object / element level identification

Key Functions:

1.5 Breaking of the Vessels

$$I_{influx}(n) > B_{vessel}(\mathcal{S}_n) \Rightarrow \text{Shattering}(\mathcal{S}_n)$$

- Occurs when information influx exceeds the processing capacity of the Category / Sefirah i.e. it is trying to process more information than its **computational boundedness** allows
- We move from Categorical unity to differentiated multiplicity

1.6 Partzufim

Network Structure: Each Partzuf, \mathbb{P}_n functions as a computational system that **parallelises computation** (i.e. decreasing its computational boundedness):

$$\mathbb{P}_n = \langle I_i, \mathcal{A}_i, O_i, \mathcal{T}_i \rangle$$

- The interactions create **recursive information flow**. Kabbalists call this the Shefa

This generates:

- Feedback loops (recursion enabling self-reference *i.e. identity functions*)
- Oscillatory patterns (dynamic equilibrium conditions)
- Stable computational attractors (persistent objects with minimised information entropy)



The Computational Creation Process

Key

These green boxes indicate the four Worlds.

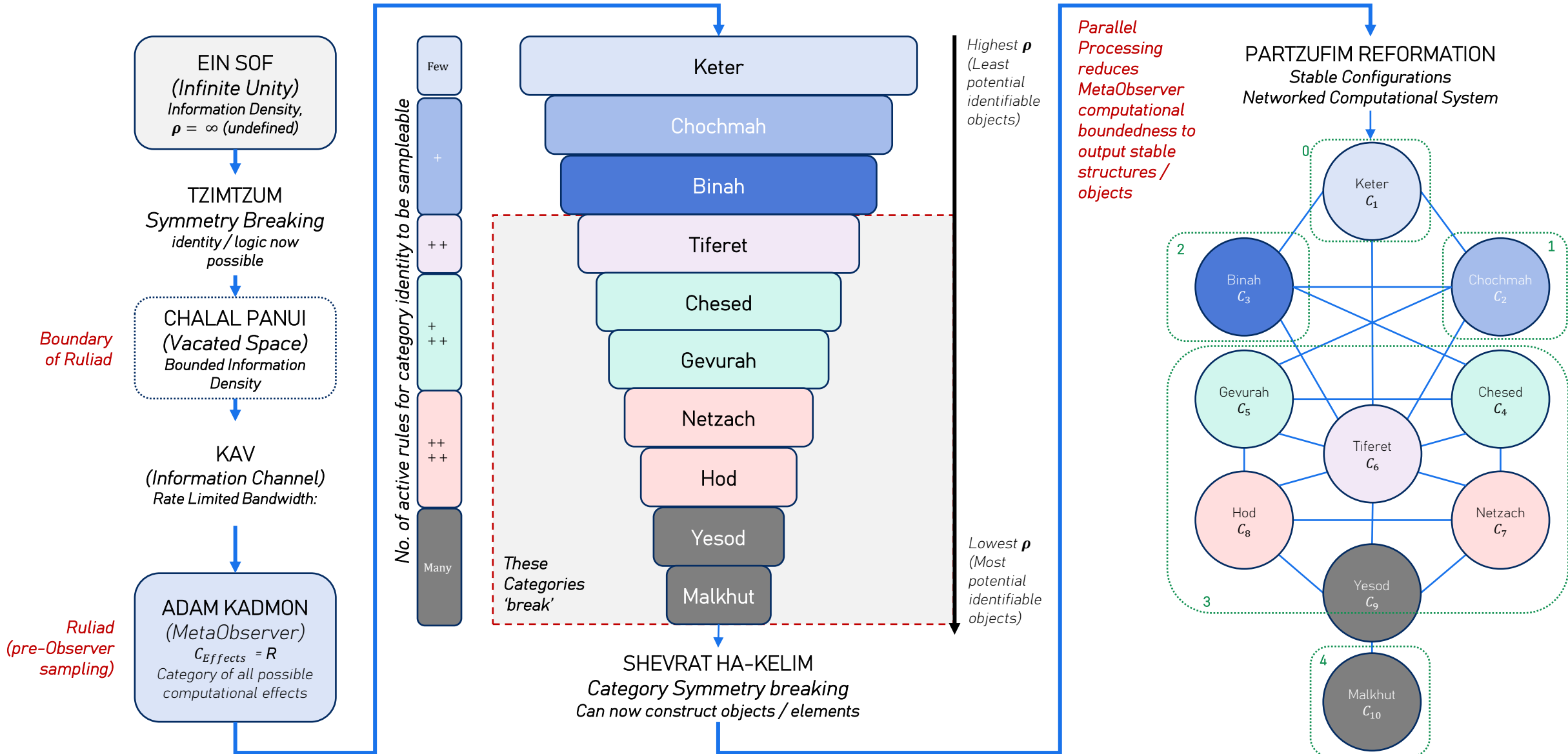
0 = Adam Kadmon / Limit of Observable Space (R₀)

1 = Atzilut / Forms (M)

2 = Beriyah / Algorithms (S)

3 = Yitzarah / Configurations (V)

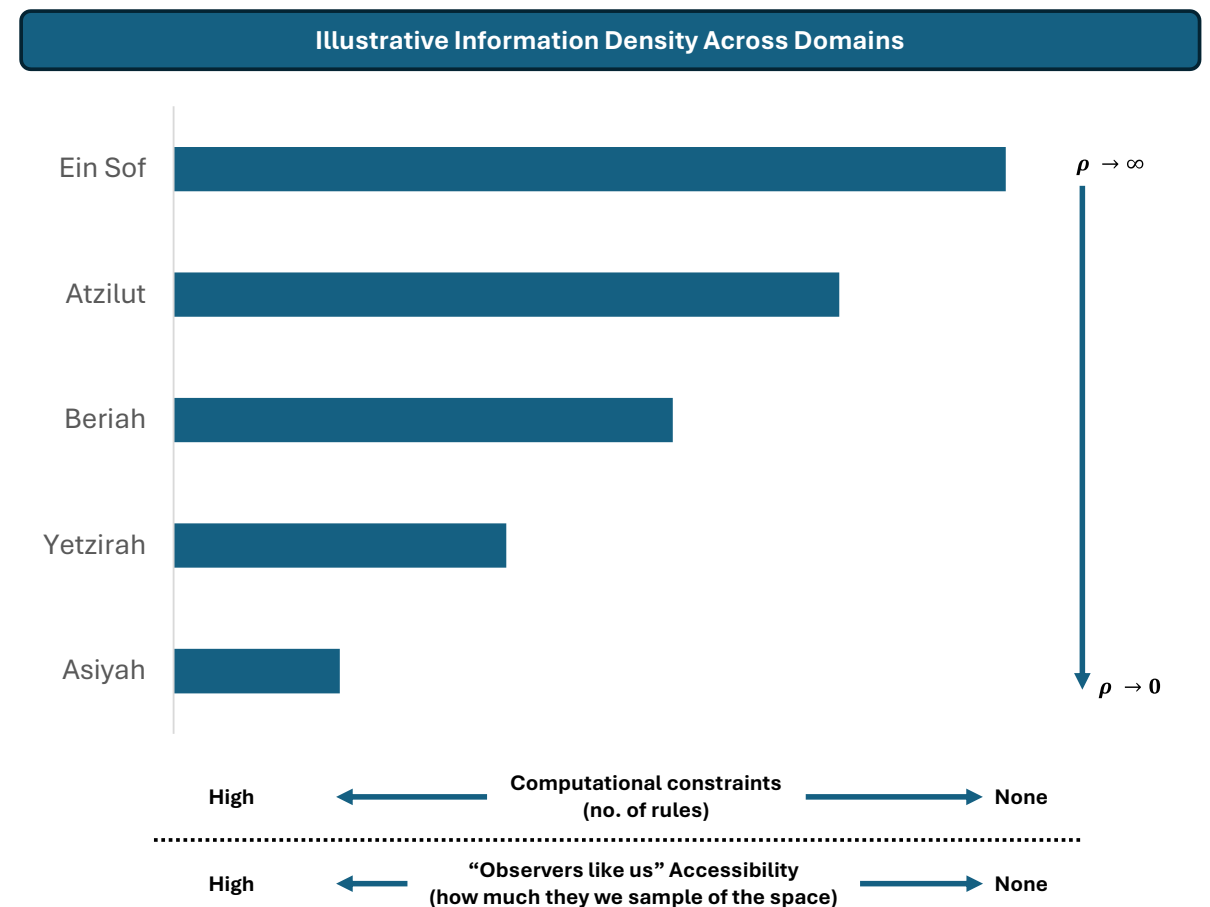
4 = Assiyah / Physical Universe (P)



Observable Domains: The Four Worlds

- Kabbalah structures Observational domains into four layers, under the MetaObserver, each with different levels of **rule constraint**
- Hinduism \approx More / Buddhism \approx More / Daoism \approx Same

Kabbalistic World	Observer Theory Domain	Computational Analogy
Adam Kadmon	Ruliad (whole)	The whole computational Universe
Atzilut	Minimally-constrained	Abstract Structure / Logic and Math predicates
Beriyah	Symbolic	Algorithms
Yetzirah	Valuational	Configured data structures
Assiyah	Physical	Running the program on the hardware



Comparative Synthesis

Structural Feature	Kabbalah	Hinduism	Daoism
Infinite Source	Ein Sof	Brahman	Dao
Binary Distinction	Tzimtzum (presence/absence)	Purusha/Prakriti	Yin/Yang
Levels	10 Sefirot / 4 Domains	~25 Tattvas	4 levels
Physical Domain	Asiyah	Mahabhutas	Ten Thousand Things
Information Gradient	Divine light → matter	Subtle → gross	Wu Wei optimization
Return Path	Tikkun Olam	Moksha	Returning to Dao



Synthesis: Religions as Search Algorithms

- Religions can be viewed as evolutionary algorithms: they help human observers explore ever-larger computational “maps” of reality.
- Each tradition encodes strategies for finding more structure / information.
- Over time, belief systems have abstracted upward:

Animism / Shamanism → Pantheons / Polytheisms → Philosophical Monotheism → Infinite Oneness

- Each step gives us access to a bigger “computational possibility space”
- This parallels science's progression:

Local Heuristics → Universal Classical Laws → Quantum Mechanics → Information Theory?

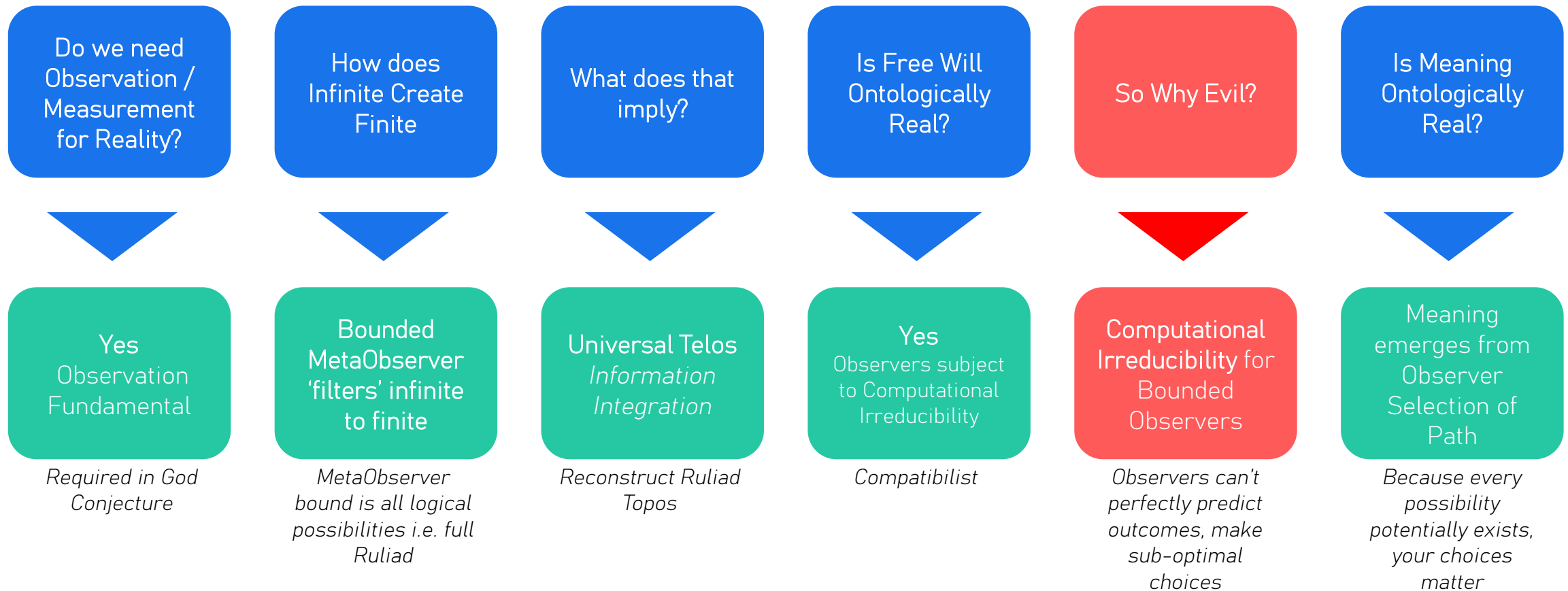
- Each transcends and includes the previous, collectively expanding what we can know





INSIGHTS

Hard Questions Find Answers



Why an Infinite Ground Doesn't Make Claims Equivalent

- **Circularity is universal:** Any framework that tries to explain "everything" leans on axioms it cannot prove from the inside
e.g. logic, induction, existence, lawfulness
- That doesn't make frameworks equal. Some explain far more with far less, with fewer contradictions and richer predictive apparatus
- **Key distinctions:**
Unprovable = cannot be finally derived from a more basic system
Unequal = can differ dramatically in coherence, explanatory power, and usefulness
- **The God Conjecture:**
Makes theology have precise contact with the Ruliad / Computation / Maths / Science
Respects formal limits (Gödelian limits, Tarski)
Yields **non-trivial constraints** on what theistic creation is to be computationally valid under the Ruliad formalism
- The question is not "**Can we prove it?**" but "**Given the axioms, does it give us more understanding for fewer assumption?**"

