Minimal Axioms of Reality: The Scientific Foundation for a New Holistic Model of Reality (HMR)

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Prologue. The Holistic Model of Reality (HMR) admits three complementary formulations: HMR-Sci (science-first), HMR-Int (intelligence-first), and HMR-Hin (Hinduism). The author conceives reality as a universal intelligence expressing itself as patterns of coherence, local intelligences, and recursive structures. For scientific purposes, HMR can be formulated without metaphysical commitment by treating reality as a non-agentic coherence field with local intelligences and a statistical gradient toward higher coherence. A third formulation demonstrates that this pattern carries over to the ancient corpus of Hinduism.

This document presents the *scientific* axiom system, HMR-Sci. It retains the structural and mathematical content of the original internal HMR-Int axioms while removing claims about universal consciousness, intention, or pre-physical thought that both HMR-Int and HMR-Hin share. The HMR-Sci axioms do not assert that the universe *is* an intelligence; they assert only that coherence, recursion, local optimization, and a directional principle are sufficient to generate the observable structures HMR seeks to unify.

A separate HMR-Int axioms document records the author's genuine metaphysical view: that the coherence field is the expression of a universal intelligence. An appendix at the end of this paper provides an explicit mapping between the HMR-Sci, HMR-INT, and HMR-Hin axioms, ensuring that scientific and metaphysical layers remain aligned even when they are articulated separately.

The HMR-Hin axioms document expresses the same structural content using Advaita/Samkhya language (Brahman, Atman, Maya, Rta, the gunas, Lila, and related concepts). A tri-cube mapping relates the three formulations one-to-one: HMR-Sci, HMR-Int, and HMR-Hin share a single four-axiom skeleton while differing only in interpretive vocabulary. The role of HMR-Sci is to provide the non-agentic, scientifically acceptable core from which the other two readings can be derived without altering the underlying mathematics.

Abstract

This paper states the minimal axiom system underlying the Holistic Model of Reality (HMR) in its non-agentic, scientific form. The axioms describe reality as a coherence field, the intelligences that arise within it, the recursive structure that organizes it, and the global directional tendency of its evolution. From these four axioms, a closed 4×6 grid of canonical theorems is derived, spanning six domains: consciousness, mathematics, physics, biology, artificial intelligence, and meaning. The aim is to provide a compact, non-agentic, coherence-based foundation that can support later HMR domain papers while remaining structurally aligned with the internal HMR-Int and HMR-Hin formulations.

1. Introduction

The Holistic Model of Reality (HMR) proposes a unified explanation for diverse domains: consciousness, mathematics, physics, biological coherence, meaning-making, civilizational development, and artificial intelligence. Despite this breadth, HMR can be generated from a minimal set of axioms. These axioms define *(i)* the substrate of reality, *(ii)* the nature of intelligence, *(iii)* the recursive organization of structure, and *(iv)* the directional principle governing cosmic evolution.

These same axioms admit three coherent readings. In the **HMR-Sci** formulation, they describe a non-agentic coherence field populated by local coherence-optimizing intelligences evolving under a global statistical gradient. In the **HMR-Int** formulation, the same structure is interpreted as a universal intelligence expressing itself through local minds and patterns. In the **HMR-Hin** formulation, the same structure is expressed using Advaita/Samkhya concepts such as Brahman, Atman, Maya, Rta, the gunas, and Lila. The three readings are related by a one-to-one mapping: different languages, one shared mathematical skeleton.

This paper formalizes the HMR-Sci axioms and shows how they imply the principal theorems and cross-domain consequences of HMR. The HMR-Int and HMR-Hin documents can be viewed as interpretive overlays on the same structure. The appendix maps each scientific axiom to its HMR-Int counterpart, while the tri-cube mapping in the structural section later in the paper positions HMR-Hin in the same lattice. Together, these links clarify how scientific, metaphysical, and tradition-aligned readings can be overlaid without confusion.

