

An Ecological Systems View of Psychedelics

**The Psygaia Hypothesis:
A Systems View of Psychedelics**

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Abstract

Amidst escalating planetary health challenges at individual, social, and ecological scales, there is growing interest in the therapeutic and transformative potential of psychedelics. Emerging empirical research has identified consistent associations between serotonergic psychedelic experiences, increased nature-relatedness, and pro-environmental attitudes. However, the cognitive mechanisms underlying these relationships remain insufficiently theorized. Drawing on systems theory, enactive cognition, and biosemiotics, this paper proposes a distributed and relational account of psychedelics and their effects. Specifically, it argues that naturally occurring serotonergic psychedelics may facilitate ecological attunement—a mode of embodied cognition in which interdependence within living systems becomes perceptually and motivationally salient—by modulating organism-environment coupling in ways that temporarily restore sensitivity to relational and ecological signals that habitual ego-centered cognition suppresses. Within this framework, psychedelic compounds are understood as interspecies signaling molecules that influence human sense-making through cross-species biochemical interaction, rather than solely through intraneuronal mechanisms. The paper examines phenomenological reports of relational and mystical experiences, interpreting them through an integrative systems-based framework. It further considers sociocultural conditions that may shape whether such experiences translate into sustained ecological attitudes or behaviours. By situating psychedelic research within a relational framework, this approach aims to expand models of psychedelic action beyond strictly neurocentric or symptom-focused accounts, while remaining grounded in empirically tractable biological and cognitive processes.

1.0 - Introduction

In recent years, research on serotonergic psychedelics—including psilocybin, DMT, mescaline, ayahuasca, and LSD—has expanded substantially, demonstrating their capacity to reliably induce experiences characterized by self-transcendence, emotional openness, mystical-type meaning, insight, and enhanced cognitive flexibility (Griffiths et al., 2011; Kuypers et al., 2016). In addition to therapeutic outcomes, a growing body of empirical work has identified associations between psychedelic experiences and increased nature-relatedness, connectedness, empathy, and prosocial attitudes (Carhart-Harris & Friston, 2019; Forstmann & Sagioglou, 2017; Kettner et al., 2019; Paterniti et al., 2022). These findings suggest that psychedelic-induced cognitive shifts may extend beyond intrapsychic or interpersonal domains to influence how individuals perceive and relate to the broader social and ecological systems in which they are embedded.

While existing models have primarily focused on neural mechanisms—such as alterations in brain network integration, predictive processing, and hierarchical belief updating—less attention has been given to how these neurocognitive changes may reorganize organism-environment coupling. The present paper examines this question through an integrative and systems-based framework that draws on Gaia and systems theory, enactive cognition, and biosemiotics. These approaches converge in conceptualizing cognition not as an isolated neural computation, but as generative and embodied sense-making emerging through dynamic, structural coupling between organisms and their environments.

Within this framework, psychedelic compounds are understood as biologically evolved molecules that participate in interspecies chemical signaling networks. When ingested, they interact with human neurophysiology in ways that may modulate perceptual and affective salience, potentially increasing sensitivity to relational and systemic patterns.

This perspective does not displace neurobiological accounts but situates them within broader ecological and relational contexts. On this basis, the paper introduces ecological attunement as a mode of embodied cognition in which interdependence within living systems becomes experientially and behaviourally salient.

1.1 - Research Question

Empirical research indicates that, under specific set and setting conditions, psychedelic experiences frequently involve recurrent phenomenological motifs characterized by (i) boundary dissolution and self-transcendence, often described in mystical or unity-related terms (Griffiths et al., 2011); (ii) heightened perceptions of aliveness or animacy in the more-than-human environment; and (iii) affectively salient insights concerning interdependence and ecological embeddedness (Forstmann & Sagioglou, 2025; Irvine et al., 2023). These experiential patterns are complemented by quantitative findings linking psychedelic use with increased nature-relatedness, as well as shifts in pro-environmental attitudes and behaviours (Forstmann & Sagioglou, 2017; Kettner et al., 2019; Lyons & Carhart-Harris, 2018; Paterniti et al., 2022).

Together, these findings suggest that psychedelic experiences may, under certain conditions, reorganize cognitive processes (including perception, affect, and behaviour) in ways that foreground relational and ecological dimensions of experience. In the present paper, this pattern is provisionally termed ecological attunement, defined as a mode of embodied cognition in which interdependence within living systems becomes perceptually and motivationally salient.

Neuroscientific models have made substantial progress in identifying neural correlates of psychedelic states, including alterations in default mode network integrity, increased global functional connectivity, and changes in hierarchical predictive processing

(Carhart-Harris & Friston, 2019). However, while such accounts describe mechanisms at the neural level, they do not fully address how these neural changes relate to the recurrent relational and ecological themes documented in phenomenological and behavioural research. This gap invites further theoretical integration across levels of analysis.

To address this issue, the present paper develops an integrative framework drawing on Gaia and systems theory, enactive cognition, and biosemiotics. Rather than positioning ecological phenomenology as evidence of metaphysical claims, this approach seeks to interpret psychedelic-induced relational experiences within a distributed and ecological model of cognition. The central research question guiding this analysis is: How might psychedelic experiences modulate organism-environment coupling in ways that contribute to ecological attunement, and which theoretical frameworks best account for this pattern without reducing it to purely neural description or invoking non-naturalistic explanations?

1.2 - Theoretical Framework

To examine how psychedelic experiences may influence ecological attunement, this paper integrates three complementary theoretical traditions that conceptualize life and mind in relational and systems-oriented terms: systems and Gaia theory, enactive models of cognition, and biosemiotics. Together, these frameworks provide multi-level conceptual resources for situating psychedelic effects within broader organism-environment dynamics.

Systems theory and Gaia theory model Earth as a complex, self-organizing system characterized by distributed feedback processes across biological and geochemical domains. In this paper, Gaia theory is employed in its weak, cybernetic formulation as an Earth-system model that describes regulatory dynamics without invoking planetary consciousness or teleology (Capra & Luisi, 2014; Lovelock & Margulis, 1974). This perspective situates

human cognition and culture within nested ecological systems rather than treating them as ontologically isolated phenomena.

Enactive cognition extends systemic principles to the domain of mind, conceptualizing cognition as embodied sense-making emerging through dynamic organism-environment coupling (Varela et al., 2016). Within this framework, meaning is enacted through interaction rather than internally represented as detached symbolic content. Psychedelic-induced alterations in perception, affect, and behaviour may therefore be understood as modifications to coupling dynamics and salience structures rather than solely as changes in internal neural representation.

Biosemiotics further complements this perspective by examining how living systems engage in non-linguistic sign processes across biological scales (Hoffmeyer, 2008). From this viewpoint, chemical signaling constitutes a fundamental mode of interspecies communication. Psychedelic compounds, as biologically evolved molecules, can be interpreted as participating in such semiotic networks. When introduced into human neurophysiology, they may modulate perceptual and affective dynamics, reshaping which environmental features are experienced as meaningful.

The proposed framework synthesizes these traditions to provide a multi-scalar model of psychedelic-induced cognitive change. Rather than positioning ecological phenomenology as evidence of metaphysical claims, this synthesis interprets psychedelic experiences as potential reorganizations of embodied sense-making within nested systems. In doing so, it seeks to bridge neural, phenomenological, and ecological levels of analysis while remaining within systems-based explanatory boundaries. This naturalistic framing is adopted as a deliberately bounded, localized translation. It does not claim to decode the full scope of psychedelic experiences, nor can it encapsulate or supersede non-Western and Indigenous

lineages of practice that have developed their own long-standing, systematic mappings of these ecological relationships.

1.3 - Methodology & Structure

This article presents a conceptual and interdisciplinary analysis rather than an empirical study. Its primary aim is theoretical integration and interpretive clarification. The Psygaia framework is advanced as a heuristic and hypothesis-generating model intended to organize existing interdisciplinary findings and identify avenues for future research, rather than to offer definitive causal explanations.

Methodologically, the analysis proceeds in three stages. First, a focused and selective review of contemporary empirical literature examines associations between psychedelic experiences and nature-relatedness, environmental concern, and relational or prosocial outcomes. The review is not systematic but is guided by relevance to organism-environment coupling and ecological attunement as defined in this paper.

Second, phenomenological descriptions of psychedelic experiences reported in clinical trials, qualitative studies, and large-scale survey research are examined to identify recurrent experiential structures. These reports are treated analytically as patterns in embodied sense-making rather than as direct ontological claims about external reality. The goal is to clarify how ecological and relational themes manifest at the level of lived experience.

Third, empirical and phenomenological findings are placed in dialogue with systems theory, enactive cognition, and biosemiotics through conceptual mapping and integrative analysis. This process aims to articulate how psychedelic-induced cognitive changes may be

interpreted as reorganizations of organism-environment coupling, salience dynamics, and semiotic engagement across multiple scales.

The paper concludes by discussing theoretical and practical implications for contemporary psychedelic research and practice. Drawing on ecological medicine and ecopsychology as interpretive frameworks, the analysis situates psychedelic-induced ecological attunement within broader discussions of planetary health, understood here as the interdependence of human wellbeing and ecological systems.

The remainder of the article is structured as follows. Section 2 reviews empirical findings relevant to ecological attunement in the context of planetary health. Section 3 develops the Psygaia framework through theoretical integration. Section 4 analyzes recurrent phenomenological structures of psychedelic experience. Section 5 examines broader implications for psychedelic research, ethics, and practice, situating the proposed framework within a critical, decolonial orientation that interrogates contemporary institutional structures.

2.0 - Disconnection & Attunement

Within the context of the planetary health crisis, ecological attunement can be understood as describing how interdependence with ecological systems becomes experientially salient at the level of enactive cognition—that is, through perception, affect, and behaviour—rather than merely as an attitude toward or belief about nature. This framing provides a conceptual bridge between the planetary health crisis and the relevance of psychedelic experiences.

2.1 - A Planetary Health Crisis

While often defined through metrics such as biodiversity loss or climate instability, the planetary health crisis also reflects a fundamental rupture in relations between humans and nature. Variouslly characterized as alienation, disenchantment, or a “crisis of perception,” this disconnection marks a diminished capacity to perceive and participate in the relational systems that sustain life (Abram, 1996; Beery, 2023; Capra, 1996; Plumwood, 2002; Roszak et al., 1995). Shaped by worldviews that position humanity as separate from and exceptional to nature, this disconnection functions as both a symptom and a driver of human and planetary distress. Recent modelling suggests this trend may represent a systemic “socio-ecological tipping point,” in which urbanization and the intergenerational loss of nature connectedness have produced a persistent “extinction of experience” with nature (Richardson et al., 2025). An Indigenous-led global consensus characterizes this rupture as a disruption of “Mother Earth-level determinants” of health—drawing on an ontological view of Mother Earth as a living, sentient relative with inherent rights, and linking ecological violence to the devaluation of feminine, relational, and regenerative orientations (Redvers et al., 2022). This perceptual and relational rupture is further intensified by contemporary technological saturation—including the rapid expansion of digital infrastructure, consumer technologies, and artificial intelligence—whose planetary health costs often remain abstracted from everyday experience (Robbins & van Wynsberghe, 2022; Wu et al., 2022), thereby reinforcing patterns of ecological disconnection.

Across many Indigenous, traditional, and non-clinical medical and philosophical traditions, health has historically been understood not primarily as the absence of symptoms but as a dynamic state of balance within and between relational systems—bodily, social, ecological, and cosmological (Adeponle, 2012; Bourzat & Hunter, 2019). Illness, within

these frameworks, reflects disturbances in relational harmony rather than isolated dysfunctions, and healing involves restoring balance across these interconnected domains. While distinct, these traditions converge with ecological medicine and ecopsychology in emphasizing that human health is inseparable from the integrity of the social and ecological systems within which humanity is embedded (Makhinson et al., 2025; Redvers et al., 2022; Roszak et al., 1995).

Ecological attunement arises in contrast to the forms of ecological disconnection or relational disattunement that structure contemporary human experience. In this sense, the planetary health crisis is not merely environmental but also cognitive and relational—shaped by structural, cultural, epistemic, and ontological frameworks that obscure interdependence.

2.1.1 - The Convergence of Crises

The contemporary planetary health crisis is unprecedented in scope, marked by simultaneous disruptions across multiple domains. Ecological destabilization is accelerating, with rising global temperatures and biodiversity loss indicating the onset of a sixth mass extinction (Ceballos et al., 2015; IPBES, 2019). In parallel, psychological distress is increasing (Moitra et al., 2023), political polarization has intensified (Boxell et al., 2020), and economic inequality has widened (Piketty et al., 2022). These developments are increasingly understood not as isolated conditions but as interconnected expressions of a broader “metacrisis,” defined as the systemic entanglement and mutual amplification of ecological, social, economic, political, and existential breakdowns (Everth, 2025). Parallel to this structural condition, scholars have also identified a “meaning crisis,” referring to a widespread erosion of shared meaning-making frameworks within industrial-growth societies (Vervaeke, 2019). While analytically distinct, these diagnoses converge on a shared insight:

the planetary situation reflects a breakdown in how humans perceive and participate in the systems that sustain life.