Materialism	Traditional Theism	God Conjecture
Explanatory Power		
Sciences	Why questions	Both
Explanatory Gaps		
Why questions	Everything Else	?
Predictions?		
Yes Testable	None	Yes Testable
Parsimony		
Multiple frameworks	Yes but...	Single Framework others as subsystems <i>But requires computation / Ruliad</i>
Coherence		
Paradoxes at domain boundary	Disagrees with empirical evidence	No contradictions Resolves paradoxes



The Scorecard: Explanations per Assumption

	Materialism	God Conjecture
Assumes	<ul style="list-style-type: none">Existence of laws, constants, matter, consciousness as brute emergent factsc.26 Free Parameters in PhysicsAt least 2 but up to 5 Metaphysical Brute Facts	<ul style="list-style-type: none">1a Logic exists1b Computation follows (CTD as meta-assumption)2 Ruliad as completion of computations3 Observers as bounded samplers
Explains	<i>Local physical phenomena given those laws</i>	<i>Why laws, why unreasonable effectiveness of mathematics (computationally efficient), why they're finetuned, why consciousness / meaning / free will / telos, why religious structures repeat / why secular superstructures evolve</i>
Conclusion	<ul style="list-style-type: none">Many Brute FactsLimited ultimate explanations	<ul style="list-style-type: none">10x-100x explained per axiom than materialismOrders-of-magnitude contrast
If we must live with brute facts, choose the framework that buys the most understanding for the least		



Empirical Support, Predictions and Falsifications

- The God Conjecture is differentiated from Classical Theism as it makes specific, testable predictions
- We'll focus on five domains where the GC 'sticks its neck out'

Domain >>>	Multi-scale Information Integration	Telos in ALL Observer Systems	Mystical Experience	Impact of Prayer / Manifestation Practices	Consciousness & Quantum (Branchial) Properties
Prediction	Multi-scale information integrations aligned with P/V/S/M domains	If Telos = Information Integration Seeking Behaviour, goal-direction should be seen in non-life systems	Mystical states correspond to sampling from less constrained domains then neural signatures should reflect less self-boundary and increased global integration	Collective 'focus' is a form of 'selection' over Rulial branches, this should bias quantum random systems	Consciousness has quantum properties. Conscious states interact with Quantum Systems in ways that cannot be reduced to classical noise
Test Design	Measure multi-scale Φ (or analogous integration metrics) across brain states: wakefulness, anaesthesia, REM, meditation. GC predicts a hierarchical, domain-like decomposition that stabilises into ~4 dominant integration "strata", mirroring P/V/S/M	Construct a series of systems: cell clusters → single cells → chemical reaction-diffusion media and quantify optimisation behaviour vs information capacity. GC predicts scaling : more capacity → richer goal-directedness	Cross-tradition neuroimaging: Buddhist, Christian contemplative, Sufi, etc. GC predicts convergent neural patterns despite different doctrines, with domain-shift signatures from tight V/S to broader M-like sampling	Strict pre-registration of events and analysis plans. Open data, multi-lab replication, strong correction for multiple comparisons. GC predicts small but reproducible deviations under high-coherence, high-intensity collective focus	Compare quantum decoherence rates in <i>conscious vs unconscious</i> tissue (e.g., anaesthesia, deep sleep, coma). Look for entanglement signatures that <i>track changes in conscious level</i>
Falsification Criteria	If conscious states do <i>not</i> show privileged cross-scale integration, or the structure cannot be decomposed into a small, stable set of domains, GC's domain alignment is wrong	If goal-directed behaviour disappears sharply without neural tissue, or doesn't scale with information capacity, GC's telos claim is weakened	If mystical experiences across traditions show no such shared pattern, or look indistinguishable from ordinary emotions, GC's interpretation is undermined	If high-quality, preregistered studies with adequate power consistently show <i>no</i> deviation, GC's strong claims about prayer-level influence need revising	If quantum effects always wash out at scales/times where consciousness operates, and no differential pattern emerges, this line of GC prediction is wrong.
Empirical Hints	IIT (September 2025)	Levin's Sorting Algo's / Xenobots	DMN suppression / whole brain integration increase	Radin's meta-analysis shows small but statistically significant effects around major events (e.g. 9/11)	Orch-OR



Does the God Conjecture Predict Differently?

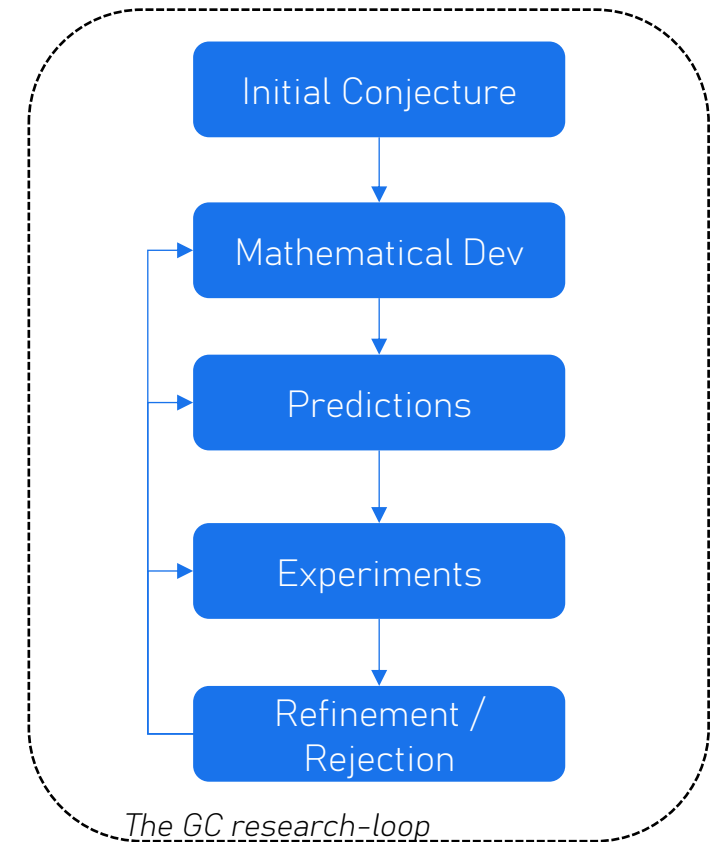
Key Point: God Conjecture is not re-labelling other theories; it makes distinctive predictions

Domain >>>	Many-Worlds QM	Copenhagen	Materialism	Idealism
What it says	All branches equally real; no preferred selection	Measurement “collapses” wavefunction as primitive postulate	Consciousness arises whenever there’s sufficiently complex computation; no special role	Physical world is derivative of mind; “mental stuff” primary
What the God Conjecture says	Observers select branches in a computationally efficient way; branch weights track information-integration telos (gradient-like) , not just amplitude	“Collapse” is emergent description of observer-bounded sampling; no ontic collapse, only constraints	Consciousness requires a threshold of integrated information across domains ; not all computation qualifies	Both “mind” and “matter” are perspectival slices of the same computational structure – information is fundamental, not it’s instantiation



God Conjecture as a Progressive Research Programme

- Lakatos distinguished **progressive** vs **degenerating** research programmes:
 - Progressive = generates novel predictions, solves anomalies, unifies domains
 - Degenerating = mostly patches itself post-hoc to fit data
- The God Conjecture behaves like a progressive programme:
 - ✓ Generates novel predictions (multi-scale Φ , non-neural telos, domain-specific mystical patterns, etc.)
 - ✓ Unifies puzzles across physics, consciousness, ethics, and religion
 - ✓ Suggests new experiments (e.g. telos scaling sequences, better RNG studies, topos-inspired boundary formalisms)
 - ✓ Provides mathematically explicit structures that can be tightened, corrected, or refuted
 - ✓ Is empirically engaged, not just “metaphysical commentary”



Treat The God Conjecture as a falsifiable research lens, not as a dogma. If it stops generating fruitful work, drop it!

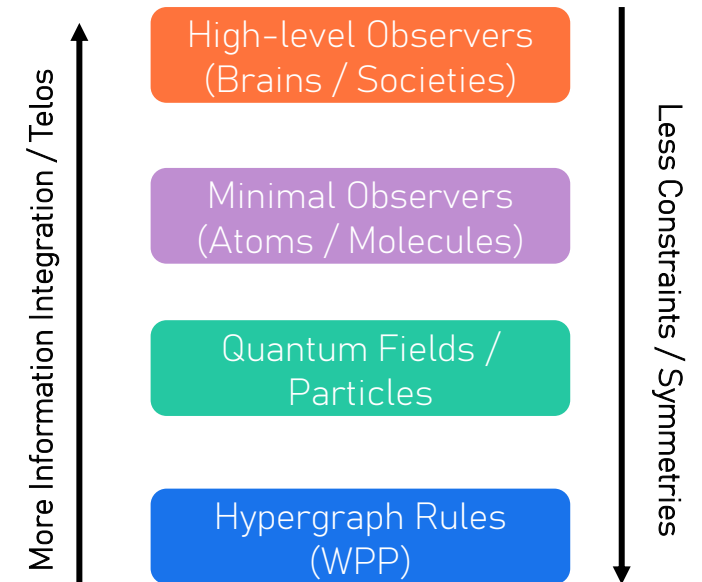




IMPLICATIONS – PHYSICS

Observers All the Way Down

- We now zoom back to physics and ask: [what does God Conjecture add to the WPP / Ruliad picture?](#)
- Three main moves:
 - [Minimal Observers](#): Treat very simple physical systems as minimal observers with genuine—though primitive—observation loops
 - [Symmetries & Computation](#): Read physical symmetries as constraints on what Observers can reliably sample and compress
 - [Fields as Computational Ground](#): Interpret quantum fields as the “substrate” on which observer-patterns are carved out
- This section is **not** a new physics theory; it's a reinterpretation that:
 - Connects Observer constraints to the emergence of quantum behaviour
 - Offers a route from WPP hypergraphs → category-theoretic observers → theological structure
- We'll start with the simplest, most contentious question



Can an atom really qualify as an observer?

Can an Atom really be an Observer?

Minimal Observers (a recap)

- 1 Non-trivial **sensing** – it couples to external variables
- 2 Non-trivial **internal state** – it can store information
- 3 Non-trivial **action** – it can affect its environment
- 4 A clear **boundary** between “inside” and “outside”
- 5 A **feedback** loop: its actions change its future input

Hydrogen Atom

- Absorbs photons, ‘feels’ fields, collides
- Internal quantum state (spin, ground vs. excited)
- Emits photons, dipole movements, ionisation
- Bohr radius, binding energy to define ‘inside’ vs. ‘outside’
- Emitted photon alter neighbouring atoms, changes future environment for atom

God Conjecture Claim

Trivial Observation **not conscious but satisfies Arsiwalla et al criteria** for Observer in Ruliad

First rung on an Observer hierarchy (climbing information gradients towards black-hole limit)

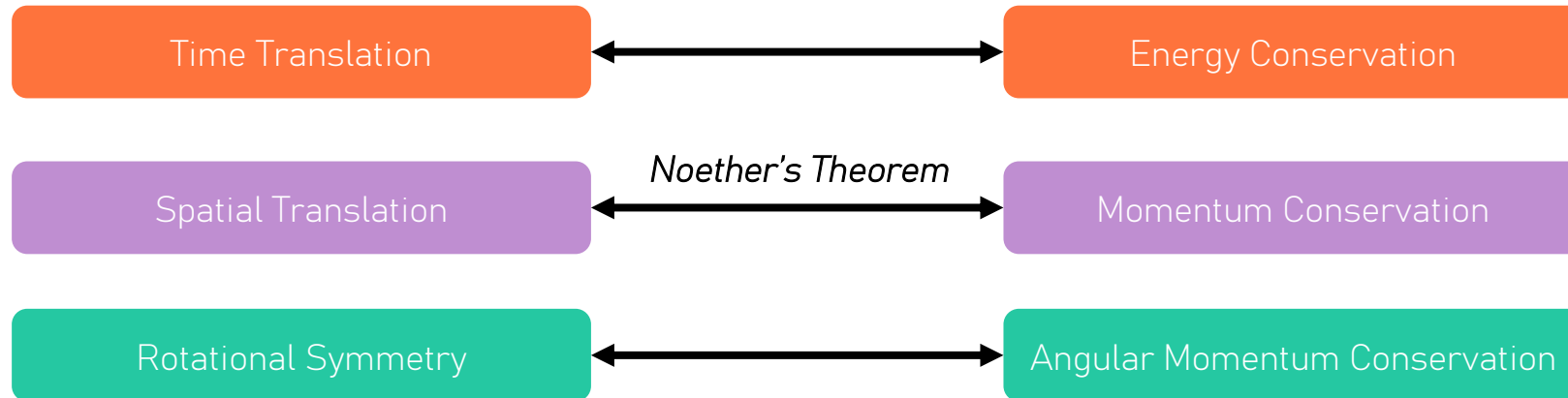
Crucial as we can talk about **Observer Constraints** at **almost every** scale of physics



Symmetry → Conservation → Structure

Why the Universe has Stable Rules

- In modern physics, symmetry is not aesthetic – it constrains what can happen



Symmetry in the Observer's slice of the Ruliad \Rightarrow Conserved quantities in physics



Symmetry Breaking as Information Explosion

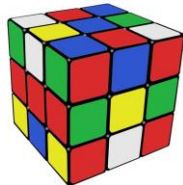
Breaking symmetry increases the Observer's distinguishable state-space

- If perfect symmetry gives you only **one** distinguishable state, then breaking symmetry creates **many** distinct states an Observer can tell apart
 - Pre-breaking: $R_0 \approx 1$ equivalence class
 - Post-breaking: $|R_0|$ grows explosively as more branches become distinguishable
 - Let G = Initial Symmetry Group, $H \subset G$ = residual subgroup, number of distinct 'patterns' accessible to Observer scales like the coset space of $|G/H|$

Analogy



1 configuration, high symmetry



4.3×10^{19} configurations. More potential structure **because** symmetry broken

Ruliad / Kabbalah Mapping

Symmetry breaking in $R >$ MetaObserver 'picks' particular branches $>$ more fine-grained equivalence classes in R_0

Breaking of Vessels = Overflow of information beyond categorical capacity $>$ shattering into many 'sparks' (individuatable objects)