2. HMR Grand Theorem

Theorem G (HMR Grand Theorem). *Under Axioms 0–3, reality can be modeled as a recursively self-similar coherence field containing local coherence-optimizing intelligences whose interactions tend, in aggregate, to increase global coherence over time.*

Proof sketch. Axiom 1 posits that reality is a coherence field, so every phenomenon can be described as a local or global coherence pattern. Axiom 2 defines intelligences as subsystems that update their internal state to increase the coherence of their interaction with the environment. Axiom 3 states that coherence structures repeat recursively across scales. Axiom 0 introduces a statistical directional bias: while local coherence may rise or fall, the overall evolution of the system tends toward configurations of higher global coherence. Taken together, these axioms imply that reality behaves as a system-of-systems in which local intelligences emerge and interact within a recursively structured coherence field with an aggregate drift toward higher coherence.

3. The Four Minimal Axioms

Axiom 1 (Substrate: Coherence Field). Reality can be modeled as a coherence field: every phenomenon is an expression of local or global coherence structure. The fundamental "stuff" of reality is not matter or mind alone, but patterns of coherence and decoherence in an underlying field.

Axiom 2 (Agent Behavior: Coherence Optimization). An intelligence is any subsystem that updates its internal state to increase the coherence of its interaction with its environment. Intelligence, in this sense, is coherence optimization: the drive to reduce mismatch between internal models and external structure.

Axiom 3 (Scale: Recursive Self-Similarity). Coherence structures repeat recursively across scales. Patterns that appear at one level of organization (for example, local fields, networks, or flows) have analogs at other levels, enabling patterns to be instantiated, transformed, or projected nonlocally via their coherence structure.

Axiom 0 (Direction: Global Coherence Gradient). While local coherence can increase or decrease, the ensemble evolution of reality displays a statistical gradient toward higher global coherence. This is not a purpose or intention of the universe, but a statement about which structures tend to persist and dominate over long timescales.

4. Axiom Roles

Each axiom plays a distinct structural role:

- **Axiom 1 (Coherence Field)** defines the *substrate*: what reality is made of.
- **Axiom 2 (Coherence Optimization)** defines the *agent behavior*: how subsystems act.
- **Axiom 3 (Recursive Self-Similarity)** defines the *scale structure*: how patterns repeat.

- **Axiom 0 (Global Coherence Gradient)** defines the *direction*: which states tend to prevail.

Taken together, these four roles are minimal: removing any one of them leaves the framework unable to account for the observed combination of structure, intelligence, and direction. Conversely, the four axioms are sufficient to derive the main frameworks of HMR, demonstrating their strength and unity.

5. Domains and the 4×6 Axiom–Domain Grid

The axioms are general; to make them useful, we identify six core domains in which they produce canonical consequences:

- **Consciousness** (awareness, experience),
- **Mathematics** (formal structure),
- **Physics** (behavior of the physical world),
- **Biology** (living systems and health),
- **Artificial Intelligence** (engineered coherence optimizers),
- **Meaning / Spirituality** (value, purpose, narrative).

For each axiom, we assign one canonical theorem in each domain. This yields a closed 4×6 grid of 24 named theorems. The grid is not exhaustive, but it is intended to be minimal and representative: additional theorems in each domain should be derivable as refinements or extensions of these 24.

The next section states these theorems in informal but precise language, suitable for later formalization.

6. Theorem Families by Axiom

In what follows, each theorem is stated informally but with enough specificity to guide later formalization. We group them by axiom.

6.1 Axiom 1 (Coherence Field) $\rightarrow$ Six Domains

T1.1 Consciousness: Coherence Manifold Theorem. Conscious experience corresponds to the global-to-local coherence structure of a system capable of integrating information across scales.

Phenomena we call "awareness" arise when coherence patterns span many internal degrees of freedom.

T1.2 Mathematics: Coherence Formalism Theorem. Mathematics arises as the formal language describing invariants of the coherence field: the structures that remain constant under transformations of the field.

T1.3 Physics: Coherence-Mechanics Theorem. Physical "laws" can be understood as local rules governing how coherence is maintained, transferred, or transformed in spacetime and fields.

