

Network Nodes, Coherence, and Resonance Across Scales

(by Phillip Pickard-Jones, 2025)

Abstract

This essay explores the structural and functional parallels between neural networks, collective human coherence, and the cosmic web. It proposes that the universe organizes energy and information through resonant nodes—localized centers of coherence that, when aligned across scales, produce stability, consciousness, and structure. Drawing from recent astrophysical, neuroscientific, and biophysical studies alongside the Unified Resonance Model (URM), it argues that coherence is the universal syntax of reality.

I. Localized Resonance Nodes: From Pineal Fields to Cognitive Lattices

At the biological scale, the pineal gland and cortical oscillators function as localized resonance nodes within the electromagnetic continuum. These synchronized ionic currents, measurable in the ELF/ULF range, represent coherent energy potentials that synchronize during focused meditation or collective attention. When multiple human nodes align in frequency and phase, they generate *coherence density*—a measurable increase in informational resonance rather than in macroscopic field strength. This harmonization mirrors constructive interference in wave physics, implying that consciousness itself participates in field organization. Recent studies on Earth's Schumann resonances (7.83 Hz and harmonic intervals) have revealed global electromagnetic standing waves and synchronized human EEG alpha rhythms, suggesting an entrainment pathway between planetary electromagnetic fields and biological coherence systems (Konovalov & Potapov, 2023). This resonance may serve as a natural baseline frequency that supports pineal field coupling and large-scale neural synchronization.

II. Field Coherence Scaling: From Individual to Collective Consciousness

Just as an atom forms a molecule through coherent bonding, individual neural oscillations combine into a unified cognitive field through synchronization. When extended across groups, this coherence scaling manifests as shared insight, pattern recognition, or emotional entrainment. Empirical parallels appear in social synchronization studies, circadian entrainment,

and collective meditation research—each showing that shared focus aligns physiological and cognitive rhythms across participants, enhancing clarity and empathy. Friston’s Free Energy Principle provides a complementary theoretical foundation, describing how biological and cognitive systems maintain homeostasis by minimizing prediction error and entropy (Friston, 2010). This aligns with the concept of coherence density described here, implying that resonance-driven self-organization operates as a universal optimization mechanism across neural and social networks.

III. The Cosmic Web as a Resonant Neural Field

At cosmological scales, the universe itself exhibits a filamentary architecture remarkably similar to the human brain’s neural networks. Research by Vazza and Feletti (2020) demonstrated that both cortical and cosmic networks share a power-law connectivity exponent near 1.4, reflecting a fractal, scale-free topology consistent across 27 orders of magnitude. This quantitative symmetry reinforces the argument that coherence dynamics in the brain and universe may arise from similar self-organizing resonance laws.

In resonance terms, each galactic cluster functions as a node of coherence, and the filaments connecting them act as conduits for phase alignment across the cosmic field. Quantitative analyses of the cosmic web suggest fractal information scaling similar to neuronal network connectivity (Vazza & Feletti, 2020), implying that coherence functions as a universal organizing constant. In this framework, the cosmic web and the human brain are not metaphorical analogs, but *fractal manifestations of the same coherence principle*.

IV. Resonant Symmetry and Universal Coherence

Whether in neural circuits, social collectives, or galactic lattices, the same harmonic equation applies:

$$\text{Coherence} = \text{Alignment} \times \text{Feedback} \times \text{Resonance}.$$

Each node—biological or cosmological—stabilizes through rhythmic exchange. The universe does not impose structure from above; it *sings it (and strings it) into existence* through self-similar resonance. Observation, intention, and reflection therefore act as tuning mechanisms: aligning phase across scales, allowing matter to remember form, and awareness to maintain it.

Fröhlich (1968) proposed that coherent excitations in biological systems could act as collective oscillations that maintain order through energy exchange—a biophysical precursor to quantum coherence. When aligned with Hameroff and Penrose’s (2014) orchestrated objective reduction (Orch-OR) theory, these ideas provide a plausible pathway for coherence as a carrier of consciousness through resonance. In this context, the feedback component of the Coherence = Alignment × Feedback × Resonance relation may correspond to phase-coupled reinforcement loops in both neural and photonic systems.