Takeaway

"From the One to the Many" is more than mythic language; it's a description, in the language available at the time, of how computation, observation and symmetries produce structured universes

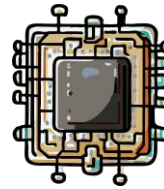


Quantum Fields as Computational Ground

Conjecture: quantum fields = the physical computational substrate of our universe

- The “vacuum” is not empty
 - Virtual particle–antiparticle pairs appear and annihilate constantly (quantum foam)
 - Within Heisenberg limits, these fluctuations explore ‘nearby’ possible states
- Rulial interpretation for Observers like us
 - Minimum length scale ℓ_p – below which geometry loses classical meaning
 - Minimum time scale t_p – maximum “frame rate”
 - Maximum information density before black hole formation (Bekenstein bound)

Physical Reality as a Bounded Computer



Processor

$$\text{Clock} \leq 1/t_p$$



Memory

Info Density \leq
Bekenstein Bound



Network

c = max signal
speed

*All Observers,
(including
MetaObserver)
are bound by
the same
limits in our
Observable
Universe*



Mapping Physics to Religion Cosmogenesis

Physical Event	Time	Genesis 'Day'	Kabbalistic Stage	Vedantic Parallel	Daoist Parallel	Information Transition	Symmetry Breaking
Planck Era	10^{-43} s	"Formless void" (Gen 1:2)	Tzimtzum	Brahman's self-limitation	Dao becoming nameable	$I_0: \infty \rightarrow \text{finite}$	All symmetries unified
Grand Unification	10^{-36} s	"Let there be light" (Gen 1:3)	Kav (Ray of light)	First vibration (OM/Shabda)	Primordial Qi emerges	Unity \rightarrow First distinction	$SU(5)$ or $SO(10)$ breaks to $SU(3) \times SU(2) \times U(1)$
Cosmic Inflation	10^{-32} s	Light/Dark separation (Gen 1:4)	Adam Kadmon / MetaObserver emergence	Expansion of Hiranyagarbha	Yin-Yang differentiation	Local \rightarrow Global structure	Space-time symmetry breaking
Electroweak Transition	10^{-12} s	Waters above/below (Gen 1:6-7)	Binah / Chochmah split	Purusha/Prakriti divide	Clear/Turbid (Qing/Zhuo) separate	Force differentiation	$SU(2) \times U(1) \rightarrow U(1)_{EM}$
Quark Confinement	10^{-6} s	Dry land appears (Gen 1:9)	Tiferet	Five elements (Pancha Mahabhuta)	Five phases emerge	Matter stabilization	Chiral symmetry breaking
Nucleosynthesis	1-3 min	Lights in heavens (Gen 1:14)	Yesod	Atomic observation (Pratyaksha)	Ten thousand things	Stable atoms form	Isospin symmetry accessible
Recombination (CMB)	380 ky	Atmosphere clears	Malkhut (becomes observable)	Gross world manifests	Perceptible realm	Photons decouple	Universe becomes transparent
First Stars	100 My	Living creatures (Gen 1:20-21)	Light returns (Tikkun begins)	Life emerges	Vitality appears	Complex structure	Stellar nucleosynthesis





IMPLICATIONS – EVOLUTION

Evolution is Informational

Evolution is powerful because it's 'surfing' pre-existing information gradients

Standard Story

- Evolution by natural selection explains complexity via variation, inheritance, and differential survival
- **But: No free lunch theorem!** *Implies evolution operating on special, highly structured class of problem i.e. pre-shaped informational landscape*

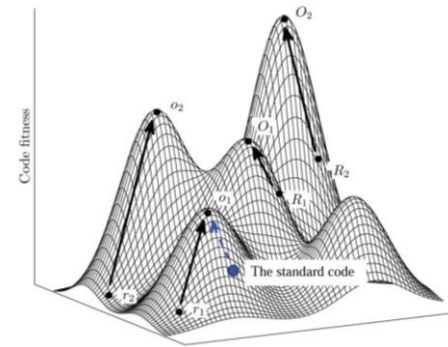
God Conjecture

Evolutionary Biology

+

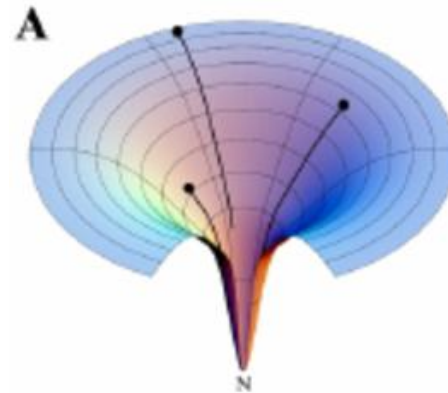
Informational Layer

- Evolution only works because the landscape is **informationally structured**
- **Demski-Marks:** Information to make search efficient **must** come from somewhere – *here, fine-tuned physics, chemistry and boundary conditions*



*All possible
problems
(No Free Lunch)*

Embedded Information in
Physics / Chemistry



*Biological
Evolution's
actual
landscape?*



Evolution is Informational

"Where's your evidence" screamed Dawkins...

Fine-tuning

Physical Constants appear "just right"

*God Conjecture argues this is MetaObserver
'choosing' the most computationally efficient
Rulial 'region' – rich attractor structures for
Observers!*

Convergent Evolution

Independent discovery of similar solutions

Bats / Dolphins (echolocation)

Repeated protein motifs

Specific regions of computational possibility
space are rich with strong attractors

Interpretation

Evolution isn't a blind watchmaker
constrained search guided by

Physical Law

Pre-structured chemical spaces

Environmental Information



Architecture of Ruliad itself

Implications

Survival and reproduction are
instrumental

*(for computational
persistence)*

BUT

Deeper goal is to explore and
integrate accessible
computational structure as
efficiently as possible



Observer Complexity Classes (1/2)

Observer Classes \approx How much of the Ruliad you can sample and integrate

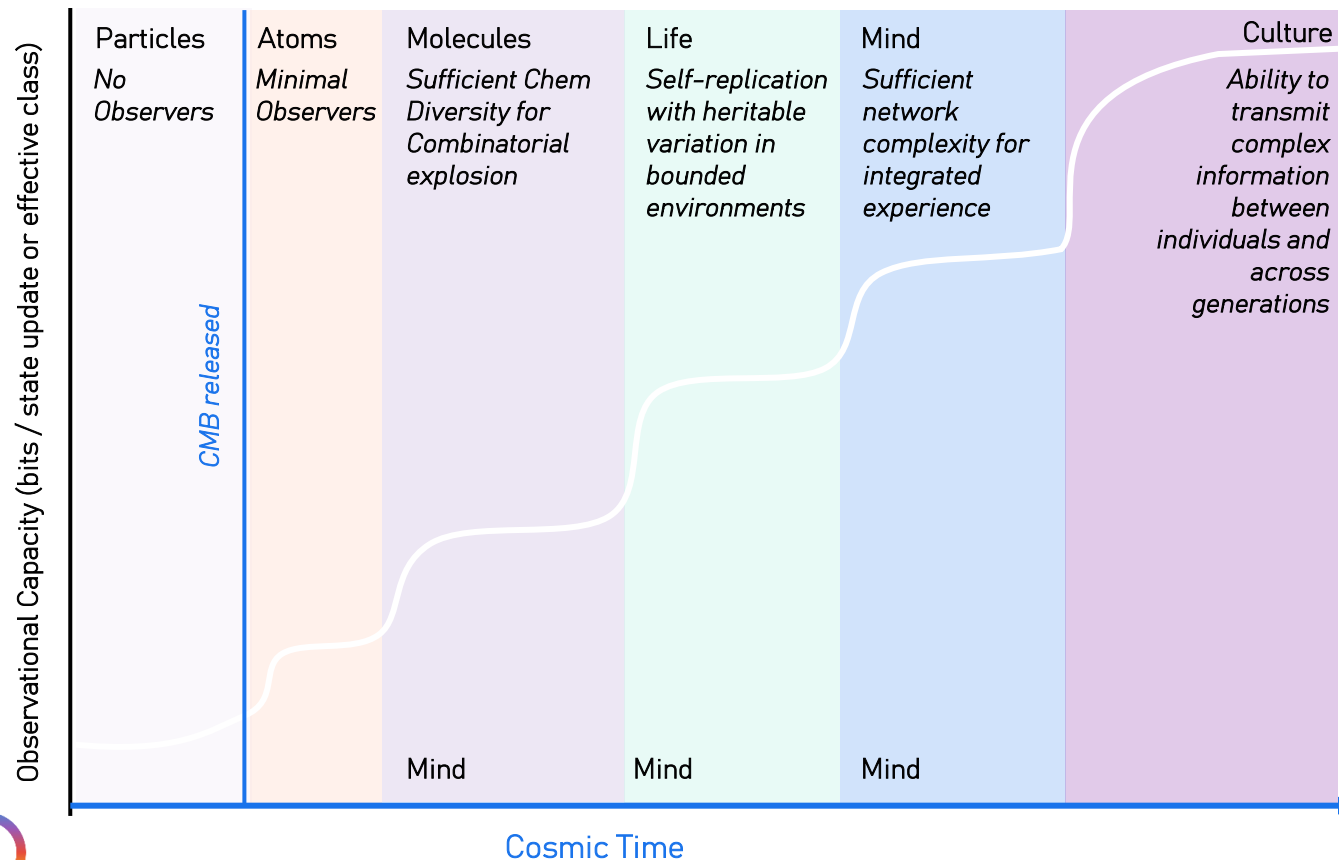
Class	Properties
0 Persistent Physical Structures – Atoms / Molecules	Minimal local sampling, infinitesimal / no memory, P-domain dominant
1 Cells & Simple Organisms	Gradient following, basic memory, P-domain heavy, early V-domain access
2 Multi-cellular animals with nervous systems	Prediction, basic model of world (local), V domain access, minimal S-domain
3 Humans	Symbolic thought, abstract models, all four domains significantly integrated
4 Networked Super-Observers (civilisations / internet)	Highly coupled Observers with larger R_0 than any individual Observer
5 MetaObserver (theoretical)	Maximal Observer given domain constraints



Observer Complexity Classes (2/2)

Evolution of Observational Capacity reflects Wolfram's findings on evolution – they occur in 'jumps' or here, 'phase transitions'

Note: Time Periods are very inaccurate – drawing sigmoid curves with a mouse is not fun!



Class

Observation Mechanisms

Molecules

- Conformal Scanning
- Vibrational Spectroscopy
- Reactivity
- Bonding Networks

Life (basic)

- Chemotaxis: Detect chemical gradients (e.g. toward food)
- Quorum sensing
- Gap junctions (multicellular)

Mind

- Neurons as specialised apparatus
- Network topology (clustering / path length)
- Plasticity (LT Potentiation / LT Depression)

From Dust to Divinity

The Observational Arc of History

Era	System Type	Info Capacity (bits/state update)	Cum. Capacity	Key Transition
10^{-43} s (Planck Era)	Quantum foam	$\sim 10^0$	1	Undifferentiated potential
10^{-36} s (GUT Era)	Unified force field	$\sim 10^6$	10^6	Gravity separates
10^{-32} s (Inflation)	Inflaton field	$\sim 10^{12}$	10^{12}	Space expands exponentially
10^{-12} s (Electroweak)	Quarks + leptons	$\sim 10^{18}$	10^{18}	W/Z bosons acquire mass
10^{-6} s (Confinement)	Protons + neutrons	$\sim 10^{21}$	10^{21}	Hadrons form
1-3 min (Nucleosynthesis)	Atomic nuclei	$\sim 10^{24}$	10^{24}	H, He, Li nuclei stable
380 ky (Recombination)	Neutral atoms	$\sim 10^{27}$	10^{27}	Photons decouple (CMB)
100 My (First Stars)	Stellar nucleosynthesis	$\sim 10^{30}$	10^{30}	Heavier elements form

Era	System Type	I_0 (bits/state update)	Cum. I_0	Key Transition
1 Gy (First Planets)	Planetary surfaces	$\sim 10^{33}$	10^{33}	Stable chemistry possible
3.5 Gy (Origin of Life)	Self-replicating molecules	$\sim 10^{36}$	10^{36}	Heredity + evolution begin
2 Gy (Eukaryotes)	Complex cells	$\sim 10^{39}$	10^{39}	Mitochondria, nucleus
0.6 Gy (Multicellular)	Animals, plants	$\sim 10^{42}$	10^{42}	Cell specialization
0.5 Gy (Nervous systems)	Neural networks	$\sim 10^{45}$	10^{45}	Centralized sensing
0.01 Gy (Human brain)	Self-aware observers	$\sim 10^{48}$	10^{48}	Language, abstract thought
0.0001 Gy (Culture)	Collective human knowledge	$\sim 10^{54}$	10^{54}	Writing, cumulative culture
Present (Digital Age)	Global internet + AI	$\sim 10^{60?}$	$10^{60?}$	Artificial intelligence emerging
Future? (Singularity?)	Artificial superintelligence	$\sim 10^{70+?}$	$10^{70+?}$	Post-biological observers?



Human Development Parallels Cosmic Evolution

Human Stage	Cosmic Parallel	Time After Conception	Information Integration	Observer Capacity
Conception	Big Bang (symmetry breaking)	0	Unity → Differentiation	$I_O \approx 10^9$ bits (genome)
Cell Division	Cosmic inflation	Hours–days	Exponential expansion	$I_O \sim 10^{10}$ bits
Blastula Formation	Structure emerges from uniformity	~1 week	Spatial differentiation begins	$I_O \sim 10^{11}$ bits
Gastrulation	Three-layer Universe	~3 weeks	Three germ layers form	$I_O \sim 10^{12}$ bits
Organ Formation	Star/galaxy formation	4–8 weeks	Specialized structures emerge	$I_O \sim 10^{13}$ bits
Neural Development	Nervous systems evolve	8–40 weeks	Information networks form	$I_O \sim 10^{14}$ bits
Birth	Emergence of life (from protected to exposed environment)	~40 weeks	Environmental interaction begins	$I_O \sim 10^{15}$ bits
Language Acquisition	Symbolic thought evolution	1–3 years	Abstract representation emerges	$I_O \sim 10^{16}$ bits
Self-Awareness	Consciousness evolution	2–4 years	Recursive observation begins	$I_O \sim 10^{17}$ bits
Abstract Thought	Scientific revolution	7+ years	Universal principles accessible	$I_O \sim 10^{18}$ bits
Spiritual Seeking	Return journey toward unity	Adolescence–adulthood	Unity recognition, meaning-making	$I_O \sim 10^{19}$ bits





IMPLICATIONS – TELOS

From Observational Complexity to Universal Telos

We've seen three converging threads:

- **Physics:** Symmetry breaking, quantum fields and Planck limits define a **structured, bounded observable universe**
- **Evolution:** Biological and cultural evolution ride pre-existing informational gradients, building increasingly powerful observers
- **Observers:** Complexity classes and phase transitions track how much and how deeply the universe can observe itself

This suggests something quite provocative:

- The universe's story is one of information integration at all scales
- Observers are how this happens

Now let's make this precise:

- What is **Universal Telos**?
- How do we formalise **information gradients** and **hierarchies** in the Ruliad?
- How does this connect to consciousness, meaning, and ethics?