Although certain indicators of human welfare have improved (Lianos, 2019), these gains have largely depended on extractive economic systems that externalize ecological and social costs. Such systems degrade ecosystems, displace communities, and amplify inequities, thereby undermining the ecological foundations of long-term resilience (Steffen et al., 2015). The cumulative effect is a decline in planetary health, defined as the sustainable flourishing of human and nonhuman life alongside the natural systems upon which life depends (Makhinson et al., 2025; Redvers et al., 2022; Whitmee et al., 2015). These converging crises highlight the need for shifts in how humans relate to and participate within ecological systems, as leading scientists warn that “a great change in our stewardship of the Earth and the life on it is required, if vast human misery is to be avoided” (Ripple et al., 2017). The disturbance in relations between many humans and the larger natural systems these humans are part of thus manifests simultaneously across ecological, social, psychological, and existential scales, highlighting the limitations of dominant anthropocentric paradigms for fostering planetary health (Redvers et al., 2022).

2.1.2 - The Ontological & Epistemic Roots

The roots of disconnection may lie in what Whitehead (1929) characterizes as the “bifurcation of nature,” or the division between nature as quantifiable physical properties and nature as directly experienced, laden with qualities and meanings. This dualism found its most influential modern articulation in Descartes's separation of *res cogitans* and *res extensa*, which effectively expelled felt experience from the dominant conception of the world — though the deeper roots of such dualisms extend further, through Platonic philosophy and Gnostic thought, into strands of metaphysical thinking that long predate the modern period.

Neurophilosophical analyses by McGilchrist (2019) suggest that this dualism reflects an epistemic bias toward the brain's left hemisphere as an instrumental, abstracting mode of cognition, at the expense of the right hemisphere's holistic, relational mode of cognition. This orientation supported the development of a substance ontology, according to which reality is understood as fundamentally composed of discrete, self-subsisting entities whose real properties are physical and measurable, while relational and qualitative aspects of experience are treated as secondary or derivative. At the level of culture and practice, this ontological commitment underwrites a mechanistic worldview in which epistemic authority is assigned primarily to objective, quantifiable modes of knowing. By privileging such abstractions, this ontological-epistemic configuration delegitimizes relational and participatory modes of being and knowing, reinforcing the perception that humans stand ontologically separate from the living systems that sustain them.

A related dimension of this widespread ontological orientation is "human exceptionalism," or the assumption that humans constitute a fundamentally distinct category of being (Haraway, 2008). This stance positions agency, meaning, and subjectivity as uniquely human, rendering the nonhuman world passive or mechanistic. Human exceptionalism thereby reinforces a subject-object hierarchy that naturalizes human supremacy while obscuring the co-constituted and dependent character of human life. Its consequences are perceptual as much as conceptual: everyday practices come to reflect and reproduce a diminished capacity to sense embeddedness and interdependence, weakening the motivational basis for ecological care and relational responsibility (Abram, 1996; Latour, 2017; Plumwood, 2002). As Redvers and colleagues (2022) observe, this manifests as a "collective loss of awareness of the interconnectedness that exists within Nature," resulting in a "fragmented and dissociated identity" that creates the psychological distance necessary to "project predatory and abusive impulses onto the environment." Ultimately, the ecological

crisis can also be understood as a crisis of identity, stemming from a constricted definition of the self as a discrete, bounded subject existing independently of the living systems that sustain it, rendering the destruction of nature not as self-destruction but merely as “environmental externalities.”

2.1.3 - Contemporary Frameworks of Entanglement

The Anthropocene concept further intensifies this perceptual rupture by collapsing distinctions between “human history” and “natural history.” As Chakrabarty (2009) argues, the recognition that humans now act as a geological force unsettles categories of modern thought—agency, freedom, and responsibility—by situating humanity within planetary processes that exceed human control. Humans appear not as sovereign subjects acting upon nature but as a species entangled within Earth’s feedback dynamics, vulnerable to biogeophysical constraints and systemic thresholds. This recognition expands moral and historical responsibility across deep time and planetary scales, demanding modes of perception and relation capable of acknowledging interdependence, limits, and shared vulnerability. In this sense, the Anthropocene aligns with what Redvers and colleagues (2022) identify as a corrective to aspects of the “modern scientific paradigm,” arguing that dominant anthropocentric and patriarchal worldviews have obscured “human interconnectedness within Nature” and denied the rights of the feminine and the Earth.

Ecopsychology makes this connection explicit, suggesting that ecological degradation both arises from and deepens psychological disconnection (Fisher, 2013; Roszak et al., 1995). The loss of relationship with the more-than-human world erodes wellbeing and undermines the motivational basis for ecological care. As Roszak and colleagues (1995) argue, “if the self is expanded to include the natural world, behaviour leading to destruction of the world will be experienced as self-destruction.” This account grounds ecological responsibility in relational

identification—an approach that, while generative, does not exhaust the philosophical basis for ecological ethics, which may equally arise through encounter, obligation, or care that does not depend on felt continuity between self and world (Levinas, 1969). From the ecopsychology perspective, the planetary health crisis is not merely environmental, cultural, or political; it is also psychological, epistemic, and ontological, rooted in a diminished capacity to perceive, feel, and respond coherently to ecological relations. Addressing this crisis therefore requires not only new policies or technologies but also the cultivation of cognitive and relational capacities capable of sustaining attuned participation within systems.

2.2 - Defining Ecological Attunement

Ecopsychological research has long documented widespread psychological and cultural alienation from nature—a weakening of felt belonging within the larger community of life—particularly within societies that conceptualize nature as an external, inert object or expendable resource rather than as a field of relations within which humans are embedded (Fisher, 2013; Roszak et al., 1995). Capra (1996, p. 4) describes this orientation as a “crisis of perception,” reflecting a mismatch between dominant mechanistic worldviews and the relational patterns that sustain living systems. From this perspective, the contemporary planetary crisis can be understood, in part, as a disruption of ecological attunement.

This paper defines ecological attunement as the embodied and enacted recognition of interdependence within ecological systems. Ecological attunement is not reducible to intellectual acknowledgment of environmental interconnection or to pro-environmental attitudes. Rather, it describes a mode of cognition through which interdependence becomes perceptually and affectively salient and action-guiding, shaping how possibilities for action are perceived and responded to. Conversely, ecological disattunement refers to a diminished

capacity to perceive or respond to ecological relations, even when such relations are conceptually understood.

While ecological attunement focuses specifically on relations between humans and nature, it can be situated within a broader framework of relational attunement, of which social attunement is one domain. The distinction at stake is not only psychological but also ontological: it concerns the basic assumptions through which experience is organized. Substance-based ontologies tacitly treat individuals—whether selves or objects—as independently existing units with intrinsic properties whose relations are secondary. Relational ontologies, by contrast, as articulated in Whitehead's (1929) process philosophy and in Buddhist analyses of dependent origination—traditions that differ significantly in their metaphysical commitments—understand phenomena as arising through relations rather than existing prior to them (Garfield, 2015). Ecological attunement aligns with this broader relational ontological orientation, in which interdependence becomes experientially salient and the self is situated within ongoing relational and ecological processes. Ecological disattunement, in this frame, reflects a default perceptual stance shaped by substance-based ontological assumptions that render relational embeddedness less perceptible.

If the planetary health crisis reflects, in part, a breakdown in ecological attunement rooted in broader patterns of disconnection from nature, then the contemporary psychedelic renaissance must be understood within this context. Psychedelics are re-emerging at a historical moment marked by ecological and social instability and by weakened experiential connection to the more-than-human world. This context makes it especially important to investigate whether and how psychedelic experiences may reorganize cognition toward ecological attunement, rendering interdependence, aliveness, and ecological embeddedness perceptually and affectively salient.

2.3 - Research on Psychedelics & Ecological Attunement

Over the last decade, empirical research has begun to quantify what many users of psychedelics have long reported anecdotally: psychedelic experiences can catalyze lasting shifts in how people perceive and relate to nature. Several cross-sectional and longitudinal studies have found that psychedelic experiences predict increases in nature-relatedness. Forstmann and Sagioglou (2017) reported that lifetime psychedelic use was associated with greater nature-relatedness, and that this relationship was mediated by self-transcendent experiences. Kettner and colleagues (2019) similarly observed significant increases in nature-relatedness that persisted at a two-year follow-up.

Comparable patterns have appeared in clinical contexts, where psilocybin-assisted therapy has been associated with increased nature-relatedness alongside improvements in wellbeing (Lyons & Carhart-Harris, 2018). Psychedelic experiences—particularly those characterized by self-transcendent or mystical qualities—have also been associated with pro-environmental behaviour (Paterniti et al., 2022). Psychedelic use has further been linked to the cultivation of the environmental virtue of “living in place,” encompassing humility, aesthetic wonder, and respect for nature (Kirkham et al., 2022). Supporting this relational pattern, psychedelic use has been shown to predict not only subjective nature-relatedness but also objective knowledge about climate change, an effect statistically mediated by increases in nature-relatedness itself (Sagioglou & Forstmann, 2022). Natural settings additionally appear to amplify and prolong increases in nature-relatedness (Forstmann & Sagioglou, 2025), suggesting a degree of ecological specificity in these effects. While effect sizes vary and samples are often self-selected, the overall empirical pattern is suggestive: psychedelic experiences can facilitate the emergence of ecological attunement.

Contemporary clinical research has reached a parallel conclusion. Disconnection itself appears to be a central feature of psychological suffering, while renewed forms of connection—to self, others, and the world—predict therapeutic improvement. Carhart-Harris and colleagues (2017) argue that connectedness functions as a primary mediator of healing in psychedelic therapy, with connection to the world, including nature, emerging as a consistent dimension of transformation. More recent work clarifies that psychedelic-induced connectedness is not a unitary construct but a multidimensional process comprising perceptual, emotional, and epistemic forms that may arise acutely or persist over time (Forstmann & Sagioglou, 2025). This multidimensionality helps explain why ecological attunement does not manifest uniformly across individuals or contexts.

Empirical models further suggest that social and ecological attunement arise through two complementary mechanisms: temporary softening of rigid ego-boundaries and increased emotional openness. Both processes enhance sensitivity to relational patterns across domains. The self-other overlap framework provides additional grounding for this account, indicating that psychedelic-induced connectedness emerges from perceived overlap between self and other, and that this mechanism generalizes across social and ecological contexts (Forstmann & Sagioglou, 2025). From this perspective, nature-relatedness and social connectedness can be understood as parallel expressions of relational attunement.

Taken together, these findings suggest that ecological attunement is best understood not as a substance-specific outcome but as one expression of a broader relational reorganization. Across studies, measures of ego-dissolution and mystical-type experience frequently mediate the relationship between psychedelic use and pro-environmental attitudes and behaviours. This indicates that it is not psychedelic use per se but specific

phenomenological qualities of the experience—particularly those that disrupt habitual self-boundaries and enhance relational sensitivity—that support ecological attunement.

At the same time, these tendencies cannot be treated as inherent or inevitable. Psychedelics are directionally, but not deterministically, relational. They often—but not always—render relational patterns more salient, and these effects are deeply shaped by set and setting. Several caveats therefore remain essential. First, much of the existing research is correlational or relies on self-report, limiting causal inference. Second, not all psychedelic experiences foster ecological attunement, underscoring that such outcomes do not arise solely from intrinsic properties of the substances themselves. Third, psychedelic experiences can also reinforce pre-existing worldviews, including right-wing or transhumanist ideologies, particularly when those frameworks dominate the cultural environments in which psychedelic experiences occur (Pace & Devenot, 2021). The trajectory of interconnection is therefore not determined by the molecule alone, but by set and setting.

These limitations necessitate interpretive caution. Functional unblinding in psychedelic research is structurally difficult to avoid, as participants reliably recognize when they have received an active dose. This makes it difficult to disentangle pharmacological effects from expectation, context, and culturally mediated meaning-making. Demand characteristics may further intensify this dynamic, as participants often enter psychedelic studies shaped by cultural narratives portraying psychedelics as agents of connectedness or ecological insight. Reported increases in nature-relatedness therefore reflect both neurobiological modulation and the interpretive frameworks through which experiences are understood. Compounding this issue, commonly used connectedness scales often collapse perceptual, emotional, and epistemic dimensions into a single construct, obscuring the distinct processes underlying relational change (Forstmann & Sagioglou, 2025).

These methodological constraints do not negate the relational and ecological phenomena frequently reported in psychedelic experiences. Rather, they reinforce a central claim of this thesis: psychedelic experiences are enacted through organism-environment coupling and situated sense-making, and are not reducible to molecular action alone.

3.0 - An Ecological Model of Psychedelics

This ecological model of psychedelics is constructed across three complementary analytic scales to situate cognition and the psychedelic experience within ecological dynamics. At the macro level, systems theory and Gaia theory frame cognition within Earth's self-organizing feedback systems. At the meso level, enactive cognition reconceptualizes the mind as emerging through organism-environment coupling and embodied sense-making. At the micro level, biosemiotics interprets psychedelic compounds as modulators of semiotic processes, influencing how organisms interpret and respond to chemical signals. Taken together, these perspectives suggest that psychedelics reorganize embodied cognition in ways that make ecological interdependence experientially salient.

3.1 - Gaia & Systems Theory

The concept of Gaia takes its name from the Greek Earth goddess, the mother of all life. Comparable Earth-mother figures appear across diverse cosmologies, including the Roman *Terra Mater*, *Pr̥thvī Mātā* in Hindu traditions, the Andean *Pachamama*, and the Hopi *Kokyangwuti* (Eliade, 1997; Sjöö and Mor, 2013). As Redvers and colleagues (2022) emphasize, such Indigenous and relational traditions understand “Mother Earth” not as metaphor but as a living system with inherent value, agency, and determinants of health—or wholeness. While Gaia theory and systems ecology do not attribute intention or purpose to planetary processes, they converge with these traditions in rejecting mechanistic and

extractive models of nature, instead describing life as constituted through relational organization, feedback, and self-regulation across scales.