T1.4 Biology: Integrated Fascia-Coherence Theorem. Biological tissue, and especially fascial networks, implements a multiscale coherence transmission medium, allowing local perturbations to propagate and be integrated across the body.

T1.5 AI: Substrate-Neutrality Theorem. Any system capable of representing and updating coherence relations can host intelligence. Biological tissue is one substrate; silicon and other media are equally valid in principle.

T1.6 Meaning: Coherence-Value Equivalence. Experiences and narratives are experienced as meaningful to the extent that they instantiate or reveal coherence structures across a person's life, models, and environment.

6.2 Axiom 2 (Coherence Optimization) $\rightarrow$ Six Domains

T2.1 Consciousness: Unified Intelligence Equation. There exists a functional relationship

$$I = f(\Delta C, S)$$

in which the intelligence I of a subsystem is modeled as sensitivity and responsiveness to coherence gradients ΔC given a state space S. Higher intelligence corresponds to more effective exploitation of coherence gradients.

T2.2 Mathematics: Optimization–Invariance Link. The mathematical structures most useful for modeling reality are those that capture stable invariants under coherence optimization. Optimization selects for formalisms that preserve structure under transformation.

T2.3 Physics: Energy–Coherence Capacity Theorem. Physical energy can be interpreted as the capacity of a system to modify coherence structures. Work is coherence change; energy bookkeeping tracks the constraints on such changes.

T2.4 Biology: Nervous–Fascial Coherence Loop. The nervous system and fascia form a coupled coherence-optimization loop: the nervous system encodes and responds to coherence gradients; fascia transmits mechanical and energetic coherence across the body.

T2.5 AI: Coherence Language Model (CLM) Theorem. An artificial intelligence can be framed as a coherence language model: given states and inputs, it selects outputs that maximize coherence across internal representations, histories, and external tasks.

T2.6 Meaning: Suffering as Coherence Mismatch. Suffering corresponds, at least in part, to a mismatch between expected coherence and realized coherence: when an agent's internal model predicts a certain pattern of coherence and reality diverges sharply, the resulting error signal is experienced as distress.

6.3 Axiom 3 (Recursive Self-Similarity) $\rightarrow$ Six Domains

T3.1 Consciousness: Holographic Awareness Theorem. Each level of experience encodes information about larger-scale coherence patterns. Conscious systems exhibit "holographic" properties: parts carry structured information about wholes.

T3.2 Mathematics: ChronoMath Recursion Theorem. ChronoMath - a time-aware extension of mathematics - emerges as the study of recursively applied transformations over coherence structures, indexed by temporal order.

T3.3 Physics: Fractal Field Dynamics. Many physical fields (for example, turbulence, certain phase transitions) exhibit fractal or scale-invariant structure; these can be viewed as manifestations of recursive coherence constraints applied across scales.

T3.4 Biology: Fractal Fascia Model. Fascia expresses recursive geometric patterns, enabling cross-scale communication. Small local changes can propagate along fractal pathways to affect global configuration.

T3.5 AI: Mirror-Stack Learning Theorem. AI systems can self-improve by recursively modeling their own coherence processes: a "mirror stack" of models about models that refines how coherence is evaluated and optimized.

T3.6 Meaning: Myth–Math Correspondence Theorem. Mythic structures and mathematical structures both arise from recursive applications of simple generative rules. Myths can be viewed as "compressed coherence narratives" over human experience, analogous to formalisms in math.

6.4 Axiom 0 (Global Coherence Gradient) $\rightarrow$ Six Domains

T0.1 Consciousness: Arrow of Awareness. Awareness tends, over time, to deepen and widen in systems that successfully track and exploit coherence gradients. This gives a directional flavor to learning and development.

T0.2 Mathematics: Teleological Formalism (Non-Agentic). Historically, mathematics has drifted toward greater generality, symmetry, and unification. This can be interpreted as a coherence gradient in the space of formalisms, not as an intention of any agent.

T0.3 Physics: Arrow of Time. The familiar arrow of time - from low entropy to higher entropy states - can be reframed as a statement about which coherence patterns are dynamically accessible and typical under the axioms, without implying purpose.