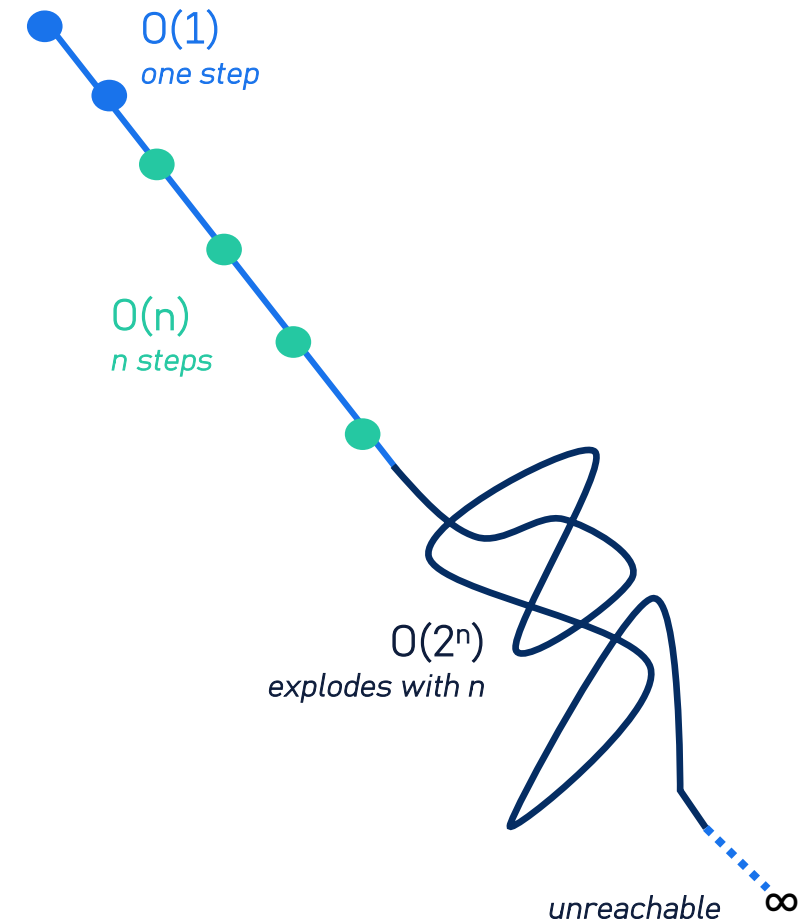
Three Stories, One Gradient?
*Toward maximal information integrated via
Observation*



Computational Complexity Primer (1/2)

Why some knowledge is harder to reach

- To talk about telos, we need a way to measure how hard it is for an Observer to access different kinds of information.
- Computer science uses **Big-O notation** to describe how the cost of an algorithm grows with problem size.
 - $O(1)$ – constant time: cost doesn't grow with size
 - $O(n)$ – linear: cost grows linearly with the number of steps or states
 - $O(n^2)$ – quadratic: cost grows like the square of the problem size
 - $O(2^n)$ – exponential: cost doubles for each extra step – quickly becomes intractable
- For Observers in the Ruliad, we interpret these as **morphism path lengths in rulial space**:
 - $O(1)$ – a single direct morphism (one-step reach)
 - $O(n)$ – n sequential morphisms
 - $O(\infty)$ – no finite morphism chain exists for bounded Observers

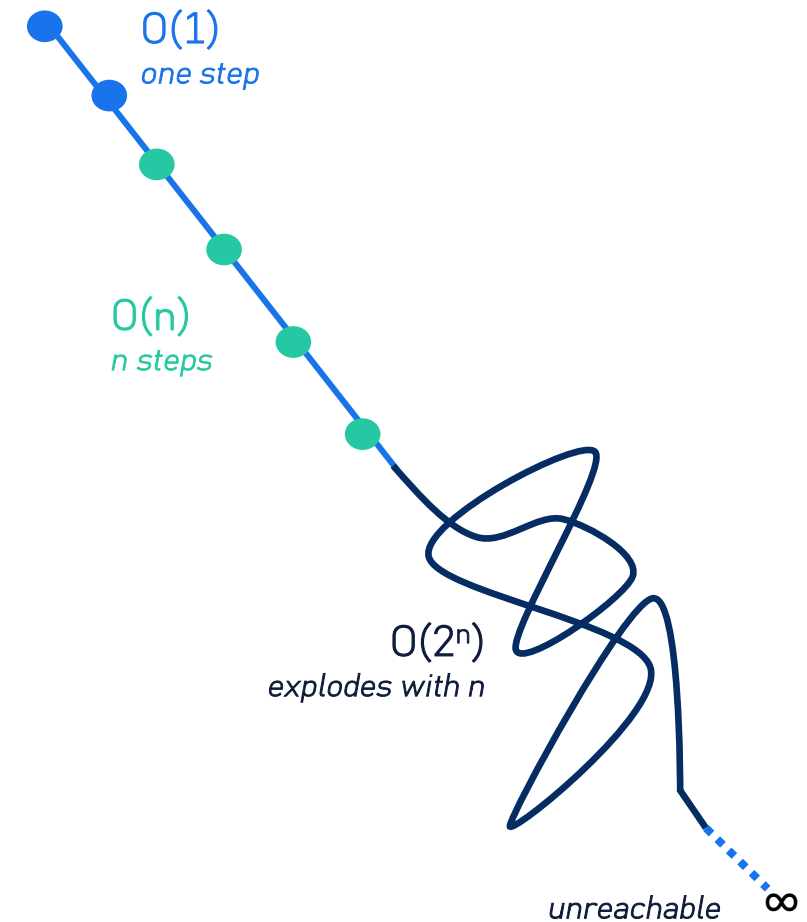


Computational Complexity Primer (2/2)

Connecting this to the Ruliad

- Here complexity measures how far an Observer must 'travel' in the Ruliad to reach a piece of information
 - $O(1)$ – information is directly accessible from your current state
 - $O(n)$ – information is n "hypergraph updates" away
 - $O(n^2)$ – needs exploring a 2D region (random walk / diffusion)
 - $O(2^n)$ – full multiway explosion: information is buried in an exponential branching of possibilities
 - $O(\infty)$ – fundamentally unreachable by bounded Observers
- Ruliad framing
 - Let the Ruliad be a hypergraph of states and rules
 - Complexity measures length and structure of morphism chains you must traverse to "find" a desired state

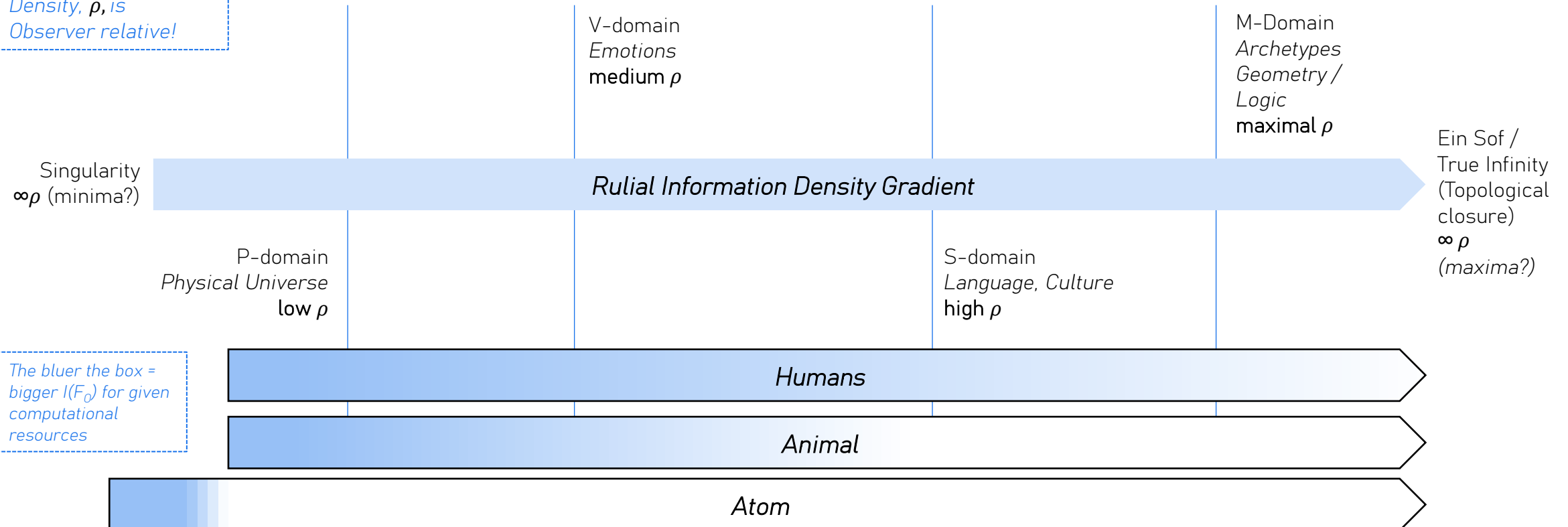
Given limited resources, which paths should Observers invest in?
Which strategies **minimise cost** per bit of **useful information gained**?



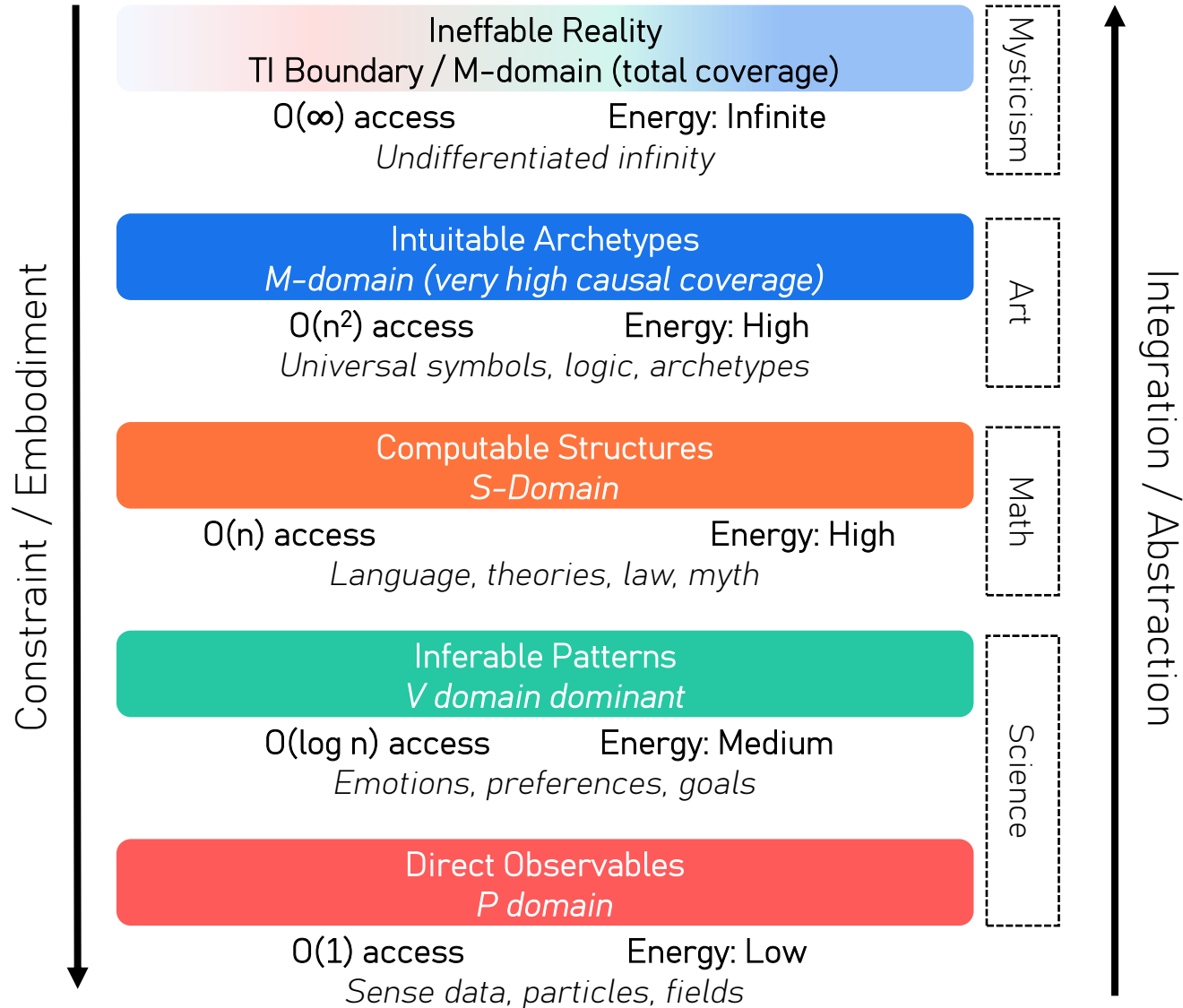
Information Gradients in the Ruliad

CLAIM: The Ruliad is not a flat topos of possibilities. It has information gradients from low to high density

Note that Information Density, ρ , is Observer relative!