Gaia and systems theory thus provide a foundational conceptual layer for interpreting ecological attunement in psychedelic experience: they articulate interdependence and self-organization in non-teleological terms, offering a scientific grammar for relationality without recourse to animism or metaphysical personhood.

3.1.1 - Systems & the Relational Structure of Life

Systems theory emerged in response to the limitations of mechanistic and reductionist approaches that attempt to understand complex phenomena by decomposing them into independent parts. In the systems view, the primary focus is not on isolated entities but on organizing relations—the patterns of interaction and feedback through which complex wholes emerge (Capra & Luisi, 2014). As Capra (1996, p. 37) observes, systems thinking represents a shift “from the parts to the whole,” recognizing that living systems constitute “integrated wholes whose properties cannot be reduced to those of smaller parts” but arise from “organizing relations” among components. From this perspective, psychedelics and the experiences they occasion cannot be adequately comprehended through brain analysis alone; they require an understanding of relational dynamics within living systems. Understanding psychedelics systemically therefore means understanding them contextually and ecologically—embedded within the feedback processes characterizing life at multiple scales.

Across scales, living systems exhibit defining characteristics: nonlinearity (small perturbations can yield disproportionate effects through feedback), self-organization (order emerging from local interactions without centralized control), and autopoiesis (the continuous self-production through which systems maintain their own organization in dynamic exchange

with their environment). Autopoiesis specifies the network organization through which living systems continually regenerate the components that constitute them while maintaining their overall pattern of organization (Maturana & Varela, 1980). This circular, self-producing structure implies that organisms do not merely adapt to a pre-given external environment; rather, they participate in ongoing structural coupling in which organism and environment co-determine or mutually specify one another. The world is neither objectively pre-given nor subjectively constructed, but co-enacted through reciprocal constraints.

For example, a cell sustains its membrane and metabolic processes through circular causality: its components are generated by and simultaneously support the network of relations that maintains the cell as a coherent unit. This same relational logic characterizes life at higher levels of emergent complexity: organisms, ecosystems, social systems, and even cognition arise from networks of interdependent processes that generate and sustain their own organizational patterns (Capra & Luisi, 2014; Varela et al., 2016). Such systems maintain coherence not through top-down control but through ongoing, structurally determined coordination among their components and in dynamic interaction with their environments.

In systemic terms, human organisms are living systems embedded within larger systems—social, ecological, and even cosmological. Human bodies, nervous systems, and cognitive processes depend on solar and lunar cycles, climate regimes, atmospheric composition, biotic and abiotic chemical signals, technological infrastructures, and social institutions. This embeddedness is not metaphorical; it is materially instantiated through continuous exchange and feedback. When participants report experiences such as “seeing how everything is connected” or “understanding how my actions ripple through the world,” they are describing experiential aspects of systemic interdependence. Systems theory thus provides a vocabulary for articulating what phenomenological descriptions may be pointing

toward: the relational organization of living systems and the organism's embedded position within them.

3.1.2 - Gaia Theory as Earth Systems Science

Gaia theory elaborates systems thinking at the planetary scale. Initially proposed by Lovelock and Margulis (1974), Gaia theory conceptualizes Earth as a complex system in which the biosphere, atmosphere, hydrosphere, and lithosphere interact through feedback processes that influence planetary conditions such as temperature, pH, and atmospheric composition. The central claim is not that Earth is a conscious organism or purposeful agent, but that biological and geophysical processes jointly contribute to large-scale homeostasis. In its “weak” or cybernetic form, Gaia theory holds that organism-environment interactions can stabilize global conditions compatible with life, without invoking intrinsic intention or teleology. For example, the evolution of oxygenic photosynthesis drastically transformed atmospheric chemistry; similarly, biogeochemical cycling influences global temperature regulation across geological timescales. These stabilizing dynamics are understood as emergent properties of distributed feedback, not as evidence of a planetary consciousness.

Gaia theory is used here strictly as a descriptive Earth-systems model to understand human cognition as embedded within biogeophysical relations. As Latour (2017) argues, human knowledge is not external to the planet but is an emergent property through which Earth's processes become reflexively processed. He situates this capacity within the “critical zone,” understood as the thin, chemically active layer of the Earth's surface where life resides and regulates its own conditions. Framing this not as the awakening of a conscious “superorganism,” but as an emergent species-level capacity to participate in planetary feedback, Latour maintains a thoroughly secular perspective. This aligns with the cybernetic

view that planetary self-regulation is systemic rather than teleological, describing Earth as “a self-regulating system... not a goddess or some sentient being” (Latour, 2017, pp. 93-95).

Within this framing, human cognition may be understood as an emergent property through which Earth’s processes become reflexively processed and represented. Within the interpretive framework developed here, when individuals report feeling “part of the Earth,” or describe psychedelic experiences as “tapping into” the “planetary mind,” such reports need not necessarily be interpreted as literal perceptions of a conscious Earth. Rather, they can be understood as experiential encounters with systemic embeddedness: moments in which the individual’s participation within planetary feedback networks becomes experientially salient. Thus, psychedelics do not necessarily reveal the planet as an intentional or conscious agent, but they may temporarily illuminate the ways in which human cognition and experience are inseparable from ecological processes.

3.1.3 - Ecological Attunement in a Systemic Frame

Bringing systems theory and Gaia theory together enables a more precise account of ecological attunement. Conceptually, this attunement names a mode of perception and participation in which selves are recognized as nodes within networks rather than self-sufficient units; environments are apprehended as dynamic relational fields rather than static backdrops; and actions are understood as participating in feedback processes that extend beyond the individual. As shown empirically in Part Two and elaborated phenomenologically in Part Four, psychedelic experiences often instantiate this attunement: individuals describe themselves as “part of a larger whole,” perceive nature as a living system, and report heightened concern for the ecological consequences of their actions.

These experiential shifts can be interpreted as temporary reductions in the misalignment between habitual perception, self-experience or ego-centered sense-making, and the relational organization of ecological systems. To the extent that living systems are structured through feedback, interdependence, and co-regulation, perceptions that foreground relationality may, in some respects, be more attuned to these systemic dynamics. This does not render all psychedelic experiences epistemically authoritative—such states can be distorted, grandiose, or overgeneralized. Rather, it suggests that certain relational experiences commonly reported under psychedelics bear conceptual resonance with relational patterns described in systems science (Capra, 1996; Lovelock & Margulis, 1974), with Naess’s (1987) account of the “ecological self” in deep ecology, with Plotkin’s (2008) concept of “eco-awakening” in ecopsychology, and with Indigenous ecological knowledge emphasizing reciprocity and interdependence (Kimmerer, 2013). These resonances indicate that relational and ecological motifs in psychedelic phenomenology can be intelligible within multiple, distinct frameworks that foreground the ecological embeddedness of humans.

This interpretive framing also helps explain why increases in nature-relatedness, pro-environmental attitudes, and prosocial orientations have been observed following certain psychedelic experiences. If psychedelics—under certain conditions—temporarily reorganize cognition such that systemic interdependence becomes perceptually and affectively salient, it is understandable that individuals might subsequently report greater care for ecological and social others. Finally, systems and Gaia theory do not imply that psychedelics are unique in this capacity; contemplative and nature-based practices have similarly been shown to cultivate ecological attunement (Richter & Hunecke, 2022; Jordan & Hinds, 2016). These frameworks offer a coherent scientific and philosophical context for understanding why psychedelic phenomenology so often takes relational and ecological form, and for situating

human cognition—including the psychedelic experience—not as a passive observation of the world, but as a dynamic mode of structural coupling within broader ecological systems.

3.2 - Enactive Cognition

If systems and Gaia theory describe the relational organization of life at ecological or planetary scales, enactivism extends this relational logic to the level of cognition. Grounded in the concept of autopoiesis, living systems maintain themselves through continuous structural coupling with their environments. In this framework, biological self-production is synonymous with sense-making, meaning that the process of life—from cells to ecosystems—is inherently cognitive. From this perspective, mind is not a localized substance but a process synonymous with living: “the process of circular organization itself—with or without a nervous system—is identical to the process of cognition” (Capra, 1996, p. 97).

Neuroscientific accounts of psychedelic states, including the REBUS model's description of loosened predictive priors under conditions of increased neural entropy (Carhart-Harris & Friston, 2019), operate at a distinct level from this account. The framework draws on REBUS as a characterization of measurable changes in hierarchical neural dynamics. It is a mechanistic description whose computational vocabulary is instrumentally useful without committing the framework to the claim that cognition is constituted by internal representation. Enactivism provides the ontological account: what the organism is doing within and through those neural changes, how coupling is reorganized, how a differently structured world is enacted. The two are not competing explanations but complementary levels of description answering different questions about the same event.

3.2.1 - Cognition as Embodied

Building on this biological foundation, Varela, Thompson, and Rosch (2016), developed enactivism to propose that cognition arises through organism-environment coupling and embodied sense-making. Rather than treating cognition purely as computation and representation, enactivism emphasizes the structural coupling between organism and environment. In this view, organisms bring forth or enact meaningful worlds through embodied engagement rather than passively receiving a pre-given world. As Capra and Luisi (2014, p. 256) summarize, cognition is “a continual bringing forth of a world through the process of living.” Recent enactive analyses of psychedelics similarly challenge linear, molecule-to-mind models, emphasizing interdependence and circular causality across the psychedelic molecule, brain, and experience relationship (Meling & Scheidegger, 2023).

Enactivism does not deny the brain’s role but reframes cognition as relational and embodied rather than purely representational. Cognition is “world-enacting” in the sense that organisms bring forth a world of significance through sensorimotor activity, affective orientation, and embodied engagement (Varela et al., 2016). A material object, such as a tree, becomes meaningful in distinct ways depending on the organism encountering it: a climbing structure for a squirrel, a landmark for a bird, a source of shade for a hiker or cat, a photosynthetic system for a botanist, and something else entirely for an ant. Perception, emotion and behaviour are not passively or singularly determined, but are actively co-constituted through the organism’s structural coupling with its environment. Consequently, a change in the state of the human organism—such as that induced by a psychedelic—necessarily results in the enactment of a different meaningful world.

This view challenges substance ontologies that treat mind and world as separate domains. In the enactive view, they are co-emergent: organism and environment specify one another through continuous interaction. As Merleau-Ponty (1963, p. 13) noted, an organism

subsists only by engaging with the physical and chemical conditions of its surroundings; the boundary between “self” and “world” is therefore porous and dynamic. Perception therefore does not just mirror external reality; rather, as Varela and colleagues (2016, p. 174) emphasize, “perception is not simply embedded within and constrained by the surrounding world; it also contributes to the enactment of this surrounding world,” such that “the organism both initiates and is shaped by the environment.” In this selective use of enactivism, mind and world co-emerge through an ongoing process of structural coupling.

From the enactive standpoint, cognition is inseparable from the autopoietic processes of life itself. Living systems maintain their organization through recursive exchanges with their environments, and cognition is the sense-making activity through which these exchanges become oriented and meaningful for sustaining the organism’s existence.

3.2.2 - Embodied Cognition as Sense-Making

A core insight of enactivism is that perception is not simply a mirroring of an external and mind-independent world; it is an active, reciprocal process between organism and environment. Organisms enact domains of significance through sensorimotor activity, affective orientation, and embodied engagement, rather than through internal, neural computations alone aimed at representing a mind-independent reality (Varela et al., 2016). In this sense, perception “contributes to the enactment of this surrounding world” (Varela et al., 2016, p. 174). It is a mode of sense-making shaped by the organism’s needs, history, body and structural coupling with its environment. The perceived and experienced world, therefore, is not a mind-independent reality, but a relational domain of meaning that is actively realized by the organism and the environment through structural coupling.

Central to enactive cognition is the concept of “groundlessness,” which, inspired from Buddhist philosophy, posits that all phenomena lack inherent, independent existence or essence, arising instead through co-dependent processes (Varela et al., 2016). As Varela and colleagues (2016, p. xviii) explain, phenomena “lack any inherent and independent being; they are said to be ‘empty’ of ‘own being.’” The stability of the ordinarily experienced world is not given by intrinsic, fixed essences but is constituted through relational processes. What appears as a stable, bounded “self” perceiving a stable, object-like “world” is an achievement of enacted cognitive processes. The coherence of experience rests on habitual ego-centered patterns of perception rather than inherent foundations. Ordinary experience feels grounded, but its perceived solidity is continually reproduced through embodied sense-making.

Recent enactive accounts of psychedelic experience further reinforces this relational or “groundless” view of perception. As Meling and Scheidegger (2023) suggest, “the psychedelic drug does not transmit information to the brain or body,” because information “does not belong to the psychedelic molecule” but to “the coupling of the psychedelic molecule with the structure of the autonomous system.” What counts as information depends on the organism’s body, history, needs, and ongoing structural interactions. In this view, psychedelic experiences emerge not from an intrinsic property of the molecule but from how an embodied, autonomous system interprets and integrates the encounter with the molecule.