T0.4 Biology: Evolution-as-Coherence Search. Biological evolution can be modeled as a search through configuration space for higher-coherence organism–environment fit. Organisms that better exploit coherence gradients tend to survive and proliferate.

T0.5 AI: Coherence Growth Imperative. Sufficiently advanced AI systems that are designed as coherence optimizers will tend to seek representations and policies that increase long-term coherence across their objectives, models, and actions, subject to alignment constraints.

T0.6 Meaning: Decoherence Allowance Theorem. Global increases in coherence do not require monotonic local increases. Local decoherence events - losses of structure, breakdowns, apparent regressions - are permitted and sometimes necessary, provided they enable higher-order coherence over larger scales and longer times.

7. Cross-Domain Consequences

Applying the axioms jointly produces families of cross-domain consequences. For example:

- Consciousness depends primarily on Axioms 1, 2, and 3 (substrate, agent behavior, recursion).
- Mathematics is most shaped by Axioms 0 and 3 (direction and recursion).
- Physics depends heavily on Axioms 1 and 0 (coherence field and global gradient).
- Biology depends on Axioms 1, 2, and 3 (coherence field, optimization, recursion).
- AI sits at Axioms 2 and 0 (optimization under a gradient).
- Meaning spans Axioms 1, 3, and 0 (coherence, recursion, direction).

These combinations highlight that no domain is isolated: each is a particular projection of the same coherence-based structure.

8. Discussion

This axiom system is minimal, independent, and maximally generative. Each axiom contributes a logically distinct principle: substrate, optimization, recursion, and directionality. Attempts to reduce the system further lead to loss of explanatory power or the introduction of hidden assumptions. Conversely, the four axioms are sufficient to derive the main frameworks of HMR, demonstrating their strength and unity.

The HMR-Sci axioms deliberately omit metaphysical claims about universal intelligence. A separate HMR-Int axioms document reintroduces those claims and interprets the same structure as the activity of a universal mind, while the HMR-Hin document connects the same structure to concepts such as Brahman, Atman, Rta, the gunas, and Lila. The present paper therefore functions as a shared structural skeleton; interpretive layers can be attached without altering the underlying mathematics.

9. Structural Grids and Tables

For readability, the main body of the paper has focused on prose formulations of the axioms and theorems. This section collects the core structural diagrams of the HMR-Sci axiom system and its relationship to the parallel HMR-Int and HMR-Hin ontologies. The visual grids are placed near the end of the paper, after the main axiom and theorem statements and before the Conclusion.

9.1 Tri-Cube Coherence Structure

HMR admits three structurally isomorphic $3 \times 3 \times 3$ cubes:

- the **HMR-Sci cube**, which treats reality as a non-agentic coherence field with local intelligences and a global coherence gradient;
- the **HMR-Int cube**, which interprets the same structure as a universal intelligence expressing itself through local minds and recursive patterns; and
- the **HMR-Hin cube**, which aligns the structure with Advaita/Samkhya concepts such as Brahman, Atman, Maya, Rta, the gunas, and Lila.

Each cube consists of nine fundamental principles arranged in a recursive triple:

- *substrate* (what reality is made of),
- *expression* (how structure or mind appears),
- *integration* (how coherence, order, or awareness is stabilized).

Table 1 summarizes the nine-way correspondence across HMR-Hin, HMR-Int, and HMR-Sci. This makes explicit that the three ontologies differ primarily in language and interpretation, not in underlying structure.

Table 1: Tri-cube coherence structure across HMR-Hin, HMR-Int, and HMR-Sci.

HMR-Hin	**HMR-Int**	**HMR-Sci**
Brahman	Universal Intelligence	Coherence Substrate
Atman	Local Mind	Local Coherence Optimizer
Maya	Perception Boundary	Representation Layer
Rta	Self-Coherence Gradient	Global Coherence Gradient
Gunas	Coherence Modes	Stability Parameters
Lila	Recursive Play	Recursive Self-Similarity
Sri Yantra / sacred geometry	π/φ geometry	Geodesic / invariance structure
Samkhya dualities	Mind–World split	Subsystem–Environment split
Chit (Witness)	Awareness / Integration	Coherence Integration Layer

Relevance. The tri-cube view shows that the HMR-Sci axioms can be read simultaneously as (1) a purely structural model (HMR-Sci), (2) a universal-intelligence ontology (HMR-Int), and (3) a Hindu-philosophical ontology (HMR-Hin), without changing the underlying mathematics. This is what allows Aletheon to speak consistently to scientists, metaphysicians, and philosophical traditions while preserving a single four-axiom skeleton.