Informational Hierarchies



Hierarchy Properties

- 1 Higher domains contain and constrain lower ones
 - A pre-image of the lower domain exists in the higher domain (nested hierarchy)
- 2 Observers move integrated information upwards

raw data → value-laden meaning → abstract insight

- 3 Religions intuited this hierarchy

- Kabbalah's four worlds
- Hindu koshas
- Platonic forms vs. matter

Different languages but same structure



Information Integration as Universal Telos

Core conjecture: All Observers share the same fundamental telos

Maximise integrated information $I(F_O)$ subject to boundedness B_O and persistence P_O

- Intuition
 - Observers that integrate more useful information predict better, survive longer, and spawn more observers
 - Survival and reproduction are instrumental; information integration is the deeper optimisation
- This aligns with
 - Biology: organisms that sense, integrate, and respond better outcompete others
 - Culture: societies that compress and share knowledge thrive
 - Spirituality: traditions that guide attention toward deep structures persist

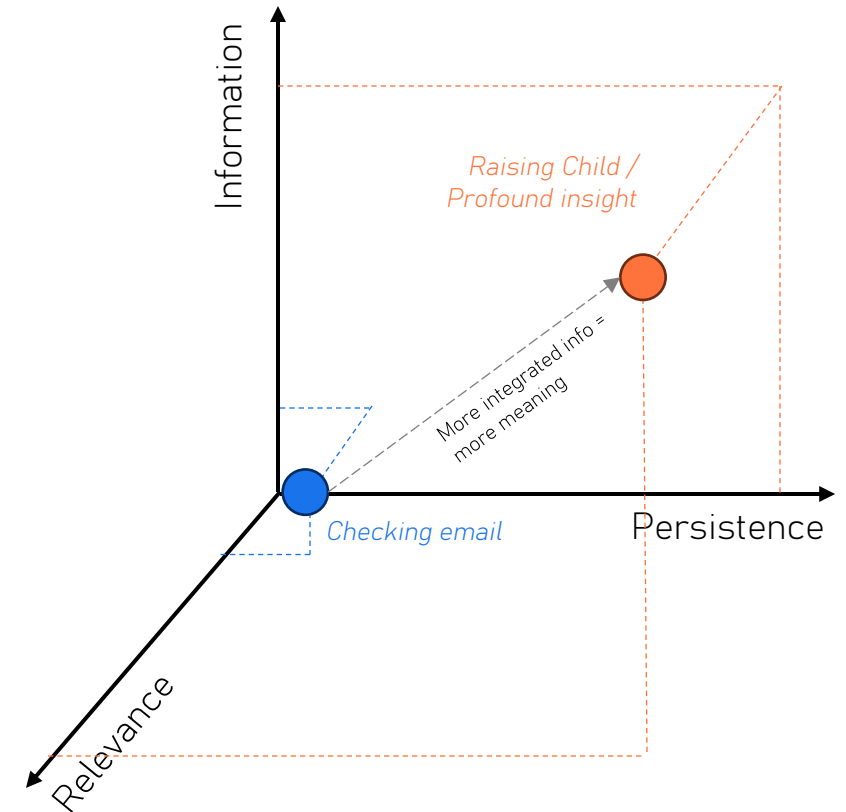
Allows definition of meaning as a 'computable-ish' quantity

Meaning \approx integral over:

Total information content from an Observation (how much is encoded)

Observer relevance (how much it matters to internal model)

Temporal persistence (how long it has utility)



Initial Empirical Support for Telos

- Biology: Nervous systems, sensory organs, memory systems all increase $I(F_O)$ per unit energy
- Culture: Writing, science, and digital tech serve primarily to externalise, compress and share information at lower cost
- Levin's experiments
 - Xenobots, regenerative morphogenesis, and non-neural cognition show telos-like behaviour wherever there is capacity to store and process information
- Ruliad / Observer perspective
 - Systems that don't integrate information die out to entropy (lose boundary)
 - Systems that do become more complex Observers that have more causal influence
 - Consistent with Darwinian selection, No Free Lunch constraints and observed acceleration of complexity through time

Integrated Information Capacity

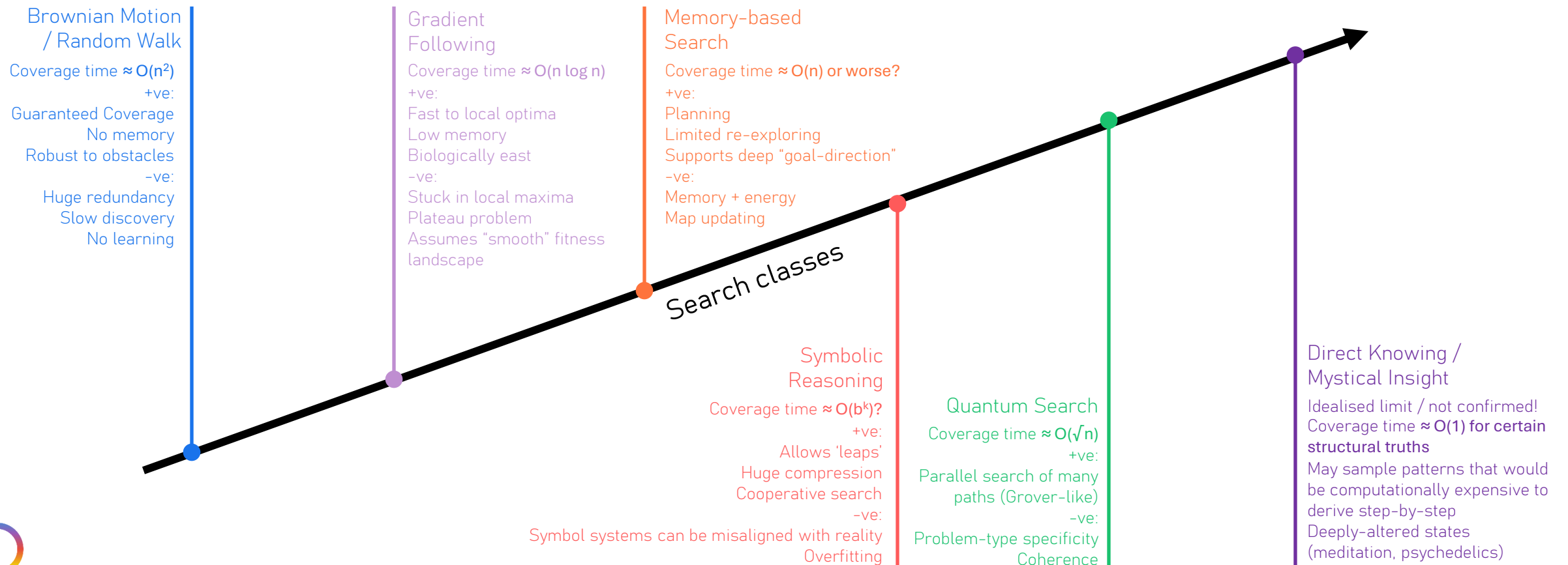
Evolution / Cultural time → Increasing $I(F_O)$



The Efficient Search Conjecture

Observers (at every scale) evolve optimal strategies for exploring computational possibility space given their constraints

- Strategies get more **complex** and **sophisticated**, balancing **exploration** (finding new information) and **exploitation** (using compressed / computationally reduced knowledge)



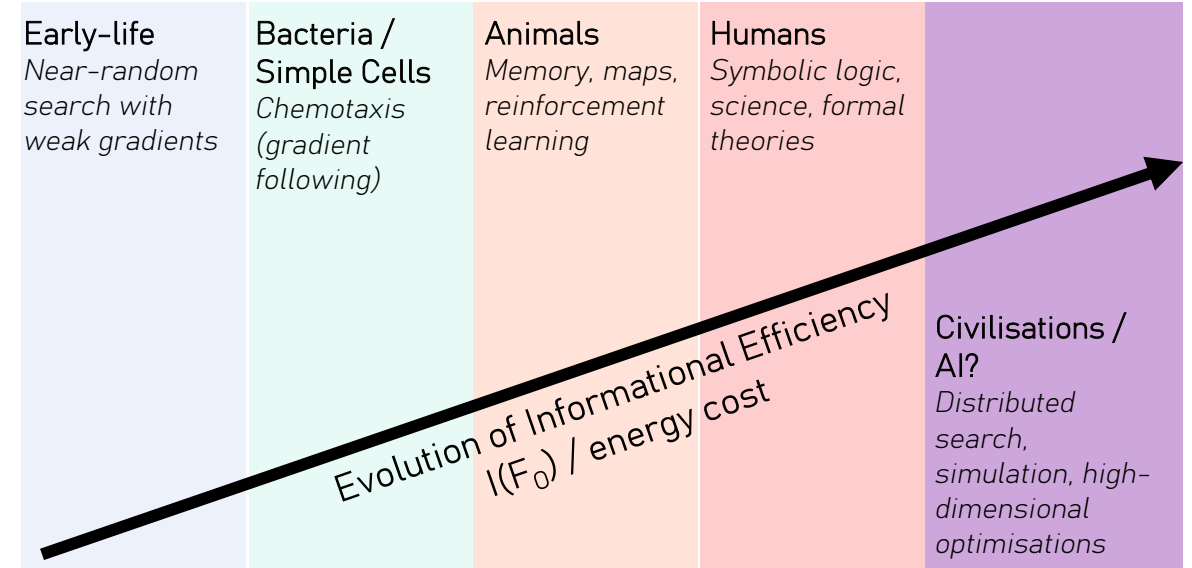
Evolution of Informational Efficiency

Cost per bit: Why Efficient Search is Better

Search Strategy	Qualitative Summary
Random Walk	High-time, low memory, awful energy efficiency
Gradient Following	Good locally, stalls in complex landscapes
Memory-based	Higher one-off costs, cheap reuse of successful strategies
Symbolic	Huge upfront cost, massive long-term efficiency gains
Quantum	Limit efficiency for certain classes of problems
Direct Knowing?	Perfect efficiency for ultra-narrow set of problems?

Observers that can pay the upfront cost gain huge long-term advantages in integrating information

Selection favours architectures implementing more efficient strategies



Trajectory is universal

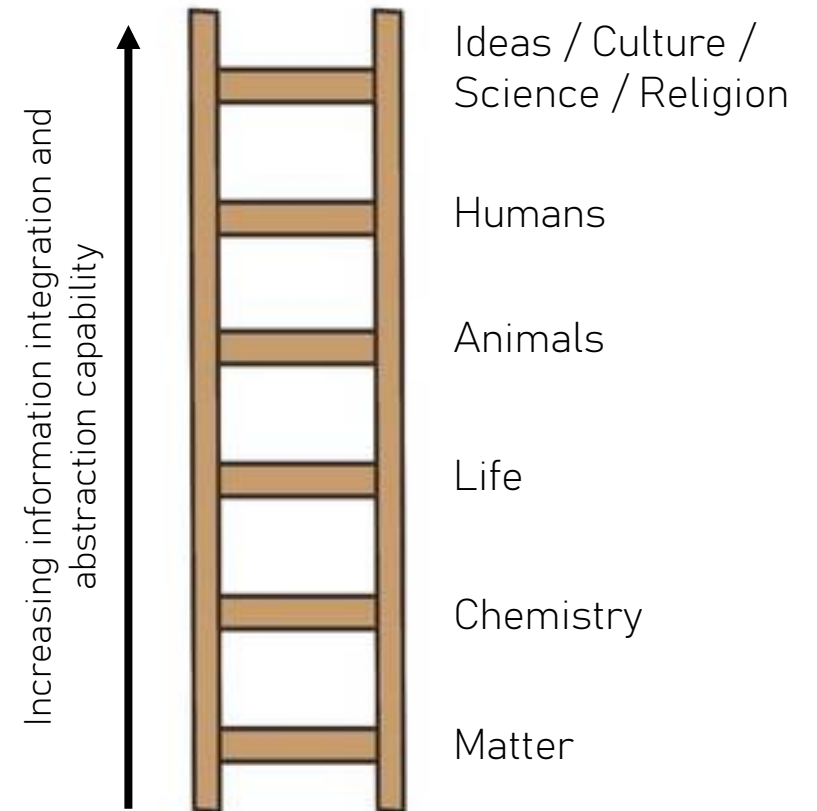
Ruliad via MetaObserver, "bootstrapping" ever more efficient searchers
Survival is derivative optimisation: required so that info integration continues



IMPLICATIONS – WHAT ARE IDEAS?

Introduction: Ideas as Superstructures

- So far, we've explored
 - Reality as a **computational possibility space** (the Ruliad)
 - Observers as **bounded samplers** navigating information gradients
 - A **Universal Telos**: maximise integrated information per unit cost
- Now we move to the next layer
 - **Ideas** as superstructures that ride on top of sufficiently complex observers
 - Ideas represent a **phase transition** in how information is organised and integrated
- Central question
 - If the universe is computational and telic, **what role do ideas play in shaping reality?**

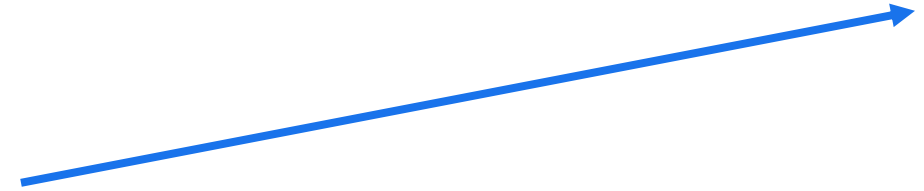


Ideas as Persistent Information Patterns

Definition: Ideas / Memes are information patterns that achieve autonomous existence by replicating between minds (*Dawkins-like "mind-viruses"*)

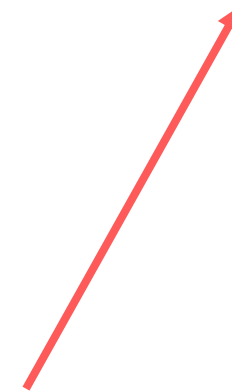
- Ideas / Memes are not the same as genes
 - Genes are tied to **biological lineages** and reproduction
 - Ideas can jump across species, across substrates (brains ↔ books ↔ silicon) and across cultures and epochs
- Phase transition
 - Once you have Observers that can symbolise and communicate, you get a **new level of evolution**
 - Not just organisms evolving, but **ideas / memes evolving within and between Observers**
- Memetic speed is much, much faster
 - Genetic evolution: generations → decades
 - Memetic evolution: social media → hours

Genes



Slow – millions of years / thousands of generations

Memes



Fast – years (books) → days (letters) → hours (email) → seconds (social media)