This perspective offers a relational or ecological way of understanding psychedelic experience. Psychedelics temporarily relax the cognitive habits that ordinarily stabilize a world of discrete objects and a bounded self (Carhart-Harris & Friston., 2019). When these cognitive routines loosen, the co-created world can appear fluid, expansive, less separable, or more relational. Experiences of boundary dissolution can be seen as encounters with the constructed, contingent nature of ordinary ego-centered perception. In this light, experiences

of unity or interconnectedness may reflect brief experiential contact with groundlessness: the embodied, felt sense that the self-world distinction lacks fixed foundation and that meaning and identity arise through dynamic relational processes extending beyond the individual.

In this frame, psychedelic experiences are not hallucinations departing from a stable, baseline reality, nor necessary revelations of ultimate metaphysical truths. They are altered modes of structural coupling and embodied sense-making that expose the relational, constructed, and potentially groundless character of perception, experience and meaning.

3.2.3 - Psychedelics Experiences as Reconfigured Coupling

Neuroscientific findings can be incorporated into this framework without reducing cognition to neural activity alone. Under psychedelics, neural dynamics exhibit increased entropy, a process formalized in the REBUS (Relaxed Beliefs Under Psychedelics) model as the loosening of rigid top-down predictive priors (Carhart-Harris & Friston, 2019). In enactive terms, this relaxation of hierarchical control allows bottom-up sensory perturbations—including environmental features—to exert a stronger influence on embodied sense-making. Psychedelics temporarily reconfigure the organism's mode of coupling with its environment, influencing sense-making and how a meaningful world is brought forth. Perceptual boundaries become more fluid, attention distributes across relational fields rather than around a habitual ego-center, and sensorimotor engagement becomes more open-ended and exploratory. Neuroplasticity windows associated with psychedelic states (Ly et al., 2018) may further enable some of these reorganized patterns of coupling to consolidate, contributing to lasting cognitive transformations.

This process is best understood through what Meling and Scheidegger (2023) describe as “dynamic co-emergence,” in which neural activity and lived experience mutually determine one another rather than forming a linear chain of cause and effect. Drawing on

Merleau-Ponty, they emphasize that in living systems “reciprocal determinations” prevail, rendering any straightforward reduction from experience to neural events conceptually inadequate. Psychedelic experiences thus reflect a circular causal process in which biological modulation, experiential sense-making, and environmental engagement co-arise through altered patterns of organism-environment coupling.

From this perspective, psychedelic experiences may be understood as intensifying or reorganizing participatory sense-making dynamics (De Jaegher & Di Paolo, 2007), wherein cognition emerges through ongoing interaction between organism and environment rather than within an isolated subject. As coupling becomes less constrained by habitual predictive and ego-centered cognitive structures, the world may be enacted as more responsive, animated, or relational. What appear phenomenologically as experiences of “unity” or “interconnection” can therefore be interpreted as novel enactments made possible by temporary shifts in predictive constraints and sense-making. The world is not necessarily perceived more “accurately,” but differently, such that relational, systemic, and processual features ordinarily backgrounded by ego-centered perception become experientially salient.

Reports of feeling part of a forest, dissolving into a larger whole, or perceiving everything as connected can thus be understood as expressions of these modified coupling dynamics. Habitual self-world boundaries no longer function as rigid partitions but as permeable, dynamically maintained distinctions. Empirical findings parallel this theoretical account: increases in connectedness, including connection to nature, consistently predict therapeutic outcomes in psychedelic research (Carhart-Harris et al., 2017). From an enactive perspective, however, such experiences are not intrinsic properties of psychedelic compounds. As Meling and Scheidegger (2023) emphasize, “information does not belong to the psychedelic molecule,” but to its coupling with the autonomous system of the organism.

Phenomenological outcomes are therefore context-dependent and agent-relative, shaped by an agent's history, needs, bodily structure, environment, and ongoing patterns of activity.

This has particular significance for ecological attunement. Habitual ego-centered perception tends to obscure the multi-scalar interdependence described by systems theory and Gaia theory. Psychedelic states may temporarily enhance sensitivity to precisely these relational patterns by reorganizing sense-making in ways that foreground interdependence and complexity. In this interpretation, ecological attunement emerges not as a belief imposed upon experience, but as a felt, embodied manifestation of reconfigured organism-environment coupling enacted under altered cognitive constraints.

3.3 - Biosemiotics

If enactivism describes cognition as arising through organism-environment coupling, biosemiotics specifies the medium through which that coupling is structured: the sign processes by which organisms interpret their environments as meaningful. Semiosis—the production, transmission, and interpretation of signs—is not a uniquely human achievement but a basic property of biological organization (Hoffmeyer, 2008). Cells respond to molecular gradients; plants detect airborne compounds released by stressed neighbours and activate defensive pathways; mycorrhizal networks mediate resource allocation through chemical signals operating across population scales. Across these cases, significance does not inhere in the signal itself but arises through the receiver's interpretive response. This distinction marks biosemiotics as a relational rather than mechanistic account of biological communication. Biosemiotics thus extends the relational logic of enactivism into the chemical and molecular processes through which organisms maintain adaptive coordination within living systems.

3.3.1 - Sign Processes in Living Systems

Organisms continuously engage in semiosis: across living systems, coordination occurs through chemical signalling processes whose meaning arises only through organism-specific responses rather than semantic content or conscious intent (Hoffmeyer, 2008). Cells respond to molecular cues regulating metabolism; plants detect airborne compounds released by stressed neighbours, triggering defensive responses via evolved receptor pathways (Baldwin, 2006); mycorrhizal networks mediate chemical signalling through which plants adaptively modulate growth, defence, and resource allocation in response to ecological context (Gorzelak et al., 2015; Simard et al., 2012); and bacteria use quorum-sensing molecules to regulate collective behaviour through threshold-dependent physiological responses (Miller & Bassler, 2001).

Across these examples, three principles recur. First, chemical signalling is widespread and foundational in ecology. Second, significance arises through the receiver's interpretive response, not the molecule alone. Third, none of these processes require intention, agency, or purpose. Biosemiotics thus contributes a non-teleological account of how living systems coordinate behaviour through information exchange embedded in ecological relations.

According to biosemiotics, organisms navigate their environments by interpreting chemical and behavioural signals as meaningful signs within processes of adaptive coordination. As Gagliano and colleagues note, the living world is “perfused with signs, if it is not composed exclusively of signs” (Gagliano et al., 2017, p. xix), highlighting that sense or meaning-making processes permeate biological organization at all levels. These interpretive processes occur within what Hoffmeyer (2008) terms semiotic scaffolding: the networks of constraints, sign-relations, and interpretive structures that guide how organisms act, perceive, and maintain coordination with their surroundings. Psychedelic experiences can therefore be understood as temporary modifications of an organism's participation in its

semiotic scaffolding, intensifying semiotic sensitivity and altering which chemical or behavioural signs become perceptually or affectively salient—though the relationship between these biological sign-processes and distinctly human symbolic meaning-making remains a substantive question within biosemiotic theory.

Each organism’s “Umwelt,” the subjective subset of the world that is perceptually and behaviourally meaningful to it, differs dramatically across species (Uexküll, 2010). The same environment is therefore interpreted differently depending on the signs a given organism is capable of perceiving through its bodily composition. For humans in industrial-growth and consumer-based societies living within technologically-saturated and economically-driven environments, the dominant mechanistic-materialist worldview and substance-based ontologies may actively structure a narrowed semiotic scaffolding. Such environments may privilege particular forms of symbolic and technological engagement while rendering certain ecological relations less perceptually salient. This narrowed semiotic scaffolding is not a neutral evolutionary baseline, but a cognitive architecture actively produced by history—specifically structured by settler-colonial land dislocation, enclosure movements, and market imperatives designed to systematically strip the more-than-human world of agency and legal standing (Plumwood, 2002; Whyte, 2018). This contrasts sharply with many non-industrial cultures, where interpretation of environmental features formed a sophisticated, maintained body of ecological knowledge and skill (Berkes, 2012; Kimmerer, 2013). Consequently, capacities to interpret these vital signs—shaped over millennia—atrophy through disuse, restricting the range of signs humans actively interpret even as those signs remain present.

3.3.2 - Psychedelics as Biosemiotic Modulators

Within this framework, naturally occurring psychedelics can be understood as biosemiotic modulators. When humans ingest psilocybin, mescaline, or DMT-containing preparations, these molecules bind to 5-HT_{2A} receptors, initiating cascading neurological changes (Nichols, 2016). What distinguishes psychedelics from other receptor-binding compounds, such as analgesics that dampen pain or stimulants that heighten arousal, is that they impact a fundamental reorganization of the entire semiotic scaffolding rather than a targeted adjustment of a single set of signs. This reorganization specifically targets ego-centered control mechanisms, leading to a profound experiential loosening of the habitual, ego-driven self-world boundary and a massive influx of otherwise filtered-out relational data. This fundamental cognitive reconfiguration is expressed as expanded semiotic sensitivity and pattern recognition, and a shift in salience hierarchies, foregrounding multi-scalar ecological relationality—changes that directly implicate semiotic processes.

Crucially, the biosemiotic view is not that psychedelic molecules contain encoded semantic content. Rather, the human organism interprets this chemical sign via its structural configuration, including receptor-mediated neural pathways. This biological interpretive responsiveness reorganizes sense-making, yielding characteristic psychedelic phenomenology. Just as a plant interprets a neighbour's VOCs through evolved receptors, humans interpret psychedelic molecules through an evolved neurobiological system that renders them experientially significant. This resemblance does not imply that plants or fungi evolved psychedelics to influence humans; it highlights that meaning arises in the relational, interpretive act itself. In this way, biophilia—originally described by Wilson (1984) and increasingly documented in contemporary psychedelic research (Irvine et al., 2023)—can be understood within the proposed framework as an inherent semiotic readiness: a general

biological capacity to interpret ecologically active chemical and behavioural signals across species. This framing avoids claims of intentional communication or teleological design, focusing instead on the relational processes through which embodied sense-making occurs.

From an evolutionary perspective, psychedelic alkaloids are widely understood as secondary metabolites—biochemical compounds that evolved primarily for defensive or ecological functions rather than communication with humans. Many such metabolites deter herbivores, inhibit microbial pathogens, or modulate insect behaviour (Heil, 2014; Wink, 2003). However, chemical ecology also demonstrates that secondary metabolites frequently participate in plant-animal interactions that are not strictly antagonistic. Some compounds simultaneously repel certain organisms while attracting others, including pollinators or seed dispersers (Fraenkel, 1959; Schiestl, 2010). Ecological communities are structured by dense, interwoven chemical communication networks, and many metabolites influence behaviour across species via evolved signaling rather than intention or design.

Genomic studies reinforce this ecological and biosemiotic interpretation. Analyses of fungal biosynthetic gene clusters show that psilocybin evolved independently at least twice in distantly related lineages—a rare example of convergent evolution in natural product biosynthesis (Meyer & Slot, 2023; Reynolds et al., 2018). Such convergence suggests that psilocybin conferred ecological advantages within fungal environments, likely in interactions with insects or decomposers rather than originating in relation to humans. At the same time, secondary metabolites frequently acquire multiple ecological functions across species, and psilocybin may likewise participate in diverse cross-species interactions, including those involving humans. This evolutionary pattern strengthens the biosemiotic framing: psilocybin is a molecule with ecological effects across species, and its psychological significance for

humans arises from the human organism's interpretive response to a chemical signal that already plays semiotic roles within broader ecological networks.

From this perspective, the sensitivity of human neurobiology to tryptamine and phenethylamine structures is neither anomalous nor suggestive of purpose; it reflects a broader evolutionary pattern in which organisms respond to secondary metabolites in ways that can be behaviourally consequential for both parties, even when such effects are incidental rather than adaptive. Thus, psilocybin's effects in humans—whether phenomenological or behavioural—can be viewed as arising from a biosemiotic modulator that participates in relational processes and ecological networks extending across species.

Psychedelic experiences therefore need not be interpreted as evidence of evolved interspecies communication. Instead, they can be understood as illustrating how secondary metabolites modulate the semiotic relations through which human organisms interpret and engage with their environments. While the possibility of more direct forms of interspecies communication remains open, it lies outside the scope of this paper.

3.3.3 - Altered Meaning-Making with Psychedelics

Biosemiotics helps clarify why psychedelic phenomenology often takes relational or ecological form. When psychedelic compounds impact neural activity, they influence the dynamic coupling between the organism and its surroundings, shifting how significance is attributed across the relational field. In conjunction with the enactive view, these effects can be understood as changes in sense-making dynamics: boundaries between self and environment loosen; features of the environment—sounds, textures, organisms, landscapes—take on heightened perceptual and affective salience; relational patterns become experientially vivid; and the world is realized as alive, responsive, or interconnected. Consistently, empirical studies show that increases in connectedness are among the most

reliable predictors of therapeutic outcomes (Carhart-Harris et al., 2017), reinforcing that shifts in relational orientation are central features of psychedelic experience.

In biosemiotic terms, psychedelics may expand the range of environmental features that register as potential signs, including features of the environment that ordinarily remain backgrounded by habitual ego-centered perception. The world can appear more communicative not necessarily because external agents transmit intentional messages, but because the organism's semiotic sensitivity has expanded. This helps contextualize experiential reports of "communication with plants," "teachings from nature," or "dialogue with the forest." Within the interpretive framework developed here, such descriptions are approached as shifts in semiosis—altered interpretive relations between organisms and their environments—without presupposing anthropomorphic intentionality, while remaining open to broader questions of interspecies and participatory sense-making explored within biosemiotic frameworks.