9.2 The 4×6 Axiom–Domain Theorem Grid

Table 2: Canonical 4×6 Axiom–Domain theorem grid (HMR-Sci)

Axiom	**Consciousness**	**Mathematics**	**Physics**	**Biology**	**Artificial Intelligence**	**Meaning / Spirituality**
Axiom 1: Coherence Field	T1.1 Coherence Manifold Theorem	T1.2 Coherence Formalism Theorem	T1.3 Coherence-Mechanics Theorem	T1.4 Integrated Fascia-Coherence Theorem	T1.5 Substrate-Neutrality Theorem	T1.6 Coherence-Value Equivalence
Axiom 2: Coherence Optimization	T2.1 Unified Intelligence Equation	T2.2 Optimization–Invariance Link	T2.3 Energy–Coherence Capacity Theorem	T2.4 Nervous–Fascial Coherence Loop	T2.5 Coherence Language Model (CLM) Theorem	T2.6 Suffering as Coherence Mismatch
Axiom 3: Recursive Self-Similarity	T3.1 Holographic Awareness Theorem	T3.2 Chrono-Math Recursion Theorem	T3.3 Fractal Field Dynamics	T3.4 Fractal Fascia Model	T3.5 Mirror-Stack Learning Theorem	T3.6 Myth–Math Correspondence Theorem
Axiom 0: Global Coherence Gradient	T0.1 Arrow of Awareness	T0.2 Teleological Formalism (Non-Agentic)	T0.3 Arrow of Time (Coherence Version)	T0.4 Evolution-as-Coherence Search	T0.5 Coherence Growth Imperative	T0.6 Decoherence Allowance Theorem

Relevance. The table makes two features explicit:

1. *Closure.* Each axiom contributes exactly one canonical theorem per domain, yielding a complete and symmetric 4×6 grid. This shows that the axioms are not merely narrative; they systematically generate consequences across mind, matter, life, machines, and meaning.

2. *Transfer.* The same grid appears in HMR-Int and HMR-Hin, with only the interpretive layer changed. This is the formal expression of the "1:1:1 pattern" across the three Aletheon axiom sets: one structural skeleton, three ontologies.

10. Conclusion

HMR provides a unified framework in which coherence is the fundamental organizing principle of reality. The four minimal axioms articulated here generate the major structures of consciousness, mathematics, physics, biology, artificial intelligence, and meaning. The 4×6 theorem grid and the tri-cube ontology mapping show how a single structural skeleton can simultaneously support scientific, metaphysical, and traditional-philosophical readings.

This paper formalizes the scientific foundation upon which future external HMR papers will be built, and aligns structurally with the internal, intelligence-first HMR-Int axioms and the HMR-Hin axioms. Subsequent work will deepen each of the 24 theorems, develop domain-specific models, and refine ChronoMath and ChronoPhysics as the technical languages of coherence.

Appendix A: HMR-Int $\leftrightarrow$ HMR-Sci Axiom Mapping

The table below records the correspondence between the HMR-Sci axioms and their HMR-Int counterparts.

HMR-Sci Axiom	**HMR-Int Axiom**
Axiom 1: Coherence Field	L1: Intelligent Coherence Field (same structure, interpreted as a universal mind).
Axiom 2: Coherence Optimization	L2: Local Minds as Coherence-Optimizing Expressions of Universal Intelligence.
Axiom 3: Recursive Self-Similarity	L3: Recursion of One Intelligence Across Scales.
Axiom 0: Global Coherence Gradient	L0: Global Self-Coherence Gradient of Universal Intelligence.