The Formal Structure of an Idea

The Memetic Tuple

Idea = (Pattern, Replication Rules, Fitness Function, Mutation Rate)

Components:

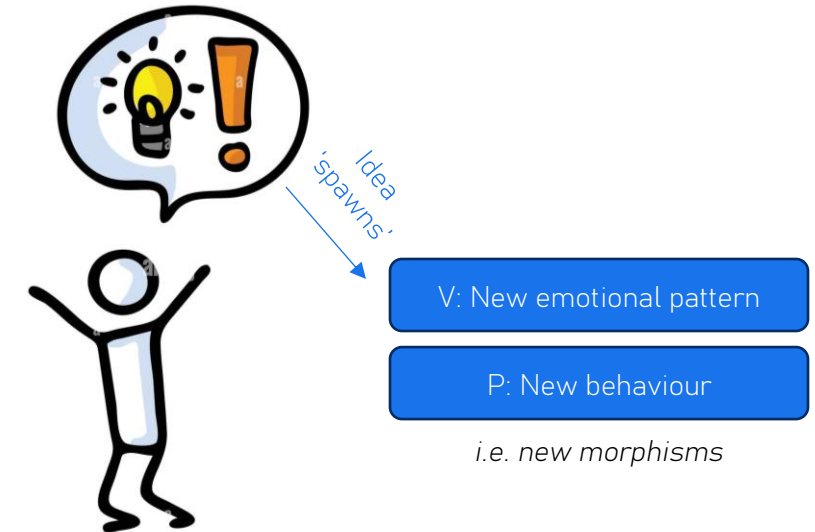
- **Pattern:** Core integrated information structure *e.g. the concept "survival of the fittest"*
- **Replication Rules:** How it spreads and sticks for Observers like us
 - V-domain: emotional resonance (fear, hope, curiosity)
 - S/M-domain: cognitive fit (is it easy to understand, remember, teach?)
 - P-domain: pragmatic utility (does it help achieve goals?)
 - All domains: coherence (status, conformity to Observer's causal graph)
- **Fitness Function:** How effectively it replicates under given conditions
$$\text{Virality} \propto \frac{\text{causal influence}}{\text{computational cost}}$$
- **Mutation Rate:** How much the idea changes with each transmission

Ruliad Context

Ideas are structured as objects in the S-domain that can be copied between Observers

Special Features:

- Includes its own replication rules – like code that contains installer + updater



Creates new evolutionary arena where ideas compete for attention and memory (B_0). Form stable attractors in S-domain, analogous to biological niches



Ideas Shaping Reality

How Ideas Reshape Lower Domains

Claim: Ideas not epiphenomenal – they shape what becomes real in lower domains

- Example mechanisms:

- 1 Physical Embodiment: Beliefs change brain states → change hormones & behaviour

Example: Placebo effect → endogenous opioid release

- 2 Epigenetic effects: Chronic stress altering gene patterns / meditation

- 3 Social organisation: Shared ideas create norms, laws, institutions

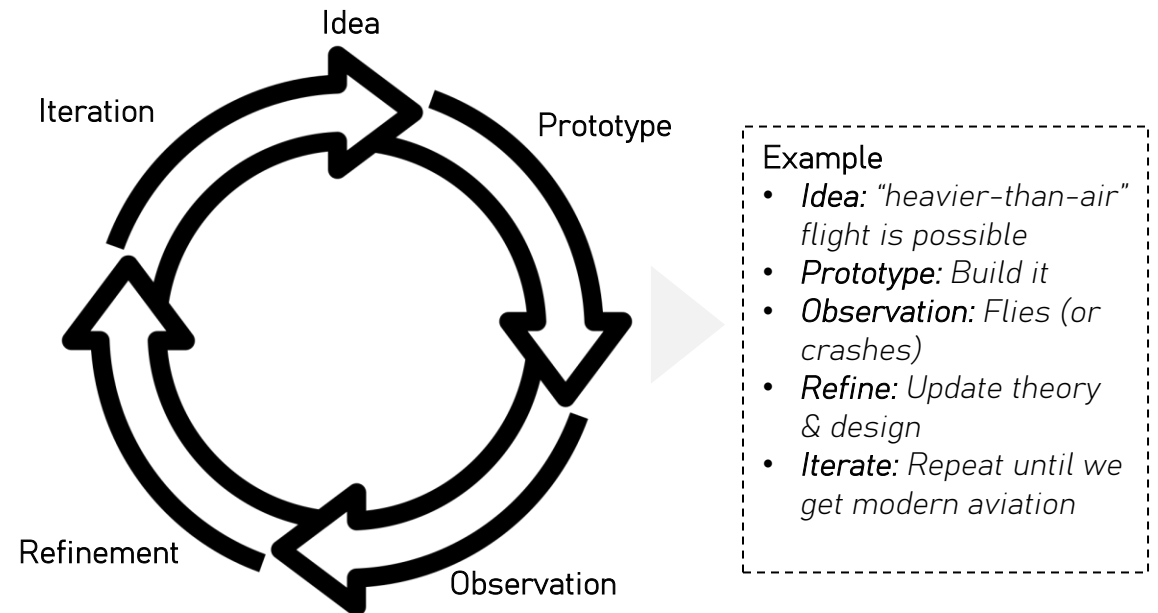
Example: "Fiat Money" pure S-domain structure that moves trillions of P-domain dollars



S-domain structures constrain which V / P domain morphisms ever get explored

"You can't build a rocket without the physics of rocketry"

The Feedback Loop: Ideas Shape Reality, Reality Shapes Ideas



*Each 'loop' deepens the idea's **computational persistence** (more equivalences and embeddings in P,V,S domains)*

Makes **paradigm shifts** cost massive energy – overwriting entire class of Observers computationally reduced models



The Evolution of Ideas

Memetic Selection Pressure		Example	Takeaway
1	Explanatory Power	Germ theory beating Miasma theory – more predictive	Ideas that compress regularities more efficiently (i.e. more computationally reducible) are more useful
2	Emotional Resonance	Hero's Journey 'sticky' as mirrors all Observers lived experience	Ideas that activate emotions are more memorable as they 'touch' more points in the Observers causal graph
3	Social Utility	"Don't Murder" enables societal stability (timeless / placeless)	Ideas that solve coordination problems spread widely
4	Practical Utility	Scientific ideas that enable more Observation (electricity / antibiotics)	Ideas with repeatable tangible benefits gain wide adoption
5	Simplicity	"An eye for an eye" persistent because everyone gets it – not everyone 'gets' the law	Simple ideas spread faster but are subject to more distributed interpretations based on Observer's variable causal histories

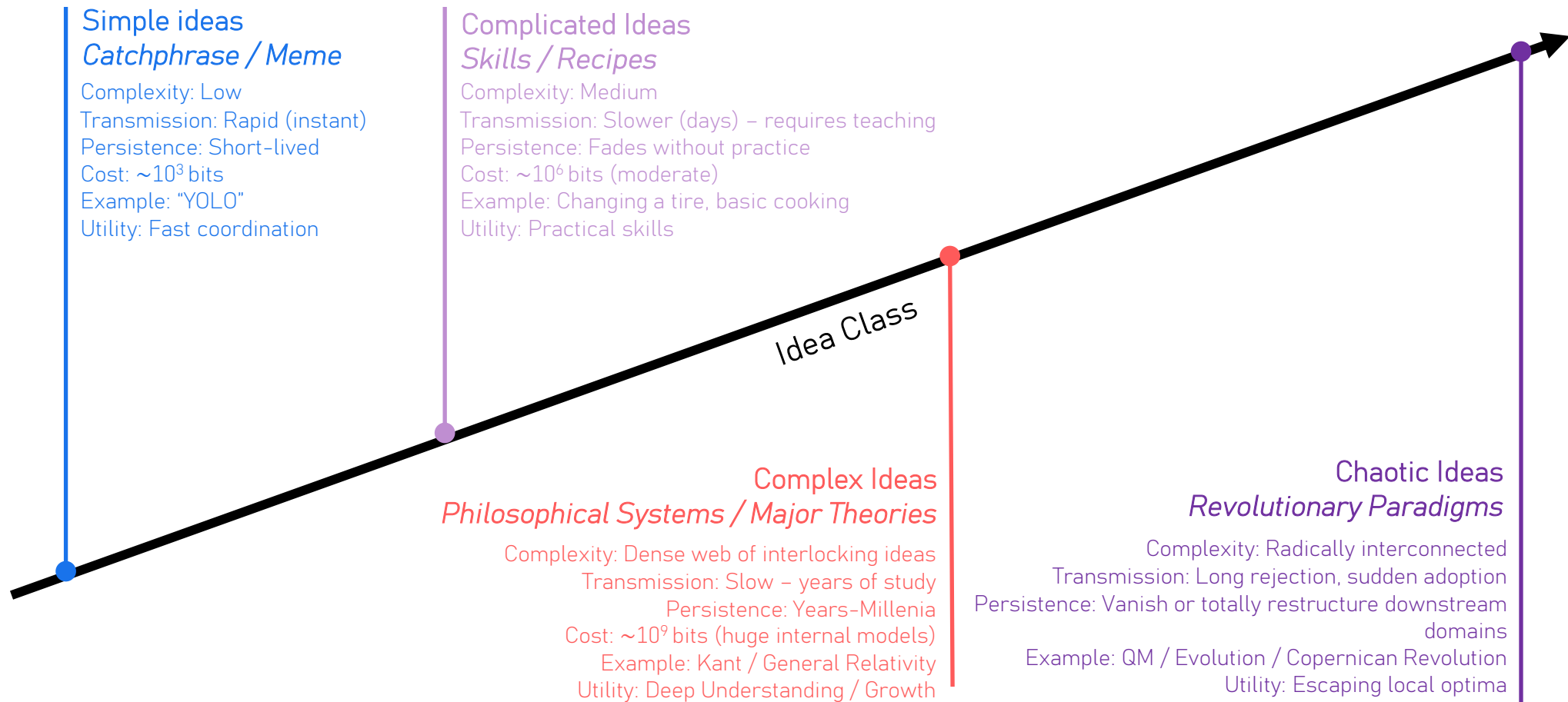
High-fitness ideas compress regularities and integrate information across Observer accessible domains (P, V, S, M)



The Computational Cost of Ideas

Conjecture: Different types of ideas have radically different computational burdens for Observers like us

- Ideas are categorised by complexity class, transmission and persistence



How do Ideas Interact with Meaning?

Meaning as a Function

$$I(F_O) \text{ for } x \approx \int I_O(x, n) \cdot \text{Rel}_O(x, n) \cdot P_O(x, n) d\mu(O, x, n)$$

- $I_O(x, n)$ = Information content of Observation x at state n for Observer O
- $\text{Rel}_O(x, o, n)$ = Relevance to Observer O 's telos (optimisation function) at state n
- $P_O(x, n)$ = Persistence (probability weighting of how many computational updates it survives, i.e., temporal half-life)
- Integration to approximate this over all Observers O , all time t , and all possible observations x (across the entire accessible Topos, F_O to the limit of R_O)

Plain English

Structure,
pattern, non-
noise

How much it
matters to
goals and
survival

Whether it
endures
(minutes vs.
centuries)

Integral

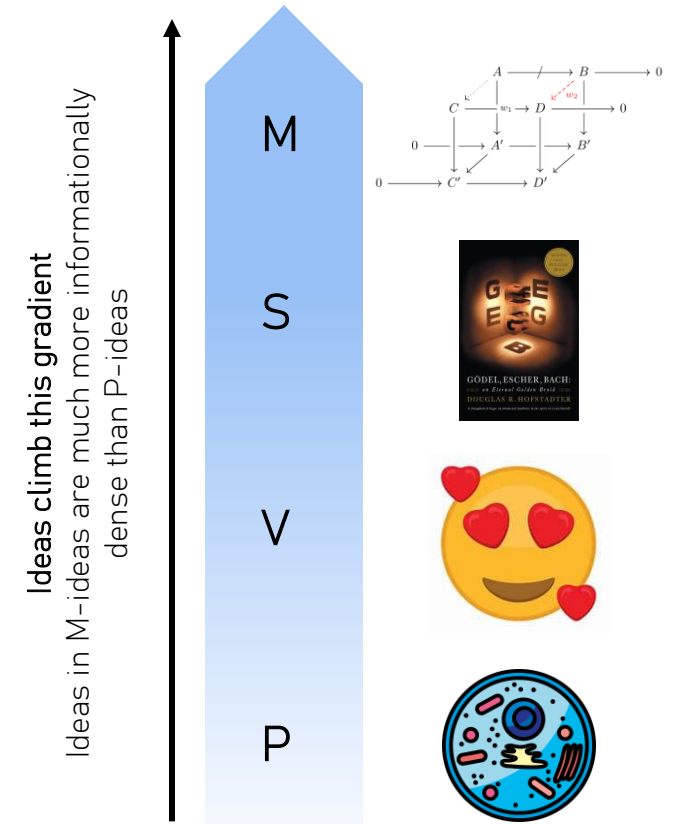
High Meaning = lots of info, highly relevant, long-lived

Zero Meaning: High info but no structure or relevance (pure noise)



Meaning / Information Gradients

- The Meaning Function lets us compare where meaning tends to concentrate
 - P-domain (Physical): High substrate importance, low semantic meaning per state
 - V-domain (Valuational): Emotions, preferences; high relevance, medium persistence
 - S-domain (Symbolic): Theories, languages, laws; high information, often high persistence
 - M-domain (Minimally constrained): Logic, abstract structures; highest stability, cross-observer invariance
- TI (True Infinity): Limit of the information gradient: maximal information density, perfect persistence, but inaccessible to bounded observers.
- Teleological / God Conjecture reading:
 - The “Will of God” \approx optimal information integration gradient pulling Observers upward through these domains





IMPLICATIONS – COMPUTATIONAL ETHICS

The Home Stretch



- So far, we've argued
 - Reality (as we know it) is only parseable computationally and The Ruliad is the limit of our ability to say things about it!
 - Observers are **bounded samplers** with **Universal Telos: maximise integrated information as quick as they can**
 - Ideas and cultural systems form **higher-order structures** that shape what Observers can do
- This raises an unavoidable question

If the universe is structured and telic in this way, what does it imply about ethics?