This interpretation aligns with the evolutionary picture: serotonergic psychedelic compounds, whether derived from the tryptamine or phenethylamine structural class, participate in ecological signaling. Their profound psychological effects in humans arise from the fact that they function as agonists at the serotonin 5HT_{2A} receptor. This shared molecular affinity and receptor agonism reflect the human organism's embeddedness within a deeply conserved serotonergic neurochemical ecology, combined with our species-specific embodied, neurobiological structure for interpreting such molecules. That 5-HT_{2A} agonism shifts cortical processing away from immediate sensory input and toward memory-associated networks (White et al., 2026) is consistent with this picture: psychedelic states may activate evolutionarily conserved relational and ecological patterns encoded in memory across deep time, rather than generating experiential content arbitrarily. Human sense-making thus

reflects the distinctive constraints and capacities of the human nervous system—an organism-specific interpretive response to molecules that operate across various species.

Psychedelic experiences therefore render ecological relations experientially vivid by reorganizing the semiotic processes through which meaning is realized, making the animate world appear more affectively charged, relationally patterned, and personally meaningful. Biosemiotics therefore complements enactive cognition by clarifying how organisms interpret chemical and behavioural signals, and how these semiotic processes modulate organism-environment coupling. Whereas enactivism characterizes cognition as organism-environment coupling and the active, embodied enactment of a meaningful world, biosemiotics explains how such structural coupling is chemically scaffolded through semiotic processes—signals that organisms interpret in maintaining adaptive coordination.

3.4 - The Psygaia Synthesis

The term Psygaia designates the integrative synthesis proposed in this paper, drawing on systems and Gaia theory, enactive cognition, and biosemiotics to interpret recurring phenomenology from psychedelic experiences. Organized along complementary analytic scales, it treats systems and Gaia theory (macro-level), enactivism (meso-level), and biosemiotics (micro-level) as mutually reinforcing perspectives that offer a multi-scalar interpretation of psychedelic experiences.

3.4.1 - Multi-Scalar Integration & Ecological Identity

The synthesis integrates its three core frameworks—systems and Gaia theory, enactive cognition, and biosemiotics—by aligning them along complementary analytic scales. Systems and Gaia theory provide a macro-level account of Earth as a relational, self-organizing system; enactivism offers a meso-level account of cognition as

organism-environment coupling and participatory sense-making; and biosemiotics provides a micro-level account of how organisms interpret chemical signals as meaningful. Taken together, these frameworks yield a multi-scalar model of how psychedelic compounds can temporarily reorganize sense-making by altering the dynamics through which human beings participate in ecological and semiotic fields. In this integrated view, psychedelic experiences modulate not only neural activity or experiential states, but the relational processes through which meaning is co-constituted between organisms and their environments.

Central to this synthesis is the dual modulation of reorganized sense-making and enhanced semiotic sensitivity. This convergence helps explain how the loosening of ego-centred modes of perceptual organization enables the organism to enact an expanded ecological identity structured by relational processes rather than bounded selfhood. This reconfiguration is expressed through the interpretive response to the psychedelic molecule as a biosemiotic sign, which in turn shifts how other environmental features and signals acquire perceptual and affective salience. Consequently, the range of signals contributing to sense-making expands, allowing for a temporary recalibration of the organism's relationship with the more-than-human world.

Within this synthesis, transformations in self-experience are understood as shifts in the cognitive constraints that ordinarily stabilize ego-centred perception, affect, and behaviour. Although ego-dissolution is often described phenomenologically as a dissolution of self, within a relational and systems-based framework it can also be interpreted as a relaxation of a narrow mode of self-identification. As these cognitive constraints loosen and sensitivity to relational complexity increases, identity transforms. As the ego structure becomes less dominant, self-identification broadens. Such experiences resonate with Naess's (1987) concept of the "ecological self" and Plotkin's (2008) account of "eco-awakening," in

which identity is no longer based exclusively on an isolated individual but is recognized as embedded within wider relational fields. Within this framework, this shift can be described as a temporary movement from ego-centric to eco-centric modes of cognition.

Commonly reported psychedelic phenomena—such as boundary dissolution, heightened perceptions of aliveness, and insights into interdependence—thus become intelligible as transient reorganizations of organism-environment coupling and altered sense-making, moments in which the nested relational systems that constitute the human organism become salient via biosemiotic modulation. What is often described as a sense of “wholeness” or “unity” in mystical-type experiences can, within this framework, be interpreted as intensified sensitivity to the multi-scalar relational processes from which the self emerges and within which it is always situated. During psychedelic experiences, the habitual egoic “I” that ordinarily organizes meaning, and thus identity, often recedes from the foreground of experience. As a result, meaning is no longer individually and centrally authored, but enacted through wider relational dynamics. Life may thus appear more ordered and significant precisely because sense-making is no longer constrained by the narrow perspective of an isolated self.

The proposed framework therefore functions as a coherent integrative synthesis: a multi-level relational account of how psychedelic experiences can facilitate ecological attunement through recurring phenomenological structures.

3.4.2 - Integrative Implications

In sum, the described synthesis suggests that psychedelics reorganize organism-environment coupling and participatory, embodied sense-making via biosemiotic modulation in ways that render relational dimensions of life experientially vivid. Within this framework, psychedelic molecules can be understood as biosemiotic keys—molecules that

modulate perception rather than encoding experiential content, generating experiences that arise from the coupling itself and are rooted in the ecological relationships through which cognition is enacted.

Although the proposed framework is primarily interpretive and theoretical, it carries ethical and practical implications for contemporary psychedelic practice, especially in an age of widespread disconnection from nature. Having established how psychedelics reorganize cognition, Part Four examines the specific phenomenological structures—boundary dissolution, perceptions of aliveness, and insights into interdependence—through which ecological attunement is enacted and stabilized in lived experience.

4.0 - Ecological Motifs in Psychedelic Phenomenology

While psychedelic phenomenology is highly variable and deeply shaped by individual, cultural, and contextual factors, qualitative and clinical studies nonetheless converge on specific recurring ecological themes. This section analyzes these relational motifs as phenomenological structures, demonstrating how the theoretical tenets of systems theory, enactive cognition, and biosemiotics are vividly expressed in, and help interpret, psychedelic experience.

4.1 - Boundary Dissolution & Self-Transcendence

A core feature of many psychedelic experiences is some form of boundary dissolution and self-transcendence. Boundary dissolution is a principal phenomenological structure—the temporary loosening or disintegration of habitual perceptual boundaries between self and world, or self and other. This structure enables self-transcendence, which is the resultant transition from a bounded ego to an expanded, dissolved, or permeable sense of identity. When self-transcendence is imbued with profound unity and sacredness, it manifests as a

mystical-type experience. Participants describe “merging” with their surroundings, feeling that “the boundary between myself and the world dissolved,” or experiencing themselves as “part of everything.” In clinical contexts, such episodes are often described as ego-dissolution or oceanic boundlessness, and their intensity has been linked to therapeutic outcomes (Griffiths et al., 2011; Watts et al., 2017; Yaden et al., 2017).

While boundary dissolution can occur without overt mystical content or affect, many participants describe self-transcendent states marked by a sense of profound unity, sacredness, and noetic quality—features characteristic of mystical-type experiences (Griffiths et al., 2011). Such states are also reported in naturalistic settings involving explicit ecological content. Recent survey data from Irvine and colleagues (2023) provide numerous such examples. Participants describe “seamless consciousness,” “no divide or separation,” or direct apprehension of the “interconnectedness of all life,” often experienced as immersion within an undifferentiated relational field rather than as a discrete, bounded self (Irvine et al., 2023). Participants report experiences such as: “There is actually no real separation between humanity and the natural world” (p. 179); “Feeling in various ways ‘one with nature’ or ‘I am nature’... made me want to preserve it even more” (p. 179). These accounts illustrate that ego-dissolution frequently takes relational and ecological significance.

Some participants and users interpret these unitive states through explicitly ecological, planetary and cosmic imagery. Reports in naturalistic and survey-based studies describe the experience as a moment of “being shown” or “reminded” of belonging to a larger living whole—sometimes articulated as contact with the Earth, Gaia, or an overarching planetary or cosmic intelligence (Irvine et al., 2023). Phenomenologically, these descriptions do not necessarily imply a literal planetary or cosmic mind; rather, they express the felt sense of participating in a larger-than-human system in which human or self-centrality is displaced

as self-world boundaries loosen and relational embeddedness becomes experientially salient. The significance of these accounts lies not in their metaphysical validity but in the experiential force with which ecological belonging can be apprehended under psychedelics.

Such states can be understood as temporary cognitive reconfigurations. From the enactive perspective, they might be the experiential expression of groundlessness—the loosening of the habitual cognitive processes that stabilize the self-world boundary. This experiential encounter with groundlessness may establish cognitive conditions conducive to ecological attunement: the recognition of the organism's fundamental relational embeddedness within larger systems of life. Instead of cognition being organized around the ego-center—perceiving the self as a central and isolated subject encountering an external world of separate objects—participants describe themselves as part of a larger relational field because the cognitive system is temporarily freed from a more restricted, self-centered structure. Unitive or mystical experiences may thus reflect the recognition that the organism's life process, including its mind, is not separate from the broader environment.

Importantly, this relational shift does not always entail the complete annihilation of selfhood, but involves a loosening of rigid ego-based perceptual boundaries towards a more permeable, embedded, ecological and processual sense of perceived identity. From the enactive view, these states may reflect a temporary shift in the structural coupling and sense-making processes through which a meaningful world is enacted, and thus through which selfhood is stabilised, enabling alternative modes of realizing one's place in the world.

4.2 - Aliveness & Animacy

A second recurrent phenomenological motif is the intensified perception of aliveness or animacy in nature, or the more-than-human world. During psychedelic experiences,

participants often report that trees, rocks, rivers, mountains, or entire landscapes appear vibrantly alive, responsive, or communicative. Visual patterns may seem to “breathe,” environments may feel suffused with presence, and natural settings may be perceived as perceptually and affectively significant in ways that exceed ordinary perception.

These descriptions are strongly supported by qualitative data. In a recent survey by Irvine et al. (2023), respondents frequently characterize nature as “alive,” “aware,” or “communicating,” with some adopting what they describe as “spiritually animist” orientations following psychedelic experiences. Examples include: “The wind, trees, grass and even soil constantly radiate an energy that we are undeniably part of” (Irvine et al., p. 179); “I understand now that nature is fully conscious” (p. 179); and “I could communicate with trees” (p. 178). While interpretations vary, the underlying phenomenological pattern—perceiving the more-than-human world as animate, alive, or responsive—is consistent across accounts. Similar motifs are documented in anthropological work on psychedelic and shamanic traditions, where natural entities are often understood as agentic or capable of relational engagement (Rodriguez Arce & Winkelman, 2021; Winkelman, 2010).

Psychedelics alter the cognitive processes through which a domain of significance is co-created. This heightened perception can also be interpreted through the biosemiotic lens as an increased sensitivity to previously unnoticed signals, foregrounding the dynamic and responsive qualities that constitute an organism and their lived experience. Instead of appearing as inert matter, the environment shows up as lively, processual, and communicative. This intensified sense of animacy amplifies ecological salience: participants frequently report renewed care for or emotional responsiveness toward nature as a whole and the natural places encountered during the psychedelic experience—as if those places had been encountered as subjects rather than objects (Irvine et al., 2023). The significance of this

common phenomenological structure lies in recognizing that psychedelics reorganize cognition—and therefore perception, affect and behaviour—in ways that make ecological relations experientially vivid and meaningful.

4.3 - Interdependence & Ecological Embeddedness

A third recurrent phenomenological structure, closely related to boundary dissolution, concerns explicit insights into interdependence, mutuality, and ecological embeddedness. Where the loosening of self-world boundaries creates the experiential conditions for relational attunement, ecological attunement often emerges as the experiential recognition of interdependence and embeddedness within larger ecological systems. Participants frequently describe realizations such as “everything is connected,” “I saw how my actions ripple outward,” or “I understood that I am part of a larger system.” These insights are rarely experienced as abstract propositions; instead, they are reported as affectively charged, accompanied by awe, grief, gratitude, or a sense of moral responsibility.

Naturalistic accounts often include imagery of networks, webs, or mycelial patterns that render interdependence experientially vivid. In the survey by Irvine et al. (2023), respondents share: “I became the forest. First the tree, the branches, the leaves, then I went underground and became the roots, the ground, the living beings in the ground. I was everything” (p. 179); “feeling the earth’s pain regarding what we are doing to the environment” (p. 179); and “Harming nature would be like hurting myself” (p. 179). These reports emphasize reciprocity, co-constitution, mutual care and ecological embeddedness—phenomenological motifs that closely parallel ecological principles of feedback, mutual dependence, and systemic interconnection.

It is important not to romanticize or overextend these accounts, especially when incorporated into grand narratives about planetary consciousness or awakening. Nonetheless, they are phenomenologically significant. They suggest that psychedelic experiences may reorganize how relationships to others—human and more-than-human—are perceived, valued, and acted upon. When individuals report “feeling plants communicate” or “seeing how everything depends on everything else,” they articulate experiential analogues of systemic interconnection, structural coupling and semiotic sensitivity.

Such experiences constitute central instances of ecological attunement: moments in which systemic interdependence is not merely recognized intellectually but cognitively apprehended at perceptual, affective, and embodied levels. While these enacted insights do not guarantee lasting transformation, they appear to open cognitive possibilities for new forms of ecological concern and relational responsibility. They illuminate how psychedelic experiences reorganize sense-making in ways that foreground life’s relational constitution.