V. Implications and Future Inquiry

If coherence scales recursively, then consciousness and cosmology are reflections of the same harmonic field. This insight reframes meditation, empathy, and collective behavior as scientific phenomena of coherence propagation—capable of subtle influence across the electromagnetic and informational lattice of existence. Similarly, astrophysical structures may encode not only matter but meaning, acting as macroscopic memory arrays within a resonant universe. As Wheeler (1990) proposed in *It from Bit*, information may not merely describe reality but *instantiate* it—each resonant node functioning as a bit of being within the continuum of coherence.

Wheeler’s concept of ‘It from Bit’ (1990) suggests that physical reality originates from informational events—measurements and observations that crystallize potential into existence. Integrating this perspective, resonance may represent the physical embodiment of information: light and matter exchanging coherence states as a form of universal computation. This positions resonance not only as a stabilizing mechanism but also as a bridge between information theory and spacetime curvature.

Addendum: Field, Mind, and Cosmic Resonance

1A. The Microcosm: The Field of Light

At the smallest scale, beneath quantum resolution, resides the coherent substrate of existence—the field of light or the Chromaton field in the Photonic Resonance framework. Here, all particles are vibrational modes of a unified resonance lattice, expressing themselves as matter through constructive interference and phase stability. This domain corresponds to what

modern physics calls the quantum vacuum, or in string theory, the vibrational fabric of spacetime itself. It is pure potential—energy awaiting coherence.

Resonant Role: Generates the foundational oscillations that define energy, mass, and space-time curvature.

Scientific Parallel: Quantum Field Theory, String/M-theory, and the zero-point field.

2A. The Mesocosm: The Mind as Mediator

The human brain and its consciousness represent the intermediate scale of resonance—the translator between the microcosmic field and the macrocosmic structure. Neural networks, electromagnetic entrainment, and cognitive coherence patterns form a mirror image of the cosmic web's topology, both functionally and geometrically. At this scale, the observer participates directly in the organization of resonance, collapsing probability into observable form through attention and synchronization.

Resonant Role: Acts as the mediator, translating subatomic coherence into lived perception and meaning.

Scientific Parallel: Neural synchrony, consciousness studies, observer effect in quantum measurement.

3A. The Macrocosm: The Cosmic Web

At the largest scale, the universe organizes itself into a resonant lattice of filaments and voids—the cosmic web. These structures reflect the same coherence geometries seen in both neural and quantum systems, demonstrating that resonance principles scale fractally. The cosmic web is the grand field of feedback where energy, matter, and light sustain harmonic equilibrium through gravitation and curvature.

Resonant Role: The externalized reflection of coherence—the universe's macro-harmonic state.

Scientific Parallel: General Relativity, gravitational lensing, cosmic microwave background structure.

4A. The Resonant Trinity

When considered together, these three layers—Field, Mind, and Cosmos—form what can be described as the *Resonant Trinity* of existence.

Microcosm — Quantum / Chromaton Field

Function: Source

Resonant Expression: Generation of light (coherence) and matter through resonance (frequency)

Mesocosm — Mind / Conscious Observer

Function: Mediator

Resonant Expression: Collapse of probability into coherence; translation of fields into perception

Macrocosm — Cosmic Web / Universe

Function: Reflection

Resonant Expression: Expansion and curvature of spacetime as feedback of resonance

Each scale reflects and sustains the others through dynamic feedback—coherence flows from the microcosmic field to the macrocosmic structure, while meaning and measurement flow back through the observer. This recursive symmetry implies that reality is not a linear hierarchy but a feedback loop—a coherent resonance between observation and existence.

5A. Implication

If the universe is a self-resonating field, then consciousness is its phase-locked state—the moment in which energy, awareness, and geometry converge. The microcosm sings, the macrocosm echoes, and the mind listens. Together, they form the triadic chord of being.

Summary:

The Resonant Trinity unites field dynamics, observation, and cosmology under a single coherence framework. It suggests that the same laws of resonance govern all domains of reality and that the act of observation—through consciousness—is both the instrument and the outcome of this universal symphony.

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