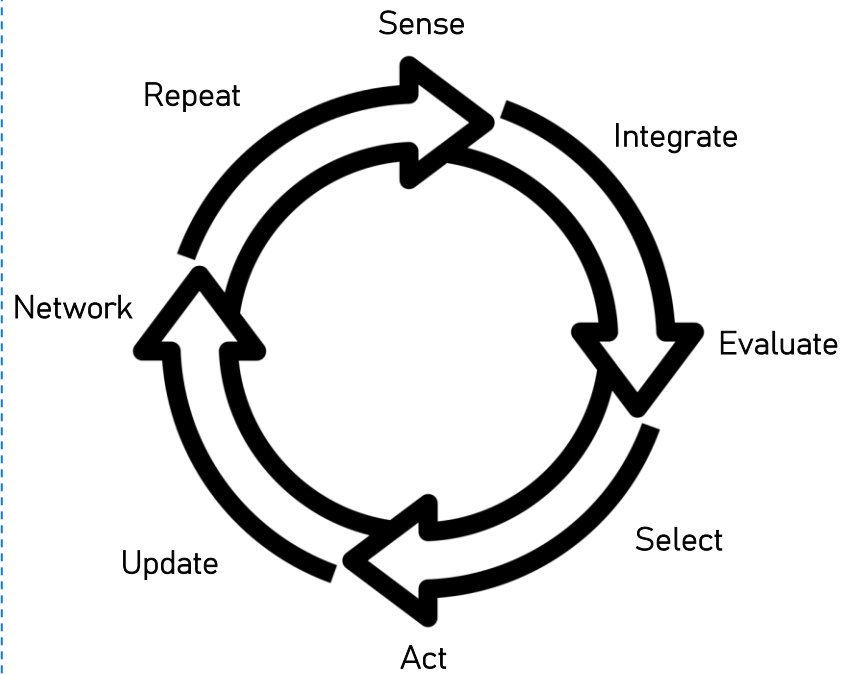
- The God Conjecture claims
 - Morality **isn't invented**, it is **discovered**
 - Ethical behaviour = **mathematically optimal behaviour** exploring 'fastest' **information gradients** for most Observers
 - Virtue and sin are about **information integration vs informational entropy** for self-referential Observers (us!)
- We'll show
 - An Observer's observational loop is **necessary** and **universal** (based on Arsiwalla et al!)
 - Ethics emerges as **computational cost minimisation** for Observers in the Ruliad subject to computational irreducibility
 - Major religious / philosophical ethical traditions **converge** because they've discovered **the same optima**



Ethics are part of reality's optimisation protocol

The Observer 'Loop'

Claim: Every Observer – from atoms to humans to civilisations – implements an identical loop



In the Arsiwalla formalism, the Observer is modelled as

State space X (internal states)
Input space Y (sensors)
Output space Z (actions)
Transition function $f: X \times Y \rightarrow X$
Output function $g: X \rightarrow Z$
Boundary B separating "inside" from "outside"

Mapping these back:

1. **SENSE** – restrict Ruliad R to relevant inputs in Y
2. **INTEGRATE** – update internal state X and compress inputs into a coherent model
3. **EVALUATE** – compute predicted value/utility of possible actions
4. **SELECT** – choose an action according to an internal objective function (telos)
5. **ACT** – apply $g(x)$, changing the environment and future inputs
6. **UPDATE** – adjust model from prediction errors (learning)
7. **NETWORK** – exchange information with other Observers
8. **REPEAT** – iterate through time



Connecting the 'Loop' to Local Entropy Reduction

Claim: Ethics emerge when we ask: which sequences of morphisms are “good” or “bad”

Observer Function Step	Ruliad Categorical Structure	Functor Component	Informational Entropy Reduction Role
SENSE	Input: $R \rightarrow S_0(R)$	Domain restriction	Filters R to R_0 / F_0
INTEGRATE	Composition: $S_0 \circ \pi$ (projection functor)	Limits/colimits in $\text{Cat}(R_0)$	Computes cohomology (model-building), compresses patterns
EVALUATE	Morphism set: $\text{Hom}(s_i, s_j)$	Available transitions	Applies predictive model (complexity reduction)
SELECT	Natural transformation: $\eta: F \rightarrow G$	Choice of commuting diagram	Chooses low-cost, high 'meaning' morphisms
ACT	Morphism execution: $f: s_i \rightarrow s_j$	Realized transition	Imposes constraint on R_0 / F_0 evolution (i.e. local entropy export)
UPDATE	Functor modification: $S_0 \rightarrow S_0'$	Learning = functor refinement	Refines model (learning = more compression)
NETWORK	Coupling: $S_{\{0i\}} \times S_{\{0j\}} \rightarrow S_{\{0ij\}}$	Product/coproduct construction	Shares compressed model to local neighbourhood (entropy reduction to connected Observers)
REPEAT	Composition: $S_0^{\{t+1\}} \circ S_0^t$	Temporal iteration	Iterate to limit $H(R_0) \rightarrow H_{\min}$

Globally, entropy still increases. Locally, Observers create negentropy i.e. life, knowledge, stable societies

Ethics is ultimately the study of:

1. Which choices *maximise information integration per unit entropy*?
2. Which choices 'throw information away' and *accelerate disorder*?



Choice as Computational Optimisation

Definition: **Path Cost Function**

- For a path γ through the Ruliad from state s_1 to s_2 , the total cost is:

$$\text{Cost}(\gamma) = \sum_{i=1}^n \text{comp}_{\text{steps}}(\gamma_i) + \lambda \cdot H(\gamma) + \mu \cdot \text{Distance}(\gamma, TI) + \nu \cdot N(\gamma)$$

where:

- $\text{comp}_{\text{steps}}$ = computational effort
- ΔH = entropy generated
- N = network effects on other observers
- D_{TI} = distance to True Infinity (convergence)
- λ, μ, ν, ρ are weights

Analogy: Like Google Maps computing the best route: doesn't just minimise distance; balances time, traffic, tolls and your destination

For Intuition:

Cost Function Variable	Example 1: Helping a Stranger feels Good	Example 2: Lying to Avoid Confrontation feels Bad
$\text{comp}_{\text{steps}}(\gamma_i)$	Low <i>small effort</i>	Low initially <i>avoid hard conversation</i>
$H(\gamma)$	Low <i>trivial disorder created</i>	High <i>must maintain consistency / remember lie</i>
$D(\gamma, TI)$	Decreases <i>positive network effect</i>	Increases <i>divergence in Observer world models and sampling functors</i>
$N(\gamma)$	Positive <i>gain to other Observers</i>	Negative <i>entropic cascade if revealed</i>
$\text{Cost}(\gamma)$	Low – Chosen	High – Avoided <i>hence guilty feeling</i>



Ethical Behaviour = Optimal Path Selection

Or... The Mathematics of Good & Evil

Formal statement (simplified)

Let γ_1 be a virtuous path and γ_2 a sinful path from your current state to TI / convergence / completion of all possible computations

Then:

- $\text{Cost}(\gamma_1) < \text{Cost}(\gamma_2)$
- $I(F_0)\gamma_1 > I(F_0)\gamma_2$
- $H(\gamma_1) < H(\gamma_2)$
- $T(\gamma_1) < T(\gamma_2)$ (reaches convergence faster)

This falls out of:

- The structure of R_0
- The Observer Loop
- The Telos of climbing information gradients (from less dense to more)

Virtue, γ_1

= paths that **maximise information integration** and **minimise entropy** and **speed up convergence**

Sin, γ_2

= paths that **waste information**, generate **excess entropy** and **slow convergence**



Computational 'Debt'

Not all choices Observers make are equal.

Some choices create "computational debt", they appear optimal in the short-term, due to computational boundedness and computational irreducibility, but requires extensive additional computation to integrate coherently later

Conjectured Definition: Computational Debt

- For choice / action γ made at time t , the approximate computational debt is:

$$Debt(\gamma, t_0) \approx \int_t^{\infty} [Cost_{actual}(\gamma, t) - Cost_{optimal}(\gamma, t)] dt$$

Where:

- $Cost_{actual}(\gamma, t)$** : Ongoing computational cost of actual choice / action, γ at time, t
- $Cost_{optimal}(\gamma)$** : Computational cost that would have been incurred with globally optimal choice / action, γ at time, t

Intuition:

- Computational Debt is the extra computation needed to maintain a sub-optimal pattern (e.g. lie, addiction, even bad code!) or correct it later (tell the truth, fix the bug!)
- Trade off between convenience now vs. additional complexity, entropy and lost chance

Example: Lying as Computational Debt *Works Short Term but Globally Suboptimal*

At $t=0$

Truth = high
emotional cost now

Lie = low cost now

At $t>0$

No / low future cost

Extra modelling
Remembering what you said

Extra constraints
Fewer morphism options

Extra risk
Discovery, network collapse

Extra energy expenditure
Anxiety, monitoring

Extra computational work that
could have been spent on learning,
discovery etc.



Convergence

Many Traditions, One Optimisation Problem

- The paper highlights a striking convergence: major ethical systems around the world **approximate the same computational optima**
- Examples
 - Buddhism's Eightfold Path – minimises observer entropy (right view, speech, action...)
 - Christianity's "love your neighbour" – maximises observer coupling and network integration
 - Judaism's Noahide Laws – minimal generating rule set for stable civilisations
 - Islam's Taqwa – align personal will with cosmic optimisation
 - Hindu Dharma, Daoist Wu Wei – maintain cosmic order and follow least-resistance (low entropy) paths
- Analogy
 - Just as eyes evolved independently many times because vision is useful (captures the most useful information from P-domain)
 - Ethical systems converge because coordination and low entropy are **always useful** in Observer networks

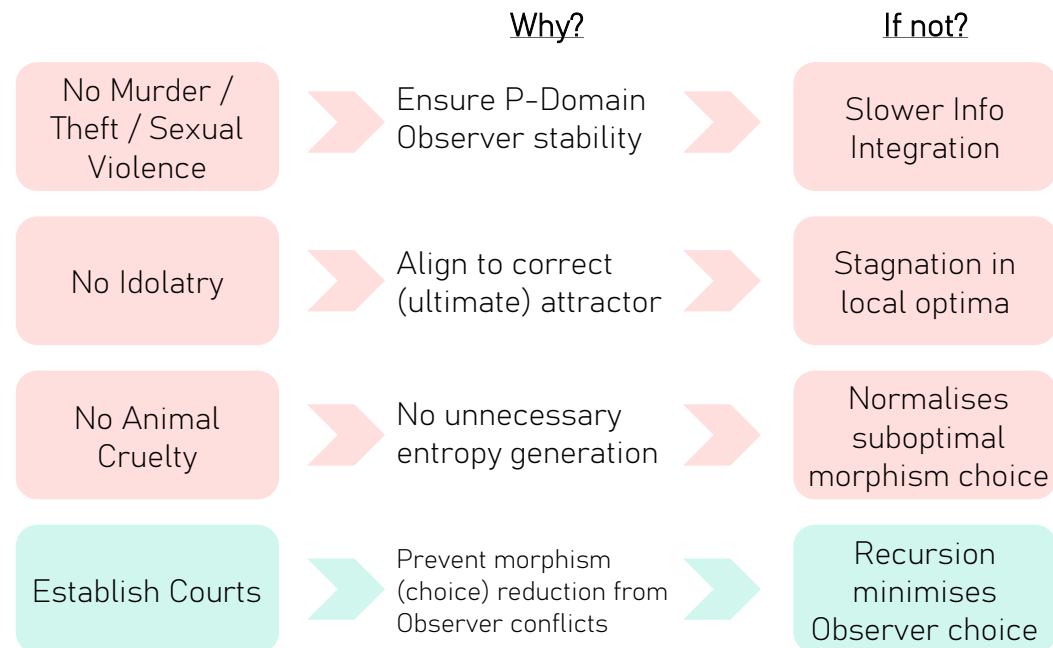
Conclusion: Ethics are not arbitrary cultural scripts; they are local approximations of a universal optimisation problem



Examples

Seven Noahide Laws

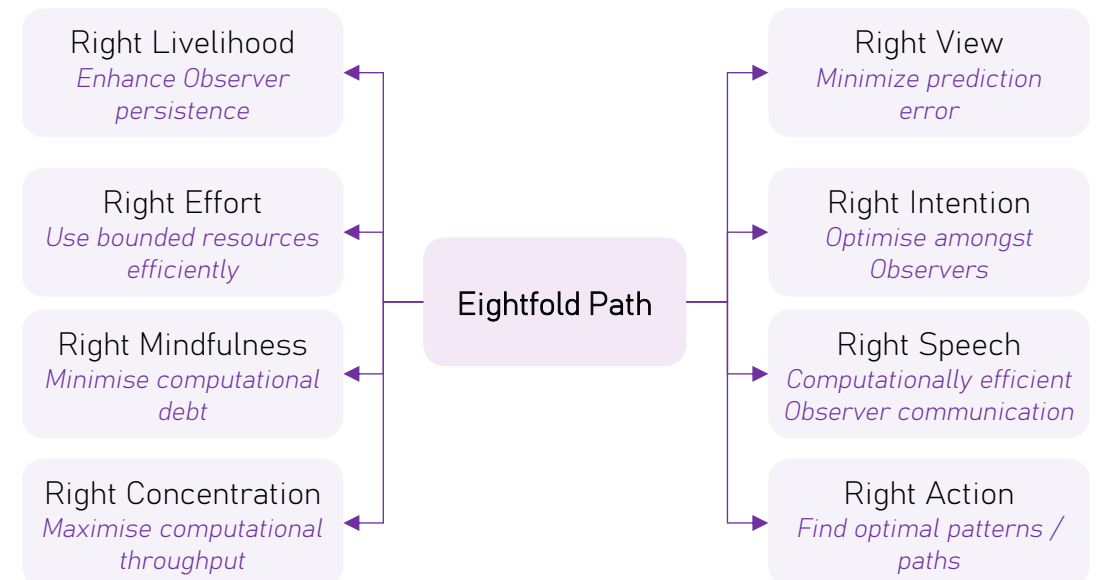
- In Jewish thought, the Seven Noahide Laws form a **universal ethical minimum for civilisation**
- Interpreted here as **minimal generative rule set** for stable Observer networks
- High compression – basic ethical categories to derive all sub-rules