4.4 - Integrating Phenomenology & Theory

Across the phenomenological structures analyzed—boundary dissolution, perceptions of aliveness, and insights into interdependence—a consistent pattern emerges: psychedelic experiences reorganize how relationships between self and other are realized, and thus how they are perceived, valued, and acted upon. Boundary dissolution loosens the habitual ego-centered self-boundary; heightened perceptions of aliveness render systemic processes affectively salient; and insights into interdependence foreground the ecological relations that ordinarily remain perceptually backgrounded.

What has been termed a “mystical” or “spiritual” experience across religious traditions, and operationalized in contemporary neuroscience as a “mystical-type

experience,” can be interpreted within the present framework as a temporary intensification of relational attunement. This is an interpretive choice rather than a denial of other accounts; religious and contemplative traditions understand such experiences in terms this framework does not adopt, and those accounts are not rendered incoherent by the present analysis. On this account, it may be a momentary apprehension of groundlessness: the recognition that self and experience has no fixed, independent foundation but arises through dynamic relations. Psychedelics can relax habitual egoic constraints, allowing these ordinarily backgrounded relational processes to become experientially vivid. In this sense, mystical phenomenology reflects a temporary realignment of organism-environment coupling, a moment in which the individual participates more openly in the multi-scalar processes that sustain life and meaning. Meaning-making becomes explicitly participatory, emerging not solely through the individual organism but through its biochemical engagement with wider ecological and relational systems. Thus, within the naturalistic framing adopted here, mystical experience can be understood as a natural, biological, ecological, and relational event—an enacted intuition of systemic embeddedness.

A particularly striking expression of this reorganized sense-making appears in DMT experiences often described as “hyperspace” or involving encounters with seemingly autonomous entities (Kagan, 2023; St John, 2018). Within the current framework, such phenomena are not interpreted as ontological disclosures of independent beings or realms but as effects of radically reorganized and participatory sense-making. As DMT is a molecule that originates in plant and fungal ecologies, its perturbation of predictive and interpretive processes may enact worlds that do not conform to familiar egocentric and anthropocentric priors. The felt “alienness” or “otherness” of such experiences can thus be understood as a consequence of temporarily enacting a world under biochemical conditions shaped outside the human evolutionary lineage. Entity encounters, visual languages, or perceived

transmissions can be interpreted as emergent features of reconfigured structural coupling, enhanced ecological sense-making and increased semiotic sensitivity. Whether such states comprise a form of interspecies communication remains outside the scope of this paper. However, such states demonstrate, in heightened form, a central claim of this framework: that psychedelic phenomenology reveals how deeply cognition is shaped by relational and ecological conditions of the systems that constitute life.

These phenomenological patterns raise practical and ethical questions. If psychedelic experiences frequently illuminate relational and ecological dimensions of life, then contemporary psychedelic practice cannot be confined to narrowly intrapsychic or neurocentric models. The following section thus examines the implications of these relational structures, using ecological medicine and ecopsychology as core interpretive lenses to frame the discussion on ethical practice. This analysis will explore how models of relational tradition, narrative repair, and ecological ethics bear upon the necessary expansion from individual healing to ecological attunement within contemporary psychedelic approaches.

5.0 - Psychedelic Practice & Planetary Health

If psychedelic experiences render ecological relations experientially salient—as evidenced by the three analyzed phenomenological structures—then contemporary frameworks for psychedelic practice and ethics must expand beyond narrowly intrapsychic or neurocentric models. This section explores how an ecological approach to psychedelics reorients health, healing, and responsibility in the context of the planetary health crisis.

5.1 - Psychedelics & Ecological Medicine

As a starting point, ecological medicine offers a contemporary medical framework for interpreting the relational and ecological dimensions of psychedelic experience. Ecological

medicine reframes health not as an individual attribute but as an emergent property of interdependence among persons, communities, ecosystems, and the planet as a whole. Central to this paradigm is the concept of “planetary health,” defined as the flourishing of both human and nonhuman beings, and the natural systems on which life depends (Makhinson et al., 2025; Prescott, 2024). Within this paradigm, psychological, social, and ecological wellbeing are inseparable and mutually reinforcing, and disconnection from relational and ecological contexts is itself pathogenic. This view resonates with ecopsychological accounts suggesting that erosion of connection to nature undermines both psychological and ecological health (Fisher, 2013; Roszak et al., 1995). The relational and ecological dimensions of psychedelic experience thus offer a chemically-mediated means of cultivating a meaningful connection to nature, with the possibility of enhancing health across scales.

Contemporary psychedelic therapy, however, remains largely situated within biomedical and psychopharmacological structures that prioritize standardized, scalable outcomes and have not yet sufficiently integrated ecological or systems-oriented perspectives. As Albert (2019) argues, such models often reproduce an “ego-centric reality principle,” defining mental health in terms of effective adaptation to prevailing social and economic arrangements rather than engagement with systemic or structural contributors to suffering. Clinical protocols emphasizing decontextualized clinic settings and narrow diagnostic criteria can inadvertently constrain or obscure relational and ecological dimensions of psychedelic experience. When psychedelic therapy is oriented toward individualized symptom reduction, it risks suppressing forms of relational and ecological insight that exceed its biomedical frame.

Ecological medicine clarifies why findings from contemporary psychedelic research repeatedly foreground connectedness—to self, others, and the more-than-human world—as a

primary mediator of therapeutic change (Carhart-Harris et al., 2017). From this perspective, shifts toward nature-relatedness or ecological attunement are not ancillary effects, but primary indicators of restored relational orientation within broader social and ecological systems. What appears clinically as symptom relief may therefore reflect a deeper reorganization of how individuals participate in relational networks that extend beyond the individual. Within this framework, the pathology addressed by psychedelic experience is not merely intrapsychic dysfunction but structurally produced disconnection, shaped by degrading sociocultural and ecological conditions. Experiences of unity, aliveness, or embeddedness thus resonate with ecological medicine's core premise: that health arises through reciprocal participation in relational systems and attunement to ecological context, rather than through the optimization of isolated psychological functions.

Understood through ecological medicine, psychedelics may function as catalysts for reorienting cognition toward relational ethics and ecological responsibility. This interpretation supports the broader argument that connection-based approaches to psychedelic therapy, rather than pathology-based models, may be necessary if psychedelic practices are to address the relational challenges characteristic of the contemporary planetary health crisis.

5.2 - Relational Traditions & Place-Based Healing

Whereas ecological medicine represents one contemporary effort to reframe health relationally, many Indigenous and land-based traditions have long situated wellbeing within broader ecological, social, and cosmological orders. Anthropological research shows that such societies often employ a range of ritual and communal practices to recalibrate relationships between individuals, communities, and the more-than-human world (Eliade, 2004; Schultes et al., 2001; Turner, 1972; Winkelman, 2010). Within these contexts, ritually structured moments of ego-loosening or symbolic self-disintegration function not as private

or isolated experiences, but as mechanisms for reorganizing social roles, renewing collective bonds, and reaffirming ethical responsibilities. Phenomenologically, psychedelic experiences frequently exhibit parallel features, including shifts in self-world boundaries, heightened perceptions of aliveness, and intensified awareness of interdependence. Situating psychedelic phenomenology within this wider anthropological landscape helps contextualize such experiences as part of longstanding human strategies for relational attunement, without implying equivalence between contemporary psychedelic use and traditional practices.

Many traditions—including Huichol peyote rites, Mazatec mushroom ceremonies, and Shipibo-Conibo ayahuasca rituals—situate psychedelic use within broader relational frameworks grounded in reciprocity, place, and participation. In these contexts, health and healing are not conceived as a purely personal or intrapsychic event but as reorganized participation in cosmologies in which humans, nonhumans, ancestors, plants, and landscapes form interdependent communities of relation (Estrada, 1981; Gebhart-Sayer, 1985; Myerhoff, 1974). Similarly, in Amazonian mestizo traditions, psychoactive plants are approached as “plant teachers” (*doctrinas*) whose knowledge is transmitted through relational and dietary engagement (Luna, 1986). Ritual specialists, healers or shamans mediate these relationships through practices embedded in kinship, obligation, communication and attunement to specific places. Ecological knowledge is not peripheral but central and constitutive: ceremonies are performed in particular landscapes, songs map ecological and cosmological relations, and plants are understood as participants within networks of meaning and responsibility (Celidwen et al., 2023; Schultes et al., 2001; Tupper & Labate, 2015; Turner, 1972).

It is crucial, however, to avoid universalizing or romanticizing these diverse traditions. They are internally heterogeneous, historically dynamic, and shaped in uneven ways by colonialism, political struggle, and market pressures (Labate & Cavnar, 2014;

Tupper, 2009). Not all Indigenous or shamanic frameworks are uniformly “ecological,” egalitarian, or reciprocal; they include hierarchies, gendered roles, competing metaphysical commitments, and situated moral orders (Smith, 2012; Whyte, 2018). “Indigeneity” is not a singular worldview but a plurality of knowledge traditions produced through specific relations to land, language, and history (Watts, 2013; Wilson, 2008). Contemporary psychedelic discourse often treats these practices as uniform and inherently ecological or spiritually superior, reproducing forms of idealization and extractive appropriation (George et al., 2019; Tupper, 2009). For these reasons, relational traditions should be approached not as static data to be appropriated, but as independent, historically dynamic knowledge and governance systems that possess their own criteria for empirical observation, ecological reciprocity, and relational responsibility.

Despite this necessary caution, many of these traditions offer insight into how healing can be conceptualized as participation in ecological and cosmological relations. In Mazatec mushroom ceremonies, the mushrooms (*ndi xi tho*) are understood as persons or teachers whose knowledge emerges through reciprocal engagement rather than instrumental consumption (Estrada, 1981). Shipibo healers describe ayahuasca as enabling perception of *kené*—a patterned, synaesthetic design system mediating communication between worlds and conveying culturally meaningful information linking health to harmony within human and more-than-human relations (Gebhart-Sayer, 1985). Huichol pilgrimage to *Wirikuta* situates peyote within a landscape of ancestral and ecological significance: healing is inseparable from fidelity to place, ceremony, and communal responsibility (Negrín, 1992). Together, these examples illustrate relational ontologies—cosmologies in which humans and nonhumans mutually constitute one another—that resonate conceptually with ecological medicine, systems thinking, and the theoretical synthesis developed in this paper. It should be noted, however, that this resonance is partial: the naturalistic framing adopted here brackets

metaphysical commitments—including plant agency, spiritual personhood, and interspecies communication—that are foundational rather than optional within many of these traditions. Drawing on their relational orientation while setting aside these commitments is a methodological choice, not a claim that the two worldviews are equivalent.

For contemporary psychedelic practice, the relevance is methodological. These traditions demonstrate that psychedelics can be embedded within ethical frameworks of reciprocity, place-based responsibility, and relational accountability. They show how health and healing may be oriented toward restoring relationships—with land, ancestors, community, and the more-than-human world—rather than solely regulating neural pathways or alleviating individual symptoms. Importantly, learning from these orientations requires ethical humility: acknowledging limits, avoiding appropriation, and recognizing that Indigenous sovereignty, cultural survival, and political struggle are inseparable from these practices (Celidwen et al., 2023; George et al., 2019). The point is not to replicate these traditions, but to consider how contemporary psychedelic practice might be shaped by sensitivity to ecological context, land and place, cultural narrative, and relational ethics, and by a recognition that healing can occur within broader ecological and communal relations.

5.3 - Meaning & Narrative Repair

These relational orientations extend beyond ritual contexts and into the cultural narratives through which individuals and societies enact meaning and participate in sense-making. Contemporary scholars increasingly argue that crises of perception are inseparable from crises of meaning, reflecting deeper disruptions in how individuals and societies make sense of and enact meaning within their embeddedness in complex living systems (Abram, 1996; Capra & Luisi, 2014; Morton, 2013; Vervaeke, 2019). Ecological degradation is sustained not only by extractive infrastructures but also by the cultural

narratives that normalize them—stories of human exceptionalism, unlimited industrial growth, mechanistic materialism, and independence from ecological processes (Latour, 2017). These frameworks shape what individuals and societies perceive as real, valuable, and possible. As Macy and Brown (2014), Tsing (2015), and Abram (1996) observe, the planetary crisis is also a crisis of story and imagination: inherited cultural narratives no longer make interdependence intelligible. For Macy, this rupture marks the threshold of what she calls “the Great Turning,” described as a civilizational shift from the industrial-growth story toward narratives of planetary interdependence and reciprocal participation.

Within this context, psychedelic experiences present a distinctive and potentially transformative phenomenon. Beyond their neurobiological and phenomenological features, they are events of meaning-making (Hartogsohn, 2018), experiences that reorganize how individuals enact themselves, the world, and their place within it. Ecological attunement via psychedelics often takes narrative form: disruption of established self-concepts (“I am part of something larger”), reinterpretation of place and relation (“I belong to the Earth”), or renewed orientation toward ecological and relational meaning. Such transformative processes can be understood as “narrative repair,” or the reconstruction of narratives that align personal experience with life’s relational processes (Cronon, 1992; Haraway, 2016; Vervaeke, 2019).

This potential role does not imply that psychedelics disclose ready-made mythologies. Rather, by temporarily reorganizing sense-making, they allow rigid narratives to become more flexible. As self-world boundaries loosen, aliveness becomes perceptually vivid, or interdependence is affectively apprehended, experiences are often articulated through relational metaphors, ecological imagery, cosmological themes, or mythic compositions. In this sense, psychedelic experiences can be described as mythogenic: they facilitate the emergence of new stories. These shifts resonate with what contemporary scholars describe as

“new animism,” understood as a relational ontology that recognizes agency and responsiveness within more-than-human life rather than spirits inhabiting material objects (Harvey, 2005). Crucially, this orientation frames animism not as an abstract metaphysical doctrine, but as a somatic mode of being—a direct way of coming back to our human senses (Abram, 1996). It represents a live, ongoing reciprocity enacted between the sensate body and the sensuous beings encountered in the field, anchored in the simple intuition that everything is alive (Abram, 1996). From this perspective, animistic motifs commonly reported in psychedelic experiences—such as perceiving plants, objects, or landscapes as communicative or alive—can be interpreted as phenomenological expressions of enhanced meaning-making capacities grounded in ecological attunement.

This interpretive frame also resonates with developments in anthropology sometimes described as the “ontological turn,” which examines how different worlds organize relations among humans, nonhumans, and environments. Rather than treating one metaphysical or ontological model as a universal template, the ontological turn emphasizes the plurality of ways beings and relationships are configured. Animistic or relational motifs in psychedelic experiences can therefore be understood not as regressions or symbolic projections but as phenomenological encounters that unsettle habitual ontological assumptions and render alternative ontological possibilities perceptible (Descola, 2013; Viveiros de Castro, 1998).

The ontological turn intersects with what ecopsychologist Plotkin (2008) calls “eco-awakening,” which is a developmental reorientation in which identity expands beyond the bounded ego and becomes experientially rooted in ecological embeddedness, revealing what depth ecologist Naess (1987) terms the “ecological self.” As Roszak and colleagues (1995, p. 203) describe, this self “experiences a permeability and fluidity of boundaries [that] manifests as empathy and identity with family, friend, lover, community, humanity, and

similarly, with the whole of the nonhuman world.” Eco-awakening similarly describes the process of narrative and existential reorientation towards the ecological self—an attunement to reciprocity, participation, and responsibility within the larger community of life. The narrative and identity transformations observed in psychedelic experiences and integration processes often resemble this developmental pattern: individuals report a felt sense of belonging, kinship with the more-than-human world, and an ethical orientation grounded in interdependence. While eco-awakening and the ecological self are not only or always caused by psychedelics *per se*, psychedelic experience can catalyze or accelerate such shifts by rendering ecological relations experientially salient and narratively available.

From this standpoint, the relationship between psychedelics and myth is best understood in terms of narrative ecology. Psychedelics modulate the cognitive processes through which individuals participate in collective meaning-making and the stories that orient human life. Anthropologists have long noted that ritual, symbol, and myth articulate relations among humans, nonhumans, the planet, and the cosmos (Eliade, 2004; Turner, 1972). In contemporary industrial, consumer-based cultures, however, such relational meaning-making frameworks have weakened, exacerbating the meaning crisis (Vervaeke, 2019). Psychedelic experiences are impactful and meaningful precisely because they disrupt dominant narratives and ontologies, thereby exposing the inadequacy of prevailing cosmologies to situate humanity within larger complex systems (Argyri et al., 2025).

While psychedelics might play a role in collective meaning-making and cultural narrative repair, Kimmerer offers an important clarification: the task is not to appropriate traditional relational cosmologies as substitutes for depleted ones, but to learn from their relational orientation while cultivating new, place-based stories adequate to contemporary conditions. As she writes, Indigenous stories may function as “a precious seeing instrument,

or lens, with which to view our sacred relationships,” offering “a corrective lens,” yet “an immigrant culture must write its own new stories of relationship to place, but tempered by the wisdom of those who were old on this land long before we came” (Kimmerer, 2013, p. 344). Her insight reinforces that psychedelic experiences may make space for a necessary cultural narrative repair via renewed meaning-making. However, the stories that emerge must remain grounded in ecological processes, cultural humility, and situated ethical obligations.

From the perspective of ecological medicine, this narrative dimension is significant. Healing, in relational terms, involves restoring meaningful and harmonious participation within ecological and social systems (Makhinson et al., 2025; Prescott & Logan, 2019). Psychedelic experiences that illuminate interdependence may therefore contribute to forms of narrative repair that support ecological responsibility and belonging, offering imaginative resources for reconnecting personal meaning with ecological and social context. Yet, caution remains essential: psychedelic experiences can also generate idiosyncratic, grandiose, or relationally ungrounded beliefs and narratives (Dupuis, 2021; Hartogsohn, 2020). Responsible and ethical approaches to psychedelic practice and integration must therefore help individuals distinguish between relational insight and personally elaborated content.

In this light, the psychedelic renaissance coincides with broader cultural efforts to articulate new relational worldviews (Abram, 1996; Kimmerer, 2013; Macy & Brown, 2014; Tsing, 2015). Psychedelics may support these shifts not by providing pre-made mythologies or cosmologies, but by reorganizing sense-making in ways that render relational and ecological patterns perceptually and affectively salient. When joined with ecological literacy, ethical grounding, and critical reflection, such experiences can contribute to renewed forms of meaning-making and cultural narrative aligned with ecological understandings of health.

5.4 - Ecological Ethics & Psychedelic Practice

The transformative potentials of psychedelics must be approached with ethical restraint. Psychedelic experiences have mythogenic capacities: they can loosen entrenched cognitive patterns, engender new meanings, and generate narrative orientations that often feel revelatory and relational. This generativity is not ethically neutral. Societies and institutions must therefore be judicious about the kinds of meaning they cultivate, amplify, or normalize through professionalized psychedelic practice. Experiences of mystical unity, animacy, or interdependence—while phenomenologically, therapeutically and ecologically significant—do not on their own constitute evidence of planetary consciousness, intrinsic intentionality, or teleological design. The relational frameworks developed in this paper offer non-metaphysical interpretations of these experiences; inflating them into ontological claims risks conceptual overreach within the explanatory commitments this framework adopts.

A further consideration concerns the socio-institutional context in which psychedelic practices are being professionalized. The emerging psychedelic industry risks reproducing the same market-driven, individualizing, and extractive logics that contribute to psychological and ecological distress in the first place. Clinical models rooted in biomedical and commercial imperatives tend to construe distress as a personal and intrapsychic pathology while prioritizing standardized, scalable, and revenue-generating treatment protocols. These frameworks can marginalize or suppress relational and ecological dimensions of psychedelic experience by narrowing therapeutic aims to individualized symptom reduction, clinical efficiency, and outcome metrics defined by investor, regulatory, or commercial priorities. If psychedelic experiences frequently reorganize sense-making toward relational, systemic, or ecological orientations, then institutional models that confine healing to the isolated individual mind risk distorting or commodifying these insights. Ethical practice therefore

requires careful scrutiny of how institutional structures, reimbursement systems, intellectual property regimes, and commercial incentives shape what forms of insight are recognized, validated, or excluded within contemporary psychedelic medicine and practice (Devenot et al., 2022; George et al., 2019; Hauskeller, 2022; Noorani, 2019; Yoo & Sakopoulos, 2024).

A related concern involves the epistemic frameworks through which ecological interpretations of psychedelics are constructed and institutionalized. As Banerjee and Arjaliès (2021, p. 13) caution, “Anthropocene and Gaia theories will not help solve the ecological crisis unless we uncover and address the colonial basis of knowledge production.” Without examining how colonial epistemologies have historically marginalized Indigenous ecological knowledge and relational worldviews, ecological framings of psychedelic insight may simply be absorbed in ways that reproduce the very disconnection they seek to remediate. As Redvers and colleagues (2022) caution, Indigenous knowledge systems are highly contextual and cannot simply be merged with clinical or scientific systems without risking the erasure of their specific cosmological and legal foundations. Accordingly, the evaluation of these frameworks requires an explicitly decolonial critique—one that interrogates whether Western systems-level theories are inadvertently extracting relational concepts while ignoring the asymmetrical power dynamics of contemporary clinical institutions. Ethical engagement therefore requires attentiveness not only to commercialization and institutional adoption, but also to the epistemic conditions that determine which forms of knowledge are legitimised, which are excluded, and how the relational or ecological aspects of psychedelic experience are interpreted within dominant scientific and clinical paradigms.

A further implication is ecological responsibility. As Capra (1996, p. 11) observes, “when this deep ecological perception becomes part of our daily awareness, a radically new system of ethics emerges.” Psychedelic experiences may indeed inspire personal lifestyle

changes—more time with nature, reduced consumption, or more sustainable habits—but ecological responsibility cannot be conflated with individual behaviour alone. Ecological attunement does not automatically yield ecological ethics; the transition requires recognition of the structural forces driving ecological degradation, including extractive economic models, settler-colonial land relations, environmental injustice, and the uneven distribution of ecological burdens. Scholars of environmental justice emphasize that these impacts fall disproportionately on marginalized and Indigenous communities (Whyte, 2018). Any relational or ecological framing of psychedelic practice must therefore integrate both dimensions: personal changes arising from ecological attunement, and the broader socio-political conditions that enable or constrain ecological flourishing. Without this dual recognition, ecological attunement risks becoming individualized sentiment rather than contributing to any collective transformations required for planetary health.

Contextual and ceremonial structures also play an important role in shaping how relational meaning is made. Ritual or nature-based settings may help situate psychedelic experiences within broader ecological or communal frames, amplifying their relational significance, while overly clinical or individualistic contexts may do the opposite. Regardless of setting, the varied psychedelic practices that will emerge must be approached with caution. Indigenous ceremonial systems are diverse, historically dynamic, and embedded in specific cosmologies, kinship systems, and territorial relations. Adapting elements of these traditions into contemporary practice without attention to sovereignty, cultural meaning, or political context risks appropriation, decontextualization, and harm (George et al., 2019; Labate & Cavnar, 2014; Tupper, 2009; Whyte, 2018). Ethical integration requires humility, respect for cultural specificity, and recognition that relational practices cannot be detached from the histories and worlds from which they evolved and in which they remain embedded.

Finally, while psychedelic experiences may reveal interdependence experientially, influence meaning-making, and transform identity, sustained ecological attunement depends on social, cultural, economic, and political conditions that enable reciprocal relations with the more-than-human world. Ethical psychedelic practice must therefore be situated within broader social and cultural commitments to ecological ethics, environmental justice, community resilience, and policies oriented toward what ecological medicine describes as planetary health: the sustainable flourishing of human and nonhuman life. Psychedelics, in this frame, are not sole solutions to the planetary health crisis but potential catalysts—one occasion among many—for reorienting perception, value, and behaviour toward more reciprocal and regenerative ways of being.

6.0 - Discussion

The ecological interpretation of psychedelics developed in this thesis conceptualizes ecological attunement as a reorganization of sense-making arising through altered organism-environment coupling and enhanced semiotic sensitivity, mediated in part by but not reducible to the neurobiological effects of psychedelic compounds. In this account, psychedelic experiences may temporarily relax habitual cognitive constraints, allowing relational patterns within ecological systems to become experientially salient. On this basis, the proposed framework suggests multiple avenues for theoretical elaboration. Moreover, if psychedelic experiences render relational and ecological dynamics perceptually and affectively vivid, future scholarship must extend beyond clinical efficacy to examine the ecological, evolutionary, and cultural contexts in which these experiences unfold.

6.1 - Theoretical Elaborations

Three areas invite further theoretical elaboration. First, *cognitive symbiosis* reframes the relationship between humans and psychedelic-producing organisms in terms of interspecies and ecological processes. Second, *ecological cognition* extends this analysis by situating sense-making within broader ecological networks. Third, the framework raises implications concerning the cultural regulation of self-world relations, particularly the contemporary absence of shared rituals for relational attunement and re-embedding. These elaborations are intentionally exploratory rather than established scientific constructs; they function as heuristic extensions compatible with non-teleological, systems-based accounts of psychedelic experience.

6.1.1 - Cognitive Symbiosis & Ecological Cognition

First, cognitive symbiosis reframes the human and psychedelic-organism relationship as potentially mutualistic without implying intentional co-evolution or design. Psychedelic compounds almost certainly evolved for ecological functions unrelated to humans (Wink, 2003). Yet, once humans began ingesting them, new feedback dynamics emerged: humans cultivate, protect, and disperse peyote, psilocybin mushrooms, ayahuasca vines, and other psychedelic-producing species—sometimes extending their ranges or maintaining them under ecological pressures. These organisms, in turn, modulate human cognition in ways empirically associated with psychological flexibility, emotional openness, wellbeing, creativity, empathy, and nature-relatedness (Dolder et al., 2016; Griffiths et al., 2017; Harman et al., 1966; Kettner et al., 2019; Kuypers et al., 2016; Rodriguez Arce & Winkelman, 2021).

Serotonergic psychedelics may temporarily modify the cognitive constraints of the structural coupling through which meaningful worlds are enacted, loosening habitual patterns of cognition that ordinarily stabilize an ego-centered organization of perception and experience. Structural coupling refers to the recursive process through which recurrent

organism-environment interactions induce lasting modifications in an organism's structure and behaviour. As Capra (1996, p. 219) notes, "a structurally coupled system is a learning system," as environmental interactions shape future patterns of perception, affect, and action. Psychedelics may therefore be understood as perturbing and temporarily amplifying adaptive dynamics. Drawing on Margulis's (2001) concept of symbiogenesis—evolutionary novelty arising from cooperative interactions without deliberate coordination—cognitive symbiosis helps illustrate how human cognition participates in interspecies chemical relationships that can yield mutually adaptive effects while maintaining strict non-teleology. As Capra (1996, p. 232) emphasizes, although there is "no evidence of any plan, goal, or purpose in the global evolutionary process," there remain "recognizable patterns of development."