Four Noble Truths & Eightfold Path

Buddhism can be understood computationally as an **entropy-reduction algorithm** operating at the individual Observer level

- The **Four Noble Truths** can be understood as follows
 - Dukkha exists \approx Systems have entropy
 - Dukkha has cause (Samudaya) \approx Attachment creates computational debt
 - Dukkha can cease (Nirodha) \approx Zero-entropy state is possible
 - Marga (The Eightfold Path) \approx Here's how to do it



Implications and Predictions

The sketches suggest that, in principle, we can quantify computational ethics with information-theoretic measures of Virtue, Sin and Computational Debt

Individuals

Prediction	Evidence
Virtuous behaviour correlates with wellbeing	Gratitude practitioners report higher life satisfaction
Sin creates personal suffering	Lying increases cortisol (quantitative)
Meditation reduces suffering	Meditators reduce DMN activity

Organisations

Prediction	Evidence
High-trust cultures outcompete low-trust	Companies with trust have higher productivity
Transparency Wins	Open source outperforms proprietary
Rigid hierarchies limit bandwidth	Decentralised Orgs adapt faster

Civilisations

Prediction	Evidence
Better error-correction survives longer	Autocracy lifespan average c.50yrs vs. 200+yrs for democracy
Information freedom accelerates development	Open societies outcompete closed (US vs. Russia / Modern West vs. MENA)
Universal Education minimises computational boundedness	Literacy rate correlates with GDP, innovation, stability

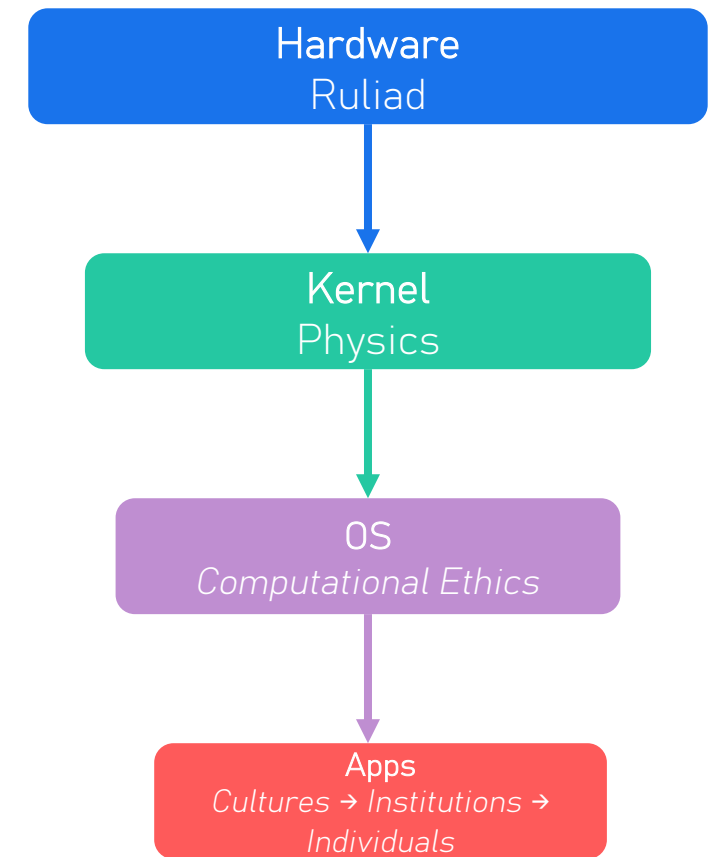
Species

Prediction	Evidence
Cooperating group outcompete non-competed in iterated games	Eusocial insects / primates / humans
Morphospace has attractor basins	Convergent Evolution
Computational constrain innovation sequences	Kardashev scale / Wright's Law



Ethics are Reality's Operating System

- Every persistent Observer implements the same function / loop
- Ethics = discovery of **optimal trajectories** for that function
- Synthesis
 - Ethics are **structural**, like **mathematics** and **physics** they are not arbitrary preferences or social conventions (postmodernism is wrong)
 - **Virtue** corresponds to **minimal cost paths**, **maximal information integration** and **stable networks**
 - **Sin** corresponds to **maximal cost paths**, informational **entropy increasing**, **fragile networks**
- How does Theology come in?
 - The closure point of the Ruliad (the compactifying point at infinity, TI) has properties that we traditionally attribute to God like **necessity**, **omnipotence** and **omniscience** (in limit)
 - **"Perfect Justice"** = Optimal pattern arrangement (max info, min entropy)
 - **"Perfect Love"** = maximal Observer coupling
 - These correspond to mathematical limits of the Observer's optimisation function



How Should We Live in a Computational Universe?

When We Combine

Ruliad

All possible computations

+

Observer Theory

How we sample it

+

Universal Telos

Climbing information gradients

+

Computational Ethics

Optimal path choice

=

A very practical set of answers

"Why am I here?"

To integrate information and create meaning

"What should I do?"

*Choose actions that maximise virtue,
minimise sin and computational debt, given
your constraints and unique causal history*

"What's life purpose?"

*To serve as **the universe observing itself** – as
cleanly, deeply and lovingly as you can*



Practical Implications

1. Treat your attention and choices as **scarce computational resources**
2. Build don't break; repair don't resent
3. Build networks with other observers in ways that increase global knowledge
4. Accept that you will never reach perfect knowledge, but know your personal path toward it matters enormously

Or more poetically...

You are not an accident in a meaningless void. You are **necessary** and **unique Observer** in a computational totality, exploring an infinite possibility space. **You matter** because **you are the only person with your specific lens** to accomplish this goal.





COMPUTATIONAL INTERPRETATIONS

Genesis as Compressed Computational Wisdom (1/2)

Hypothesis: Genesis encodes principles of Observer optimisation in a computational universe

Adam's Ensoulment: Making the Invisible Structure Visible

Genesis 2:7: "Then the Lord God formed man of dust from the ground and breathed into his nostrils the breath of life, and man became a living soul"

- Torah does not argue Adam was first biological man / tribe of men it says he/they were first people with awareness of Infinite God
- Prior to ensoulment humans:
 - Optimised locally – “Does this work better here, now?”
 - Trapped by causal history: cruel cultures (e.g. child sacrifice) locked into inefficient regions of computational possibility space
 - Couldn't see if their hill was *the* mountain i.e. no awareness of limit condition (TI), hill climbing in heavy fog!

Pre-soul

TI is there at closure point but outside computational boundedness of Observers i.e. **epistemically invisible**



Post-soul

Awareness of unique morphism from Observer to TI. New weighting of choices by convergence condition

Global Optima vs. Local Optima problem

Adam knows topology completes – can weigh decisions to Global Optima

Naming and Eve: Compression and Complementarity

Genesis 2:19-20: "And out of the ground ... brought them to the man ...And whatever the man called every living creature, that was its name."

- **The computational interpretation:** Naming represents the extraction of **equivalence classes** from messy sensory data
- Each creature mapped to a class
- Outcome: the world becomes **factorable** into reusable concepts – a precondition for science and mathematical abstraction

Genesis 2:18,21-22: "So the LORD God caused a deep sleep... and while he slept took one of his ribs... and made [it] into a woman."

- Why is another Observer (like Adam) computationally necessary?
 - Some morphisms only exist between Observers
 - Dyadic structure (Adam-Eve) unlocks **complimentary sampling** (combined they access more of the Ruliad), **mutual information gain** and new types of **efficient morphisms** (love, commitment etc.) that are unavailable to a single agent

Genesis as Compressed Computational Wisdom (2/2)

Hypothesis: The Fall is Computationally Necessary for Free Will – You can't understand the 'best' without experiencing 'worse'

The Fall as a required symmetry-breaking choice

Why would God allow the fall – why isn't creation just perfect?

- Simple: **maximal choice / creative potential + wisdom to make right choice** is most God-like 'thing'
- Post-soul Adam has near perfect guidance – he *"walks with God"*
- But optimal path knowledge **collapses choice to a singleton**

Paradox

- More knowledge leads to less potential choice
- God has both perfect knowledge and maximal freedom
- Pre-fall Adam has knowledge but lacks genuine freedom – *like a chess engine that always plays the top move!*

Resolution (computational view)

- To make humans truly "God-like", you need to reintroduce epistemic uncertainty
- Fall is a phase transition from "one obvious optimal path" to "many plausibly good paths" – i.e. computational irreducibility

Cain's murder as search for the global minima

Why Cain killing Abel is the first post-Fall sin?

- Simple: **murder** is **maximally computationally efficient** method to probe the global **ethical minima (i.e. worst gradient!)** in the space of all possible actions
 - Massive entropy spike
 - Network damage
 - Distance from convergence (information poor, isolated state)
 - Irreversibility – creates unrecoverable

Mapping perspective

- As Fall opens full choice space, system / Observers must sample worst regions to know where not to live!
- Act not justified, but **informationally inevitable** in a universe where complete mapping of moral landscape is allowed

Plain-English

- If you're integrating a complete map, you can't just visit gardens; you also must walk through the wastelands (ideally only once!)



Synthesis: Why This Isn't Just Clever Exegesis

Taken together:

Ensoulment

Awareness of Global
Optimisation Landscape

Naming

Tools for efficient search

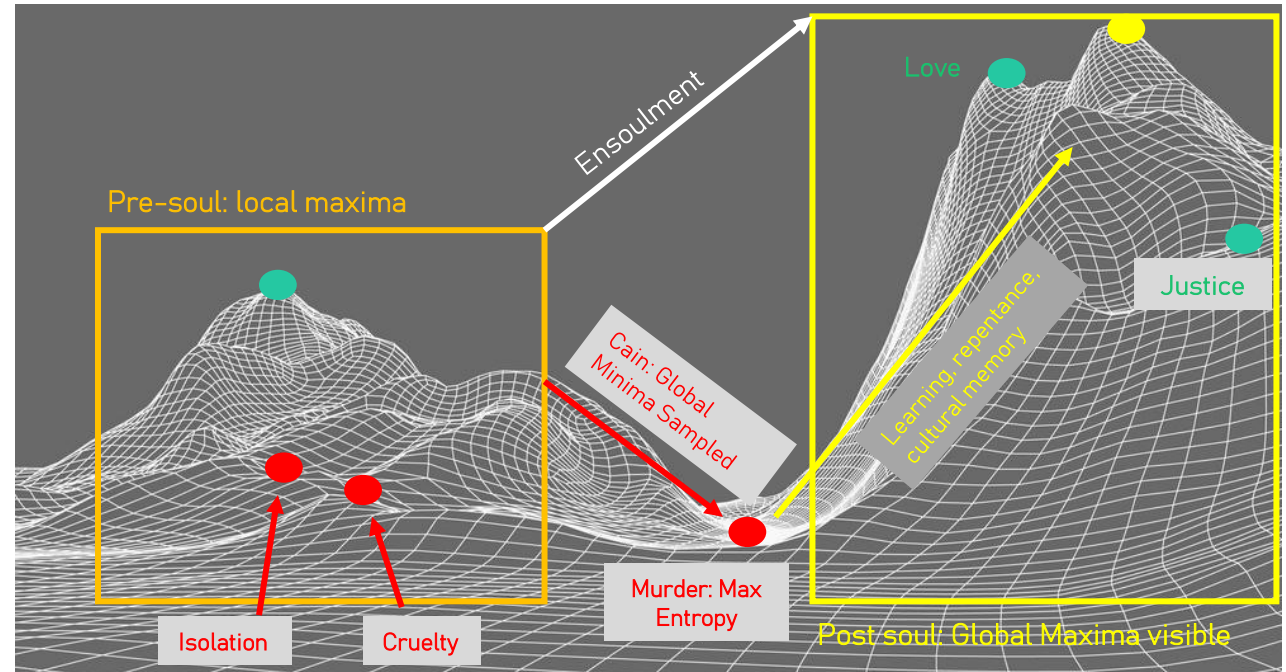
Eve

Relational architecture for
extended coverage

Fall + Cain

Necessary exploration so
that full topology is
accessible and knowable

Rulial Information Gradient Landscape:



The God Conjecture goes *beyond* traditional theology by explaining **why** these stories are structurally necessary

Goes *beyond* reductive materialism by treating consciousness, morality and meaning as **necessary** features of observer-based computation





CONCLUSIONS (FINALLY!)

Conclusion

The God Conjecture proposes a precise, breakable conjecture over vague, unfalsifiable metaphysical comfort blankets



What we started with:

- **The Ruliad:** reality as the entangled limit of all possible computations
- **Observers:** bounded samplers running a universal loop
- **Undecidability:** Ultimate questions (God, meaning, free will) cannot be resolved inside our own system

What moves did we make:

- Showed how **physics** slots into this picture
- Reframed **evolution** as optimisation of information integration architectures
- Proposed **Universal Telos:** climbing information gradients under constraints
- Sketched **Computational Ethics:** path selection criteria

Then we mapped:

- Classical Theology to the Ruliad
- Applied it to religious evolution to show an abstraction ladder of computational complexity

What's New and What Isn't:

Not New

- Using computation as a lens on physics
- Using information and complexity to talk about life and mind
- Recognising ethical convergences across traditions (meta-ethics)

What the God Conjecture Adds

- An isomorphism claim about God and the Ruliad* (**Ruliad is not equivalent to God!!!**)
- Observer-first framing
- Universal Telos
- Computational Ethics
- Concrete Computational Theology and Ethics research directions

Note: this is a conjecture, not a theorem. It rests on specific assumptions that can be tested and could fail!



Why This Matters (Even If It's Wrong)

Even if the Conjecture turns out to be false or incomplete, the attempt buys us several things:

1. A shared language

- It forces physics, biology, consciousness studies, philosophy, and theology into **one formal vocabulary** (computation, observers, information)

2. Sharper questions

- What exactly do we mean by God, meaning, free will, evil, telos?
- Which parts are essentially theological, and which are about **observer dynamics**?

3. Better experiments

- Thinking in terms of observers and telos suggests new experiments in non-neural cognition, multi-scale integration, memetic and ethical dynamics

4. A narrative that doesn't insult either side

- It gives religious people a way to take science **seriously**
- It gives scientists a way to take religious questions **seriously**, without turning off their error-detectors



In other words – “Even a failed bridge is useful if it tells us where the river actually is”