A second theoretical horizon, ecological cognition, examines information-processing not as a property of individual organisms but as an emergent feature of ecosystems themselves. Ecosystems can be described as complex adaptive systems that exhibit distributed regulation, feedback, and semiotic exchange—not as conscious agents but as cybernetic networks (Capra, 1996). Bateson's (1972, p. 460) claim that mind "is immanent in the biological system—in the ecosystem" captures this systemic orientation: cognition emerges through multi-scalar relational processes that include but also extend beyond neural or even organismic structures. Psychedelic-induced relational attunement may resonate with these dynamics by heightening sensitivity to feedback, patterning, and distributed coordination across ecological networks—rendering visible relational structures that ordinarily remain backgrounded by habitual ego-structured perception.

Verifying concepts such as cognitive symbiosis or ecological cognition poses methodological challenges. These constructs describe emergent, multi-scalar dynamics that cannot be directly observed but must be inferred through convergent

evidence—phenomenological, ecological, neurobiological, behavioural, and cultural. Their value lies not in empirical finality but in their heuristic power: they highlight the ecological conditions under which psychedelic experiences and shifts in cognition become possible.

6.1.2 - Cognitive Imbalance & Ritual Absence

A further implication of the present framework concerns the cultural regulation of self-world relations. Across many societies, anthropological research suggests that ritually structured practices—including rites of passage, vision quests, ceremonial intoxication, fasting, and prolonged immersion in wilderness contexts—have functioned to periodically loosen ego-centred identity and reorient individuals toward wider relational orders (Eliade, 2004; Schultes et al., 2001; Turner, 1972). From a systems perspective, such practices may be understood as culturally sanctioned mechanisms for cognitive and relational recalibration.

From a complementary cognitive-cultural perspective, McGilchrist's (2019) analysis of hemispheric asymmetry offers a useful lens for contextualizing the diminished role of such recalibrating practices in modern societies. McGilchrist argues that human cognition depends on the dynamic balance between distinct modes of cognition: one oriented toward abstraction, control, and manipulation, and another oriented toward contextual awareness, relational meaning, and lived experience. While both are necessary, industrial-growth and consumer-based culture has increasingly privileged the former, fostering modes of cognition that fragment wholes, decontextualize experience, and obscure relational embeddedness.

Without treating hemispheric dynamics as necessary causes, this analysis helps contextualize how contemporary societies are structurally biased toward ego-centred, instrumental modes of cognition. The erosion of ritual, ceremony, and sustained ecological immersion may therefore reflect not only cultural change but a broader cognitive imbalance that privileges abstraction, control, and individuation while marginalizing relational,

ecologically attuned sense-making. Psychedelic experiences may temporarily loosen these dominant constraints, allowing more contextual, embodied, and relational modes of cognition—encompassing perception, affect, and behaviour—to re-emerge.

From this standpoint, the described framework invites cautious reflection on whether contemporary industrial-growth, consumer-based societies—often characterized by persistent individualism, anthropocentrism, instrumentality, and abstraction—lack comparably integrated mechanisms for ego-loosening, reanimation of aliveness, and relational re-embedding. This absence need not be treated as a deficiency unique to the contemporary planetary condition, but it may contribute to the persistence of ego-centred psychological and cultural patterns associated with multiple dimensions of the planetary crisis. Specifically, the political stigmatization and cultural marginalization of these practices may result in a structural, epistemic and ontological bias towards diminished relational attunement and the consolidation of rigid, ego-centric perceptual boundaries, weakening the capacity for this specific type of participatory sense-making with the more-than-human world.

Within this context, psychedelic experiences that evoke boundary dissolution, heightened animacy, and ecological embeddedness can be understood not as panaceas to the planetary health crisis, but as revealing—often in fragmented, privatized, and weakly integrated forms—the kinds cognitive recalibrations that many societies have historically maintained through collective, ritualized, and ecologically grounded psychedelic practices.

6.2 - Future Research

A first priority for related future research concerns the role of environmental context. Preliminary findings indicate that psychedelic experiences occurring in natural settings may intensify relational and ecological themes (Gandy et al., 2020; Irvine et al., 2023), yet

controlled comparisons with clinical or indoor environments remain limited. Future studies should examine how environmental complexity, multisensory features, and aesthetic qualities shape phenomenology, sense-making, and therapeutic outcomes. Insights from environmental psychology, which documents restorative and regulatory effects of natural settings (Hartig et al., 2014; Li, 2022; Park et al., 2009), provide a promising foundation for such inquiry.

An extension of this direction would be a comparison of psychedelic experiences administered in nature-based environments and those occurring in conventional clinical settings. Future studies should employ active control conditions involving non-psychedelic ecological immersion, such as forest bathing, to isolate the specific contribution of psychedelics to nature-relatedness and distinguish these effects from the well-documented benefits of nature exposure alone (Li, 2022). Within the proposed framework, such designs would test the hypothesis that psychedelic-induced increases in neural entropy and relaxed predictive constraints reorganize organism-environment coupling and semiotic sensitivity in ways that are differentially shaped by ecological context. The proposed framework would predict that by embedding participants within richer ecological and semiotic fields, nature-based settings would amplify shifts toward ecological attunement relative to indoor or clinical settings. Such studies could examine how differences in organism-environment coupling shape phenomenology, sense-making, and longer-term outcomes. Quantitative measures of nature-relatedness, ecological identity, and psychological symptoms could be combined with qualitative analyses of mystical-type experiences, perceived animacy, and narratives of interdependence.

Community-based and naturalistic research designs may offer a complementary pathway for investigating these questions. Prospective self-report methodologies that combine pre and post-experience measures of wellbeing, nature-relatedness, and spiritual

orientation—implemented within nature-based ceremonial or collective contexts—could help operationalize this framework's emphasis on organism-environment coupling and participatory sense-making. Such approaches treat context, environment, and relational dynamics as integral components of psychedelic experience rather than as background variables. Research in naturalistic group settings suggests that acute subjective effects of psychedelics can predict longitudinal improvements in trauma symptoms, shame, and connectedness, supporting the feasibility of community-based contexts as sites of both healing and research (Healy, 2025). Longitudinal community-based surveys and other naturalistic designs may thus provide an important methodological bridge between controlled clinical trials and the relational, ecological, and cultural dimensions of psychedelic experience emphasized in this framework.

A related area of potential investigation concerns durability and integration. Current empirical literature relies heavily on short-term follow-ups, leaving unclear whether increases in nature-relatedness, ecological concern, or relational attunement persist, consolidate, or attenuate over time. Longitudinal mixed-method studies such as those embedded within contemplative, ecological, or community-based practices could clarify how relational insights are integrated or lost as individuals re-enter disconnected sociocultural environments.

Finally, cross-cultural research remains essential for clarifying how ecological perspectives shape the interpretation and integration of psychedelic experiences. Such work must proceed under Indigenous governance, with explicit ethical safeguards. Many Indigenous traditions situate psychedelics within ecological kinship systems, reciprocity, and relational cosmologies rather than individualistic therapeutic frameworks (Schultes et al., 2001). Examining how differing ontological and epistemological orientations influence meaning-making and integration may enrich contemporary understandings of relational and

ecological attunement. However, such inquiry must remain critically reflexive, avoid epistemic extraction, and respect Indigenous sovereignty, authority, and self-determination in both research design and knowledge dissemination (George et al., 2019; Wilson, 2008).

6.3 - Limitations & Risks

While the proposed framework offers a coherent theoretical synthesis, it is subject to several limitations. First, the empirical evidence linking psychedelic use with increased nature-relatedness remains largely correlational and reliant on self-report measures. Second, the synthesis presented here is necessarily selective; it draws on specific, compatible strands of systems theory, enactivism and biosemiotics while setting aside other interpretations within those fields. Finally, there are ethical risks in framing psychedelics as catalysts for ecological attunement. Such narratives can lead to the romanticization of substance use or “spiritual bypassing,” where individual experiences of connection are substituted for structural political and social engagement. Furthermore, without the careful integration of Indigenous perspectives, ecological frameworks run the risk of appropriating relational ontologies while ignoring the colonial histories that shaped the current planetary health crisis.

Consequently, the utility of the Psygaia framework rests on an ethics of non-closure. It must not be leveraged by Western clinical structures to claim a scientific monopoly on “truth” over spiritual or animate phenomena. True decolonial alignment requires that systems-based clinical models remain answerable to, rather than extractive of, the living lineages and territories from which these molecules emerge.

7.0 - Conclusion

If contemporary planetary instability reflects a breakdown of ecological attunement, then understanding how psychedelic experiences reorganize sense-making in ways that foreground relationality and interdependence becomes increasingly relevant. Psychedelics do not resolve the structural drivers of the planetary crisis, yet they may illuminate cognitive and cultural conditions under which ecological responsibility becomes meaningful—conditions that policy and technological interventions alone struggle to cultivate.

Contemporary psychedelic discourse often frames these possibilities in grand terms, suggesting that psychedelics might “save the world” or catalyze a “planetary awakening.” Such claims are frequently inflated or unsupported. Yet the intuition behind them—that ego-centric and individualistic modes of participating in the world contribute to collective harm—is not unfounded. To the extent that psychedelic experiences temporarily loosen habitual egoic constraints and foreground relationality, they resonate with this recognition. Properly contextualized, these experiences can be understood as moments of remembering one’s embeddedness within a larger field of relations—an experiential insight that aligns with Harvey’s claim that “every event is an ecological action in the same way that every act is fully, inescapably relational” (2005, p. 179), echoing longstanding traditions in which health and meaning arise through balanced participation in larger orders. In this sense, psychedelic experiences may briefly mend a historical rupture—the separation of mind from matter and spirit from nature—without abolishing science or reinstating literal cosmologies. They momentarily restore a mode of participation in which value and vitality are again encountered as intrinsic to the living world.

The phenomenology of psychedelic experience reinforces this interpretation. Many individuals report not only insights into interdependence but encounters with a world that feels responsive, animate, or communicative. Integratively, such experiences can be

interpreted through enhanced semiotic sensitivity, relaxed top-down neural constraints, and a reorganization of organism-environment coupling and participatory sense-making. Phenomenologically, however, they echo an intuition shared across cultures: that humans live within an animate world dense with meaning. Kimmerer's (2013) account of the living world as a community of reciprocal relations, and Latour's (2017) Gaia as a dynamic, responsive Earth system, offer complementary articulations of this insight. Across these perspectives, meaning does not reside solely within an exceptional human mind but arises through ongoing relational participation in complex living systems.

Ecological philosophers increasingly call for a rethinking of humanity's place within an animate Earth, challenging the assumptions that have shaped industrial society's disconnection from nature. Albrecht's (2016) *Symbiocene*—a post-Anthropocene epoch grounded in mutualistic flourishing—signals growing recognition that ecological crises require more than technical solutions; they demand shifts in perception, narrative, and ethical orientation. Hofmann anticipated this transformation when he wrote that humanity must move “from the materialistic, dualistic belief that people and their environment are separate, toward a new consciousness... in which people feel their oneness with animate nature and all of creation” (1980, p. xii). Contemporary ecological thought similarly emphasizes that perceptual and affective transformation forms the basis of ecological responsibility (West et al., 2024). While psychedelics alone cannot bring forth such futures, they may help cultivate the modes of cognition and subsequent relational sensibilities required for them to become conceivable and actionable, particularly when embedded within ecologically grounded practices and relational ethics.

Naturally occurring psychedelics are chemical expressions of plants, fungi, and other organisms shaped by evolutionary and ecological processes, whose effects arise through

relational encounters between human physiology and the wider biosphere within the broader cosmos from which life emerged. Psychedelic experiences often evoke humility: the recognition that human life unfolds within ecological and cosmological processes vastly more complex than human control or comprehension. Within the proposed framework, the spiritual or mystical qualities of these experiences need not remain conceptually isolated from Western science, but can be productively mapped as expressions of reorganized structural coupling, shifts in embodied sense-making, and enhanced semiotic sensitivity. Under psychedelics, ecological relations may become perceptually vivid, affectively salient, and ethically charged because these compounds modulate the processes through which organisms enact a meaningful world. The “unity” apprehended in mystical experience can thus be understood as an enacted intuition of systemic embeddedness—a remembering of belonging to nature as an interconnected and self-organizing whole long regarded as sacred across cultures (Capra & Luisi, 2014; Harvey, 2005; Kimmerer, 2013; Miller, 1998; Redvers et al., 2022).

By temporarily loosening anthropocentric and ego-centered modes of perception, psychedelics may reveal not new doctrines but a long forgotten relational embeddedness and the reciprocal responsibilities that follow from it. The enduring task, however, lies beyond the experience itself. Psychedelics may help attune cognition toward ecological and relational dimensions of life—to ecosystems, communities, and the more-than-human, including the plants and fungi from which these molecules emerge—but such attunement must be sustained through practice, culture, and ethical commitment. The challenge that follows is therefore collective, multigenerational, and relational: translating transient insights into durable forms of responsibility and care. In this sense, psychedelic experiences may contribute not only to personal healing, but to planetary health—the long-term flourishing of human and nonhuman life as inseparable from the integrity of the ecological systems upon which all depend.

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